USE AND ECONOMIC IMPORTANCE OF THE WEST BRANCH OF THE FARMINGTON RIVER

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National Park Service

BRINGING RIVERS TO LIFE

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EXECUTIVE SUMMARY

This report presents the results of a comprehensive study of the recreation users, use and economic benefits, economic impact on towns, and effects on nearby property values of the 14-mile Wild and Scenic segment of the West Branch of the Farmington River in west central Connecticut. The study was conducted in 2001 and 2002 and was a cooperative effort involving North Carolina State University, American Rivers, the National Park Service, the Farmington River Watershed Association and the Farmington River Coordinating Committee.

Four hundred and eighty-three users were interviewed at the West Branch with 51% of them returning follow up mail questionnaires. Users tended to be well-educated, middle-aged males on day trips who had traveled 30 miles or less to get to the river. Fishing, tubing and boating were the three most common activities, in that order. Forty percent of users were either on their first trip to the Farmington River or had first visited five years ago or less, but over a quarter had made their first trip more than 25 years ago. Seventeen percent used the services of a commercial outfitter during their visit. Nature-oriented motives were the most important reasons people visited. On average, levels of satisfaction were quite high and levels of problems were low. Problems, although minor for most visitors, included crowding, too few rangers/management staff on the river, and conflicts with other users. Parts of the Housatonic and Salmon Rivers appeared to be the closest substitutes for the West Branch, but many users apparently felt there to be no substitutes for the segment and what they did there. Over half of all users were unaware that the West Branch was designated wild and scenic. After a brief description of designation and its intended protections, most felt wild and scenic river designation was important for the river. Likewise, most felt the current "partnership model" was appropriate and effective for the Farmington.

The West Branch is estimated to receive 77,400 recreation visitors annually. Sixty percent of the visits are for fishing, 30% for tubing, and 8% for boating. Recreational river use generates an estimated annual economic impact of $3.63 million for the five river towns. This is an estimate of direct as well as the indirect and induced effects from user expenditures on the local economies. This economic impact is quite large considering the small area under consideration, its relatively rural character, and the fact that only 10% of visits involved overnight stays. The total economic benefit (consumer surplus) to recreational users was estimated to be $9.45 million. This represents the total social value of the river segment to users over and above what it costs them to visit.

By examining users' actually current river demand and their intended trip demand under hypothetical conditions, we were able to infer changes in benefit values under different trip cost and river quality conditions. Analyses show that trip cost increases would affect average trip demand by only one trip per person per year. However, users would demand significantly fewer seasonal trips if either a natural or a man-made disaster were to impair the quality of the West Branch of the Farmington. Similarly, the current economic benefits to users would drop dramatically if river quality were impaired, while increased prices would have very little effect. Even the imposition of fees, for example, would not deter use or decrease benefits as significantly as a deterioration of the river's site quality. Our conclusion is that protecting and conserving the West Branch's natural, scenic, and recreational resources are the most critical

contributors to the recreation experiences of users. Therefore, conserving the quality of the river itself and river corridor resources should be the highest priority for river authorities.

Proximity to the Farmington River explains approximately 8% of the values of nearby residential land. Property owners demanding properties nearer the river placed a higher economic value on the river than those at distant locations. The river's effect on residential land values at a one-mile distance is $3.76 per foot and at a six-mile distance is $0.63 per foot.

Overall, the results of this study indicate that this segment of the West Branch is providing the kinds of settings and experiences intended by the Wild and Scenic Rivers Act of 1968. Based on the user responses and further study analyses, conserving and maintaining the quality of the river resources and natural environment along its shores are the most important things that river authorities can do to keep river benefits high.

ACKNOWLEDGMENTS

The authors would like to thank a number of key people and organizations for their crucial assistance in bringing this project to a successful completion. We would first like to thank project sponsors American Rivers and the National Park Service for their support, encouragement and hard work. In our experience American Rivers is just what their literature asserts, the nation's leading river conservation group, which has worked since 1973 to protect wild and scenic rivers, repair damaged rivers, and restore wildlife habitat. Particular recognition is due to Jack Hannon of American Rivers for his contribution as their project liaison.

Two outstanding programs of the National Park Service were instrumental in initiating and supporting this research – the Rivers, Trails and Conservation Assistance Program and the National Wild and Scenic Rivers Program. Beth Porter and John Haubert of the Park Service were superb partners representing these programs. This project would have never come about without them.

Kevin Case and Alex Persons of the Farmington River Watershed Association worked tirelessly making contacts for us and assisting with local support and gathering information that would otherwise have been extremely difficult for us to obtain. Thank you also to the Farmington River Coordinating Committee for their advice and particularly for their help in refining the survey instruments for the study. Special thanks are due to interviewers Pat Keener, Lisa Candels, and Dianne Hizon who talked to hundreds of river users on our schedule regardless of the weather. We know that is rewarding but demanding work.

Six North Carolina State University graduate students provided countless hours of questionnaire mailing, data entry, analysis and assistance with report preparation. They are Bill Avant, Shanna Davis, Debra Bradsher, Andrew Kerins, Shannon Peterson, and Erin Massarelli. Thank you for your dedication.

Finally, we wish to thank the hundreds of river users who generously shared their time and information to provide the basis for the analyses and results presented here. We hope you will agree that your time and efforts were well spent and benefited the river that you care so much about.

Thank you,

Roger Moore and Chris Siderelis

I. INTRODUCTION

Rivers and the recreation experiences associated with them are extremely important to the people of the United States. According to the National Survey on Recreation and the Environment, 29% of the US population 16 or older participated in boating/floating in 1994-95 and another 29% fished during the same period. This represents approximately 58 million people participating in each of these types of activities (Cordell et al., 1999, p. 222). More importantly, the future demand for river-related activities is predicted to increase nationwide. Forecasts indicate that the number of primary purpose canoeing trips will increase by 29% between 1995 and 2050. Raft/floating trips are expected to increase by 30% and fishing trips by 15% for the same period (Cordell et al., 1999, p. 329-334).

In order to meet present and future demand for conserved rivers in the nation, Congress passed the National Wild and Scenic Rivers Act in 1968. The act requires that rivers designated into the system must be free-flowing and must have at least one "outstandingly remarkable" resource value. Wild and scenic designation affords permanent protection from federally licensed or assisted projects that would adversely affect a river segment's special resources or free-flowing condition. The National Park Service (NPS) is responsible for implementing provisions of this act, including identifying rivers that meet the criteria for inclusion in the Wild and Scenic Rivers System. In addition, various NPS programs are responsible for providing comprehensive river planning, consultations and technical assistance to agencies and organizations involved in planning, developing, and managing rivers in the U.S. However, the protection of wild and scenic rivers depends largely on public support from communities near those rivers.

River advocates have long contended that free flowing and conserved rivers provide a wide variety of benefits to individuals, communities and society. A growing body of research is beginning to support and document this contention. Some of the potential benefits of conserved river corridors and river-related issues that are receiving increased research attention are recreation and tourism experiences, economic impacts, economic benefits, wildlife habitat, effects on adjacent property values, water quality, in-stream flow, and small dam removal (e.g., Porter et al., 2001). Assessing the magnitude and importance of these and other benefits is an important undertaking as public, private and nonprofit organizations at all levels develop policies and programs to effectively plan and manage river corridors and systems.

Any effective planning, management or development effort must be based on accurate and timely information. This is particularly true of rivers because of the many, often conflicting, uses and priorities such corridors face and the dynamic and rapidly changing environments in which they exist. Although various federal, state and local programs attempt to guide river conservation and use, there are still important pieces of information that are lacking if such programs are to meet their mandates. Some of the most poorly documented types of information are the various aspects of the economic importance of conserved river segments. This report documents the results of a comprehensive study undertaken to help address this need. It was conducted on the 14-mile wild and scenic segment of the West Branch of the Farmington River in Connecticut, and was a collaborative effort involving North Carolina State University, American Rivers, the National Park Service, the Farmington River Watershed Association and the Farmington River Coordinating Committee.

The research had four primary objectives:

1. Document the recreational use and characteristics of recreation users along the river segment.

2. Estimate the economic impacts of river recreation on communities along the river segment.

3. Estimate the economic benefits of the river segment to river recreation users.

4. Estimate the effects of the river segment on nearby property values.

The remainder of this report documents the results of the study designed to address these four objectives.

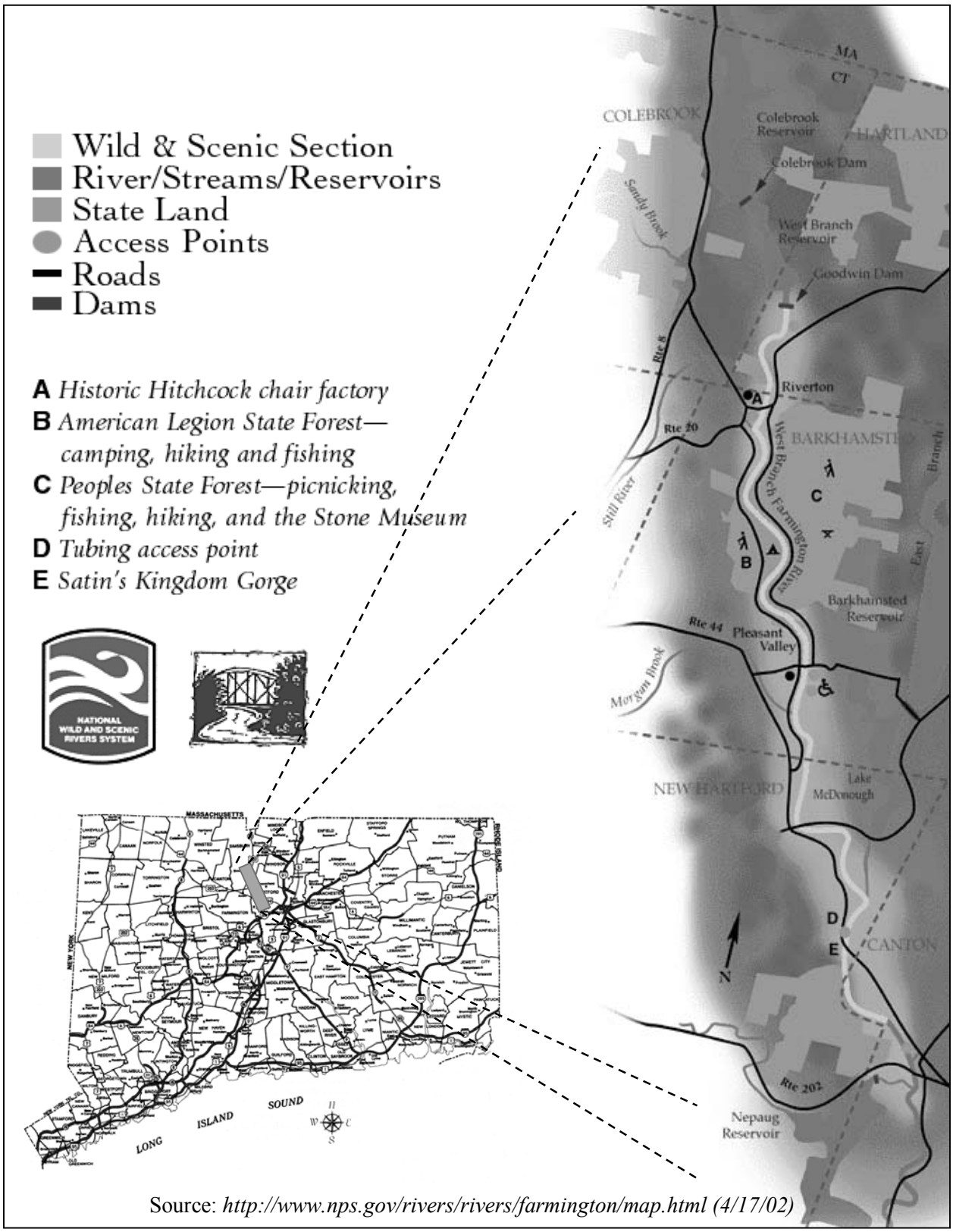
II. BACKGROUND

The West Branch of the Farmington River was added to the national Wild and Scenic River System in August 1994. This 14-mile river segment is located in western Connecticut. It flows through a mix of rolling wooded hills, farms and small communities that give the river a remarkably rural and undeveloped character in spite of its proximity to large urban centers. It is approximately a 30-minute drive west of Hartford and within a two hour's drive of Boston, New York City, Albany, and Springfield. The segment stretches from Colebrook Dam in the town of Hartland down river through the towns of Barkhamsted and New Hartford into Colebrook just below Satan's Kingdom State Recreation Area[1]. For those not familiar with New England, the above towns are broad jurisdictions and each town includes numerous communities. The wild and scenic river segment flows through the communities of Riverton, Pleasant Valley, and Canton. It, also, flows through several publicly managed parks and forests including American Legion State Forest, People's State Forest, and Satan's Kingdom State Recreation Area (see Figure 1).

An important feature of the wild and scenic river segment of the West Branch is the location of a very popular "Trout Management Area" (TMA) there. The TMA was established in 1988 by the CT Department of Environmental Conservation. This 3-mile TMA is located in the upper half of the segment and is stocked and managed by DEC under a year-round catch and release policy. Cold water from the dam upstream and favorable insect hatches help make the segment an excellent trout fishery. The West Branch of the Farmington was recently featured in *Fly Fisherman* magazine and described as follows, "With consistent hatches, cool flows in summer, and beautiful scenery, the Farmington River is one of the premier fisheries in the East, and it's getting even better" (Passante, 2001).

This wild and scenic river segment flows through a complex patchwork of private and publicly owned lands under numerous jurisdictions. It is considered a classic example of a "partnership river." Whereas, "public" wild and scenic rivers are managed by the managing agencies responsible for the lands through which they flow, partnership rivers are more directly affected by multiple stakeholders. Local communities, businesses, land managing agencies, private landowners, conservation groups, and various government bodies can and do become involved in river management through what is referred to as a "partnership model." The Farmington River partnership model is centered on the locally based Farmington River Coordinating Committee (FRCC), which monitors and guides activities that could affect the river. The FRCC relies primarily on local municipal zoning and coordination with existing groups. This advisory committee is made up of representatives of the five river front towns, the State of Connecticut, Metropolitan District Commission, Farmington River Watershed Association, the National Park Service and others.

[1] Because the wild and scenic river segment begins very close to the town of Colebrook, that town is also considered a "riverfront town" and is represented on the Farmington River Coordinating Committee. Colebrook was therefore included as one of the five river front towns in the study.



Source: *http://www.nps.gov/rivers/rivers/farmington/map.html (4/17/02)*

Figure 1. Map of the West Branch of the Farmington River

The FRCC uses an important river protection tool -- the "river protection overlay districts" in the four towns through which the segment actually flows. The districts are zoning overlays that include the river and 100-foot buffer zones on either side, and are in addition to any regulations already in place along the segment. The zoning overlays are designed to minimize development and disturbance within 100-feet of the river. They prohibit constructing new buildings, installing septic systems, and excavating and restrict vegetation cutting. Exceptions to the overlay restrictions can be approved by the town zoning commissions.

Two commercial outfitters operate within the river corridor, and use the wild and scenic river segment for some of their operations. Farmington River Tubing rents inner tubes and provides a shuttle service for its customers who float the lower 2.5 miles of the segment. They operate from Memorial Day through Labor Day out of Satan's Kingdom State Recreation Area at the downstream end of the segment. The other outfitter is Main Stream Canoes and Kayaks, which rents boats and provides guided trips on the upper portions of the segment. Main Steam's local base of operations is a river front property just upstream from Satan's Kingdom.

III. RESEARCH METHODS

This study required two separate and distinct collections of data and multiple types of analyses. The first collection of data involved recreation visitors to the river and the second related to the value of residential property located near the river. A description of the study area followed by the methods used in the visitor study is detailed here. The property value study methods will be addressed in a later section.

Sampling Recreation Users

River users were sampled and contacted on site by field personnel trained by the principal investigators. Sampling was conducted weekly from late April through late September 2001 following a predetermined systematic sampling schedule designed to represent all days of week and key daylight times. On sample days, study personnel traveled to each of the river access points and contacted each user encountered at those sites. Only users 18 years old and older were surveyed. Users were approached and introduced to the study using a short script and asked to participate. Those agreeing were either handed a clipboard with a one-page self-administered questionnaire, or were read the questions if that was more convenient for them[2]. The last question on the on-site questionnaire asked for the user's name, address, and permission for the investigators to send them an extensive mail questionnaire. The on-site contact took approximately two minutes. Those agreeing to receive a follow-up were sent a mail questionnaire within 10 days of their initial contact. Up to three mailings were employed with each respondent, as necessary, to maximize response rates. During the sample days, study personnel counted all river users they saw along the entire segment. This was possible because the majority of the segment is visible from nearby roads. User counts and information on their recreation behaviors from the questionnaires were used in estimating total recreational use of the segment.

The two survey instruments (on-site and mail back questionnaires) were designed by faculty from NC State University in collaboration with American Rivers, NPS and local river groups. The on-site questionnaire focused on users' characteristics and their trips. The mail back questionnaire gathered detailed information on each user's visit, experience, expenditures, attitudes about Farmington River resources and management, and the user's demographic characteristics. Copies of the two survey instruments are included in the appendices.

Five hundred and sixteen contacts were made along (or on) the river during the scheduled sample periods. Thirty-three or six percent of these were individuals who had been contacted by study interviewers at points earlier in the study, and were not included a second time making an on-site sample size of 483 eligible users. The majority (433 or 90%) of these agreed to participate in the on-site interview and provide their names, addresses and permission to be sent the follow-up mail questionnaire. Of the 433 agreeing to receive mail questionnaires, 247 (57%) returned completed ones. The 247 completed mail questionnaires represent a response rate of 51% of the

[2] Typically users who were either actively fishing at the time or boating by preferred to have the questions read to them. Tubers were all contacted at their river access point in Satan's Kingdom Recreation Area and generally used questionnaires on clipboards to record their own responses to the same questions.

eligible 483 users originally contacted on the river. Comparisons between the observed river recreation activities from on-site interviews and activities reported in the mail back questionnaires were quite similar assuring us that we were maintaining an overall representative sample of respondents to mail back questionnaires.

Data were entered, checked for errors and analyzed using the STATA and SPSS statistical packages. Descriptive statistics were used to summarize the findings regarding the characteristics of the survey respondents, and their river use, attitudes, experiences, and preferences. For each result, it is important to note whether that data were obtained from the on-site interviews or the mail questionnaires since these were separate data sets with different sample sizes and response rates. Results based on the on-site interviews have smaller sampling errors (due to the larger sample size) than those based on the mailed questionnaires. Various inferential statistics were used to help answer questions related to the study objectives.

The results of the user study are summarized first, beginning with a description of the characteristics of the river users themselves and their river visits. Findings related to the users' river experiences are presented next followed by a description of users' attitudes toward river resources and management. This is followed by the estimation of overall economic impacts of river recreation and the economic benefits of the West Branch of the Farmington River to users.

IV. RESULTS: USERS' CHARACTERISTICS, ATTITUDES, AND OPINIONS

In general, river users tended to be well-educated, middle-aged males with relatively high household incomes. Only 16% of river users were women (Figure 2). Fifty-five percent were college graduates (Table 1) and nearly a third were in their 40s. The overall mean age was 48 (Table 2). The most common occupation type was managerial or professional at 37%. Interestingly, the second most common occupation was retired at 20% (Table 3). Ninety-six percent of river users were white.

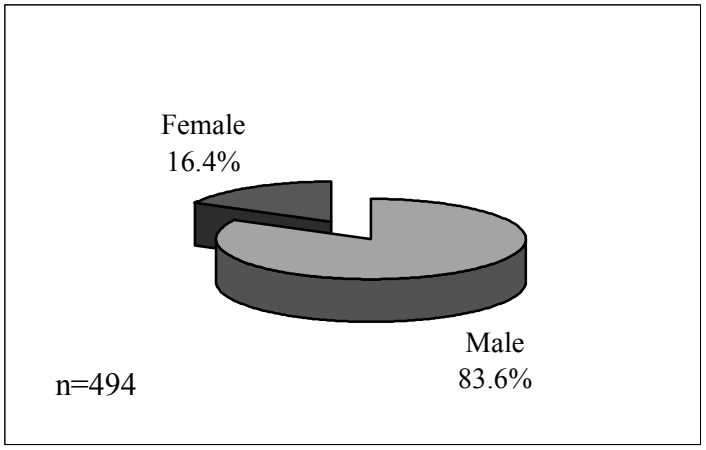


Figure 2. Respondent's Gender

Overall, annual household incomes were relatively high. Although a fifth of respondents had incomes below $40,000, over a quarter had household incomes of $100,000 per year or more. The most common incomes were between $40,000 and $59,999 (Table 4).

Table 1. Respondent's Highest Level of Education

Education Level	Frequency	Percent
8th grade or less	2	0.9%
Some high school	4	1.7
High school diploma or GED	32	13.7
Business or trade school	36	15.5
Some college	30	12.9
College graduate	59	25.3
Some graduate school	10	4.3
Master's degree	44	18.9
Doctoral or professional degree	16	6.9
Total	233	100.1%

Table 2. Respondent's Age

Income	Frequency	Percent
Under 20	2	0.8%
20-29	25	10.3
30-39	37	15.3
40-49	75	31.0
50-59	50	20.7
60-69	38	15.7
70 and over	15	6.2
Total	242	100.00%

Mean = 48, Median = 47, Standard Deviation = 14

Table 3. Respondent's Occupation

Occupation	Frequency	Percent
Managerial or professional specialty	85	36.6%
Retired	46	19.8
Technical, sales or administrative support	30	12.9
Service occupation	21	9.1
Precision production, craft or repair	15	6.5
Educator/Teacher	8	3.5
Operator, fabricator or laborer	7	3.0
Student	6	2.6
Farming, forestry or fishing	5	2.2
Homemaker	2	0.9
Business owner	2	0.9
Other	5	2.2
Total	232	100.2%

Table 4. Respondent's Household Income

Income	Frequency	Percent
Under $20,000	7	3.2%
$20,000-$39,999	39	17.6
$40,000-$59,999	50	22.5
$60,000-$79,999	36	16.2
$80,000-$99,999	29	13.1
$100,000-$119,999	19	8.6
$120,000-$139,999	14	6.3
$140,000-$159,999	8	3.6
$160,000-$179,999	3	1.3
$180,000-$199,999	4	1.8
$200,000 or more	13	5.8
Total	222	100.0%

The items in the following section all refer to the particular river visit the respondents were engaged in on the day they were contacted to participate in the study. More general attitudes and experiences are discussed later.

Most users had not traveled far to visit the river that day. In fact, 34% had traveled 20 miles or less one way to get there (Table 5). The median distance was 30 miles. Not surprisingly, the vast majority (85%) of Farmington River visitors were from Connecticut and another 8% were from Massachusetts. New York was the next most common state of origin. Another 4% of visitors came from other states including, Rhode Island, Wisconsin, Florida, Virginia, and one each from Maryland, North Carolina, New Hampshire, Washington, Colorado, Texas, New Jersey and Illinois (Figure 3).

Table 5. Miles Traveled to Farmington River

Miles	Frequency	Percent
0-10	77	15.9%
11-20	91	18.9
21-30	76	15.7
31-40	64	13.3
41-50	57	11.8
51-60	40	8.3
61-70	18	3.7
71-80	15	3.1
81-90	7	1.4
91-100	11	2.3
>100	27	5.6
Total	483	100.0%

Mean = 58.9 miles, Median = 30 miles, Standard Deviation = 190.5

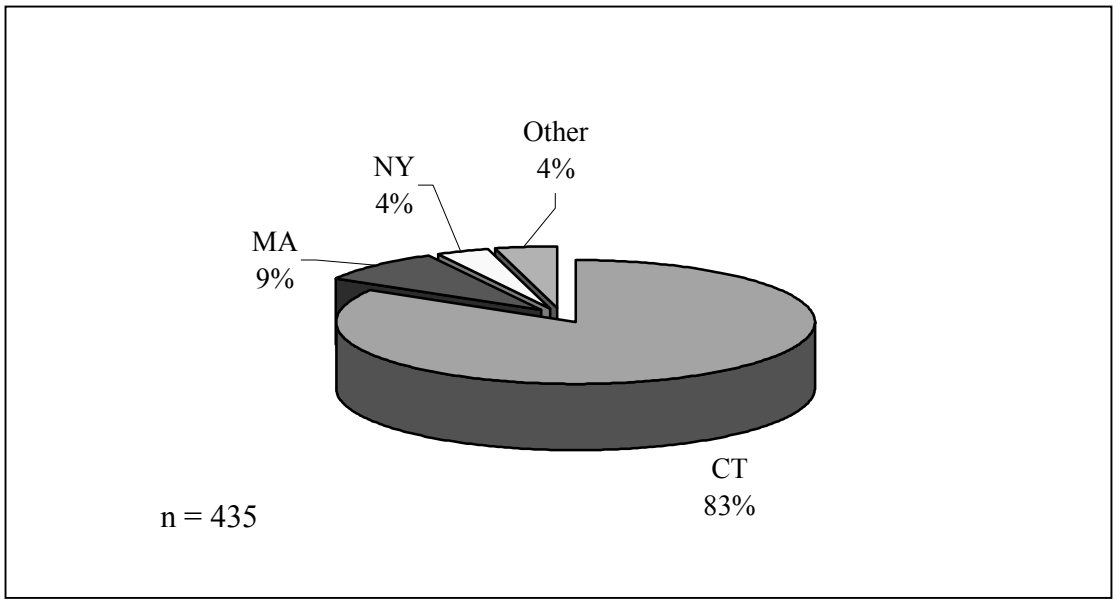


Figure 3. River User's State of Origin

The typical Farmington River visit was a day trip where the river was the primary destination. Nine out of 10 were on day trips rather than overnight visits (Figure 4) and the majority (95%) reported that the Farmington River was the primary destination of their trip rather than a side trip as part of a larger trip (Figure 5).

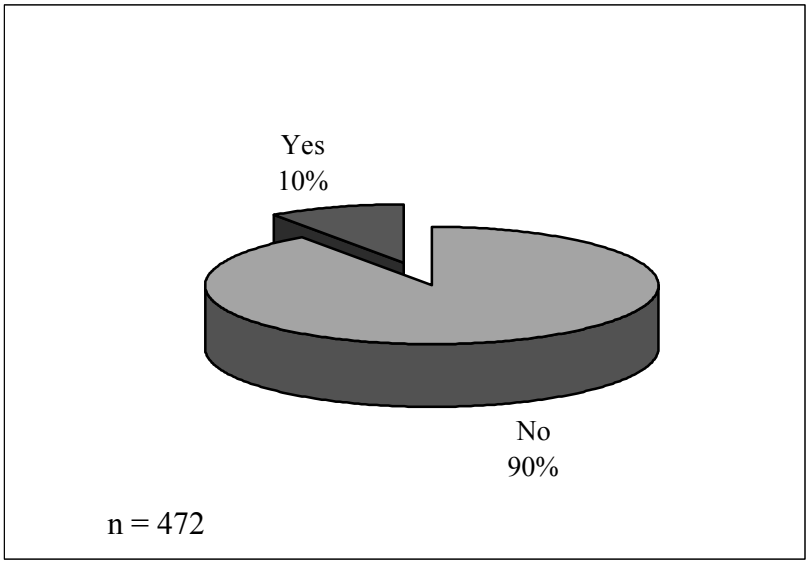


Figure 4. Was Visit Part of an Overnight Trip?

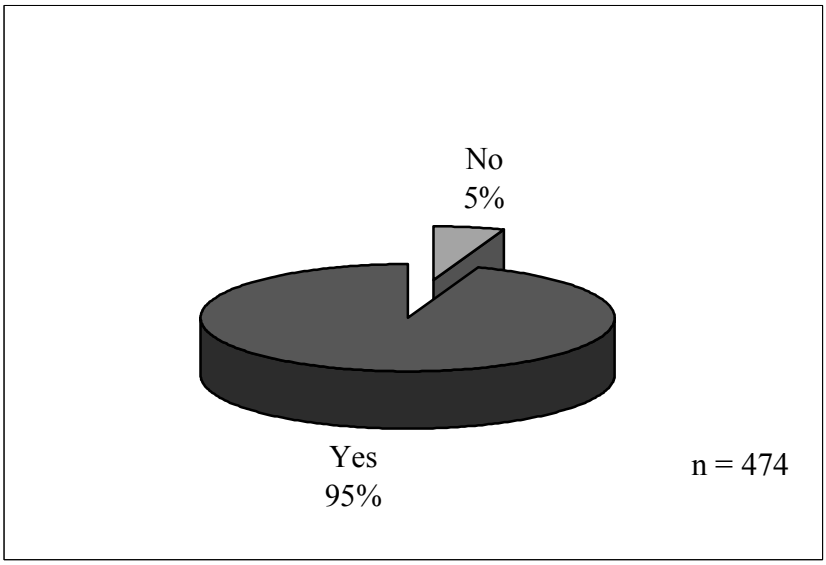


Figure 5. Was Farmington River the Primary Destination?

A number of visitors had begun visiting the West Branch only recently. In fact, 14% were on their very first visit to the river when they were contacted to take part in this study (Figure 6) and another 27% had visited the first time within the last 5 years (Table 6). However, a sizable segment has been associated with the river for many years. Over a quarter of those contacted made their first visit more than 25 years ago. On average, respondents made 26 trips to the river in the past 12 months and expected to take 30 trips in the next year (Table 7 and Table 8).

Almost 40% of river users were visiting by themselves. About a quarter were in groups made up of their friends and another quarter were in family groups (Table 9). Most visitors (58%) stayed at the river for 4 hours or less on that trip with the most common trips being between 2 and 3 hours (Table 10).

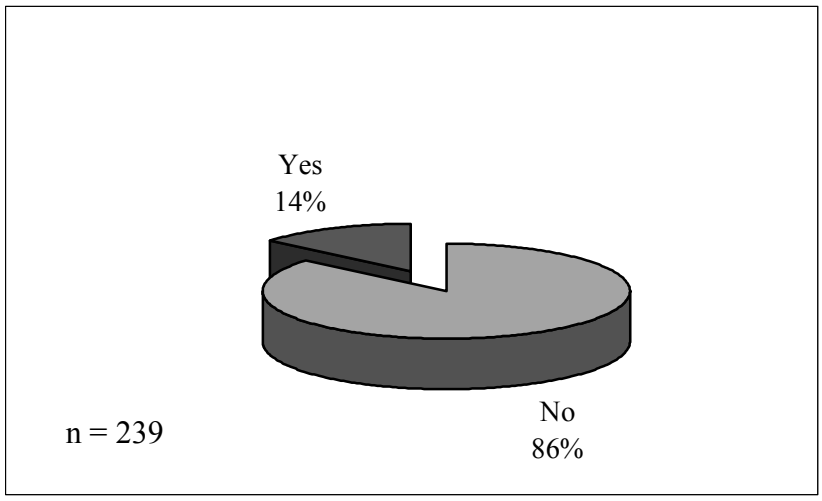


Figure 6. Was this Respondent's First Visit to the Farmington River?

Table 6. Number of Years Since Respondent's First Visit to the River

# Of Years	Frequency	Percent
1st Visit	34	15.4%
≤ 5 yrs	60	27.1
6-10 yrs	20	9.1
11-15 yrs	21	9.5
16-20 yrs	15	6.8
21-25 yrs	12	5.4
26-30 yrs	17	7.7
31-40 yrs	17	7.7
41-50 yrs	13	5.9
>50 yrs	12	5.4
Total	221	100.0%

Table 7. Farmington River Trips Taken in Past 12 Months

# Trips	Frequency	Percent
1	119	24.9%
2-5	114	23.8
6-10	54	11.3
11-20	53	11.1
21-50	80	16.7
51-100	30	6.3
>100	28	5.9
Total	478	100.0%

Mean = 26, Median = 6, Standard Deviation = 54

Table 8. Farmington River Trips Expected to Take in Next 12 Months

# Trips	Frequency	Percent
0	18	3.9%
1	60	13.0
2-5	106	23.0
6-10	59	12.8
11-20	63	13.7
21-50	97	21.1
51-100	27	5.9
>100	31	6.7
Total	461	100.1%

Mean = 30, Median = 10, Standard Deviation = 58

Table 9. Type of Group

Group Type	Frequency	Percent
Alone	94	39.2%
Friends	65	27.1
Family	57	23.7
Family & Friends	18	7.5
Organized Group	4	1.7
Guide with Clients	2	0.8
Total	240	100.0%

Table 10. Length of Respondent's Stay at the River

Time	Frequency	Percent
1 hour or less	5	2.0%
>1 hour through 2 hours	29	11.7
>2 hour through 3 hours	56	22.7
>3 hour through 4 hours	53	21.5
>4 hour through 5 hours	30	12.1
>5 hour through 6 hours	33	13.4
>6 hour through 7 hours	6	2.4
>7 hour through 8 hours	16	6.5
Longer than 8 hours	19	7.7
Total	247	100.0%

Mean = 4.7 hrs, Median = 4 hrs, Standard Deviation = 2.7 hrs

Fishing was by far the most common activity. When given the opportunity to note *all* the river-related activities respondents engaged in that day, 44% reported they had been fly fishing and 13% had been bait fishing (Table 11). When asked to identify their one *primary* activity, 76% said fishing. Tubing and boating were the second and third most common primary activities, respectively (Table 12). Most anglers were successful in catching fish with 90% catching at least some fish. The average catch was five fish for the visit (Table 13).

Table 11. Type of Activities Respondents Engaged in During their Visit

Activity Type	Frequency[3]	Percent
Fly Fishing	148	43.9%
Fishing with Bait	44	13.1
Wildlife Observation	42	12.5
Tubing	41	12.2
Fishing with Lures	27	8.0
Kayaking	12	3.5
Canoeing	11	3.3
Other	12	3.5
Total	337	100.0%

[3] Respondents could indicate more than one activity for their visit.

Table 12. Respondent's Primary Activity During their Visit to the Farmington River

Activity Type	Frequency	Percent
Fishing	179	76.2%
Tubing	34	14.5
Canoeing	9	3.8
Kayaking	9	3.8
Other	4	1.7
Total	235	100.0%

Table 13. Number of Fish Caught by Anglers

# of Fish	Frequency	Percent
0	18	10.5%
1-4	78	45.6
5-8	48	28.1
9 or more	27	15.8
Total	171	100.0%

Mean = 5, Median = 4, Standard Deviation = 6

The majority of users (83%) had visited the river without the services of a commercial outfitter. Of those who did rent equipment or hire a guide, renting an inner tube was the most common service followed by boat rentals and fishing guides (Figure 7).

Most respondents reported being fairly skilled and active in their river activities, as well. The average number of days they had participated in their activity during the past 12 months was 39 (Table 14). On a 7-point scale with seven indicating "expert," the average self-reported skill level was five (Table 15). Their activities were important to them, on average, with a mean importance rating of 5.7 on a 7-point scale where seven indicated "very important" (Table 16).

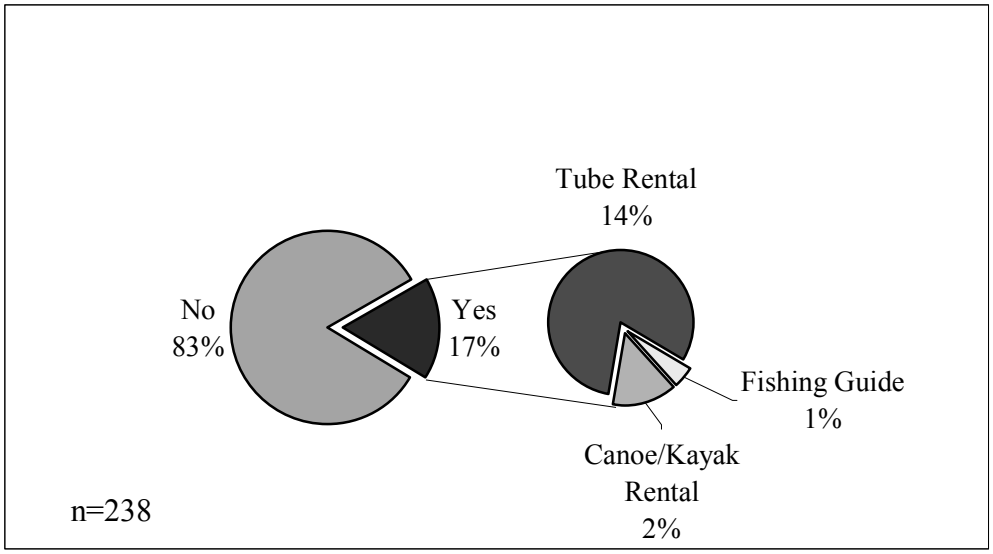


Figure 7. Did Respondent Use a Commercial Outfitter During their Visit?

Table 14. Number of Different Days Respondent Participated in Primary Activity During the Last Twelve Months

# Days	Frequency	Percent
1	34	13.9%
2-7	40	16.4
8-14	28	11.5
15-30	67	27.4
31-60	36	14.8
61-90	10	4.1
> 90	29	11.9
Total	244	100.0%

Mean = 39, Median = 15, Standard Deviation = 61

Table 15. Respondent's Self-reported Skill Level in their Primary Activity

Novice			Intermediate			Expert			
1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Mean	Standard Deviation	n
2.0	2.9	5.7	22.0	30.1	26.8	10.6	5.0	1.3	246

Table 16. Importance of Respondent's Primary Activity

Not at all important			Moderately Important			Very Important			
1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Mean	Standard Deviation	n
0.4	4.4	3.6	14.9	12.5	22.2	41.9	5.7	1.5	248

In order to better understand user trips to the Farmington River, respondents were asked what they would have done instead that day if the West Branch had not been available to them for some reason. Table 17 summarizes their responses. Over half of the respondents would have gone fishing at substitute sites. The next most common substitute was simply staying home, which was the choice of 10% of all respondents.

Table 17. Substitute Activity if Farmington River had not been Available that Day

Response	Frequency	Percent
Fishing	92	39.0%
Fly Fishing	27	11.4
Stay Home	24	10.2
Canoe/Kayak	14	5.9
Go to Another River	10	4.2
Beach	9	3.8
Swim	7	3.0
Go Somewhere Else	7	3.0
Golf	7	3.0
Home Improvements	6	2.5
Nothing	5	2.1
Bike	3	1.3
Work	3	1.3
Same/Similar Activity	3	1.3
Hike/Walk	3	1.3
Other	16	6.8
Total	236	100.1%

When asked *where* they would have gone instead, visitors gave a wide variety of substitute sites, some very specific and some general. The most common substitute for the West Branch appears to be the Housatonic River. Just over a quarter of the respondents would have gone there if the

Farmington had not been available for some reason. The Salmon River was another common substitute river listed by 10% of users. The other substitute areas are categorized in Table 18.

Table 18. Substitute Site if Farmington River had not been Available that Day

Substitute Place	Frequency	Percent
Housatonic River	50	25.5%
Salmon River	20	10.2
Another River	14	7.1
Connecticut Shoreline	10	5.1
Other Connecticut Destinations	44	22.5
Destinations in Massachusetts	19	9.7
Stay Home	19	9.7
Other	20	10.2
Total	196	100.0%

Users' Experiences

Users' motivations for visiting the Farmington River on the day they were interviewed are summarized in Table 19. Twenty-two potential motives were drawn from previous outdoor recreation research for examination among Farmington users. Each respondent rated the importance of each motive on a 5-point scale from one ("not at all important") to five ("extremely important"). Overall, 10 of the 22 motives were rated at or above the scale midpoint of three indicating that on average they were at least somewhat important reasons for people visiting. The three motives having to do with the natural environment itself were the most important motives overall. These involved the river views, nature, and experiencing the river itself.

Table 20 presents the same 22 possible motives a user might have had for visiting the river and the degree to which each of them was *attained* by users. In other words, how well did the Farmington River do in providing the experiences that users may have been seeking? Although the order varies slightly, the top seven reasons people visited were also the motives that were most highly attained on average. The three natural environment oriented motives were again at the top of the list. Tables 19 and 20 together indicate that the river segment is doing a good job of providing what the current users are after. Another indication of this is that the strength of each of the motives is significantly correlated with its level of attainment.

Another way to understand users' motives is shown in Figure 8. Here users were asked to indicate which of three broad types of reasons was the *most important* for their visit: the place itself, the activity that they participated in, or their companions. Almost 70% said they came because the Farmington was a good place for their activity and another 20% came because they simply enjoyed the place itself. Only 1 in 10 listed spending time with their companions as the most important reason for their visit.

Table 19. Motivation for their Trip to the River

Issues	Not at all Important 1 (%)	2 (%)	3 (%)	4 (%)	Extremely Important 5 (%)	Mean	Standard Deviation	n
To enjoy the view along the river	3.4	0.9	16.2	30.8	48.7	4.2	1.0	234
To be close to nature	4.4	2.2	13.3	32.4	47.6	4.2	1.0	225
To experience the Farmington River	3.8	3.4	14.0	29.4	49.4	4.2	1.0	235
To relax physically	5.9	6.4	16.5	33.9	37.3	3.9	1.1	236
To help reduce built-up tension	11.2	7.3	16.7	24.9	39.9	3.8	1.3	233
To use my equipment	19.5	4.8	16.0	20.8	39.0	3.5	1.5	231
To experience solitude	15.6	10.4	20.4	28.1	25.5	3.4	1.4	231
To get exercise	22.2	10.9	28.3	27.0	11.7	3.0	1.3	230
To think about my personal values	25.2	14.2	20.8	19.9	19.9	3.0	1.5	226
To bring back pleasant memories of a prior visit	26.2	10.2	24.9	18.7	20.0	3.0	1.5	225
To be on my own	23.7	12.1	31.0	22.4	10.8	2.8	1.3	232
To be with the members of my group	42.8	3.7	14.4	14.9	24.2	2.7	1.7	215
To do something with my family	43.8	9.2	7.8	8.3	30.9	2.7	1.8	217
To reach a specific destination	42.4	8.0	17.4	16.1	16.1	2.6	1.6	224
To learn about the countryside	33.9	14.2	27.1	17.0	7.8	2.5	1.3	218
To share my skills and knowledge with others	41.3	14.2	24.9	10.2	9.3	2.3	1.3	225
To be away from the family for a while	56.1	14.4	16.5	7.0	6.1	1.9	1.2	230
To meet new people	61.4	14.0	18.9	2.2	3.5	1.7	1.1	228
To test my endurance	67.0	10.3	14.3	5.4	3.1	1.7	1.1	224
To take risks	62.7	16.4	16.0	3.1	1.8	1.6	1.0	225
To show others I can do it	68.8	10.7	12.1	5.8	2.7	1.6	1.1	224
To be creative (sketching, painting, taking pictures, etc.)	72.6	9.6	10.1	4.1	3.7	1.6	1.1	219

Table 20. Extent to Which Each Motive was Attained

Issues	Not at all Attained 1 (%)	2 (%)	3 (%)	4 (%)	Highly Attained 5 (%)	Mean	Standard Deviation	n
To experience the Farmington River	2.6	0.9	14.1	24.7	57.7	4.3	0.9	227
To enjoy the view along the river	3.1	0.9	14.7	29.9	51.3	4.3	1.0	224
To be close to nature	3.3	1.9	11.7	36.5	46.7	4.2	1.0	214
To relax physically	4.0	4.9	16.5	27.7	46.9	4.1	1.1	224
To help reduce built-up tension	5.9	5.0	19.4	26.6	43.2	4.0	1.2	222
To use my equipment	13.4	3.2	14.8	17.1	51.4	3.9	1.4	216
To experience solitude	13.0	10.2	28.7	24.1	24.1	3.4	1.3	216
To think about my personal values	16.8	8.1	24.9	23.4	26.8	3.4	1.4	209
To be on my own	15.5	7.3	29.2	25.1	22.8	3.3	1.3	219
To get exercise	13.0	9.3	32.4	25.0	20.4	3.3	1.3	216
To bring back pleasant memories of a prior visit	20.1	7.2	22.0	24.4	26.3	3.3	1.4	209
To be with the members of my group	31.3	1.5	12.9	15.4	38.8	3.3	1.7	201
To do something with my family	34.3	1.9	8.7	8.2	46.9	3.3	1.8	207
To reach a specific destination	29.3	6.3	18.5	16.6	29.3	3.1	1.6	205
To learn about the countryside	22.0	12.7	26.3	22.9	16.1	3.0	1.4	205
To share my skills and knowledge with others	30.8	11.1	26.4	13.0	18.8	2.8	1.5	208
To be away from the family for a while	37.0	9.1	15.9	12.5	25.5	2.8	1.6	208
To take risks	41.8	11.7	19.9	10.2	16.5	2.5	1.5	206
To meet new people	44.0	11.0	20.1	8.6	16.3	2.4	1.5	209
To show others I can do it	48.5	8.8	19.1	6.4	17.2	2.3	1.5	204
To test my endurance	51.2	7.4	18.2	8.4	14.8	2.3	1.5	203
To be creative (sketching, painting, taking pictures, etc.)	54.5	8.4	11.9	8.9	16.3	2.2	1.6	202

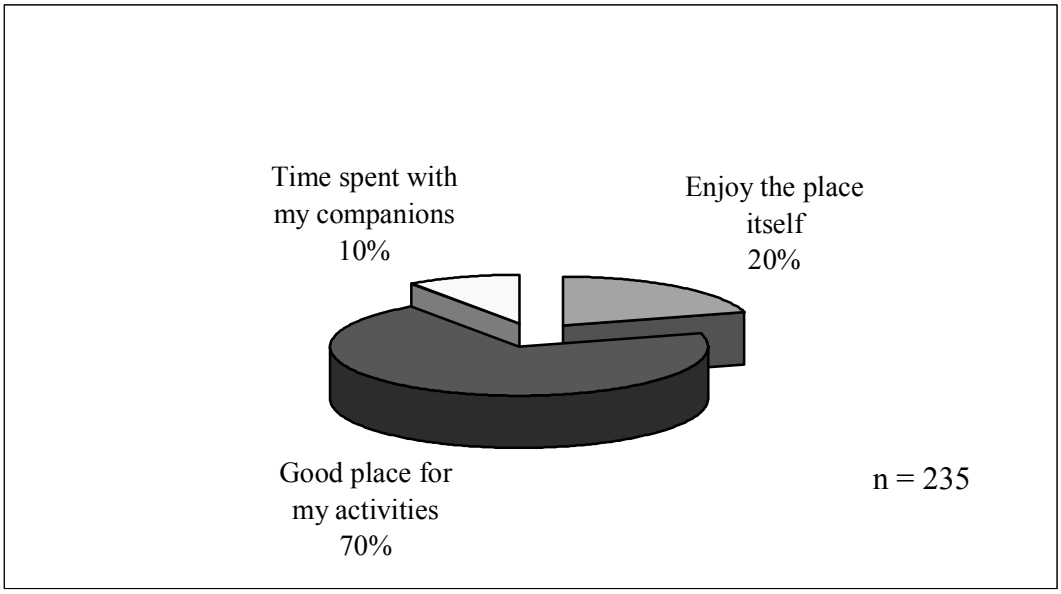


Figure 8. Most Important Reason for their Visit

Most users (60%) felt the section of the river they visited that day was best described as an "undeveloped recreation area" (i.e. "the kind of place where a natural setting is provided, but seeing other people is part of the experience"). Only 3% felt the river was "wilderness" ("a place generally unaffected by the presence of people, providing outstanding opportunities solitude and self-reliance"). The remaining 37% described the area as "semi-wilderness" ("the kind of place where complete solitude is not expected, but the environment appears mostly unaffected by people") (Figure 9).

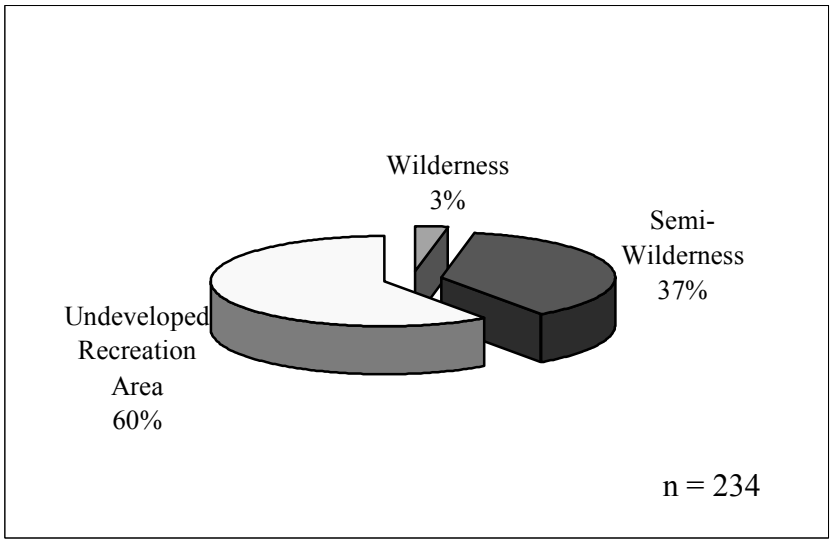


Figure 9. Respondent's Perception of River Section Visited

Farmington visitors rated the quality of their trips very highly overall. On average, 26% rated their trips as a 9 or 10 where 10 were "the best possible trip." The average rating was a 7.6 on the 10-point scale (Table 21).

Table 21. Respondent's Quality Rating of this Visit to the Farmington River

1 (%)	**2** (%)	**3** (%)	**4** (%)	**5** (%)	**6** (%)	**7** (%)	**8** (%)	**9** (%)	**10** (%)	Mean	Standard Deviation	n
0.0	0.4	2.0	2.0	8.9	6.5	22.6	31.5	8.5	17.7	7.6	1.7	248

Crowding does not appear to be a major problem for most respondents. On average, visitors rated the segment "somewhat crowded" on the day they were contacted. While 45% reported that the river was "not at all crowded" that day, a small minority (2.4%) felt otherwise and reported that conditions were "extremely crowded" (Table 22).

Table 22. Level of Crowding Experienced on the River

Not at all Crowded		**Somewhat Crowded**			**Moderately Crowded**		**Extremely Crowded**				
1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	8 (%)	9 (%)	Mean	Standard Deviation	n
13.9	31.0	14.3	17.1	4.1	9.0	8.2	1.2	1.2	3.4	2.0	245

A group of questions explored potential conflicts among users by focusing on the adverse effects of people fishing, canoeing, and tubing, on respondents (Tables 23 through 28). Users saw far fewer canoeists than anglers or tubers with average numbers seen of 5.6, 10.2, and 10.8, respectively. The majority reported that the people in each of those three different groups had no adverse effect on their experiences.

Table 23. Number of People Respondent Saw *Fishing* During their Visit

# People	**Frequency**	**Percent**
0	20	8.1%
1-5	81	32.9
6-10	71	28.9
11-20	47	19.1
> 20	27	11.0
Total	246	100.0%

Mean = 10.2, Median = 6, Standard Deviation = 11

Table 24. How Respondent's Encounters with People *Fishing* Affected their Enjoyment

People *fishing* greatly reduced my enjoyment			People *fishing* had no effect on my enjoyment			People *fishing* greatly increased my enjoyment			
-3 (%)	-2 (%)	-1 (%)	0 (%)	1 (%)	2 (%)	3 (%)	Mean	Standard Deviation	n
1.3	2.9	11.3	57.7	11.7	6.3	8.8	0.3	1.2	239

Table 25. Number of People Respondent Saw *Canoeing* During their Visit

# People	Frequency	Percent
0	94	39.7%
1-5	70	29.5
6-10	42	17.7
11-20	18	7.6
> 20	13	5.5
Total	237	100.0%

Mean = 5.6, Median = 2, Standard Deviation = 10

Table 26. How Respondent's Encounters with People *Canoeing* Affected their Enjoyment

People *canoeing* greatly reduced my enjoyment			People *canoeing* had no effect on my enjoyment			People *canoeing* greatly increased my enjoyment			
-3 (%)	-2 (%)	-1 (%)	0 (%)	1 (%)	2 (%)	3 (%)	Mean	Standard Deviation	n
7.3	6.4	11.9	64.7	2.8	3.2	3.7	-0.3	1.2	218

Table 27. Number of People Respondent Saw *Tubing* During their Visit

# People	Frequency	Percent
0	166	68.0%
1-5	13	5.3
6-10	14	5.7
11-20	12	4.9
> 20	39	16.0
Total	244	99.9%

Mean = 10.8, Median = 0, Standard Deviation = 25

Table 28. How Respondent's Encounters with People *Tubing* Affected their Enjoyment

People *tubing* greatly reduced my enjoyment			**People *tubing* had no effect on my enjoyment**			**People *tubing* greatly increased my enjoyment**			
-3 (%)	-2 (%)	-1 (%)	0 (%)	1 (%)	2 (%)	3 (%)	Mean	Standard Deviation	n
10.1	4.2	6.4	70.9	2.1	3.7	2.7	-0.3	1.2	189

Users' Attitudes about River Resources and Management

This section summarizes respondents' perceptions and attitudes about the wild and scenic segment of the West Branch. Unlike findings in earlier sections, these results do not focus on the particular trip when the visitor was contacted on-site. Respondents are here referring to the scenic river and the corridor of land within 100 feet of the riverbank, in general.[4]

The 86% of respondents who were not on their first visit to the river when contacted, were asked how the overall quality of visiting had changed since their first visit. Most said there had been no change in quality, but close to a third (31%) felt conditions had improved (Figure 10).

[4] This corridor width corresponds with the protective "river protection overlay districts" designed to minimize development and disturbance within 100 feet of the river.

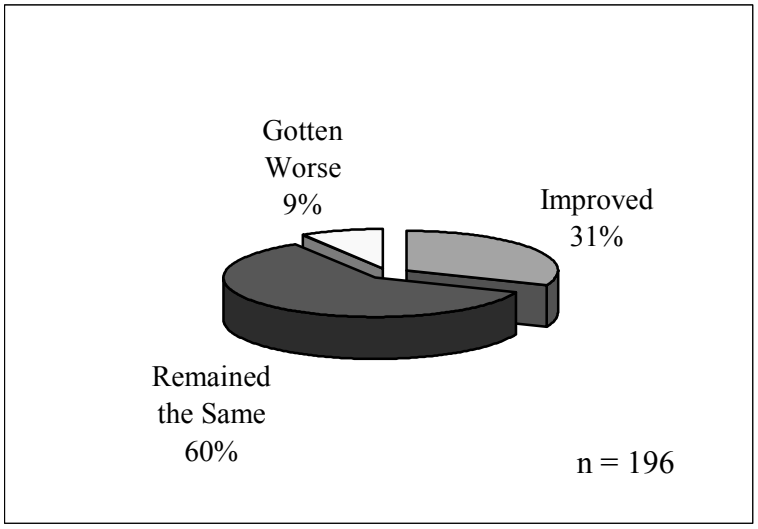


Figure 10. Change in Quality of the Site

Two open-ended questions asked respondents to report the things they liked best and least about the Farmington River and the corridor of land within 100 feet of its banks. As can be seen in Table 29, what visitors tended to like best about the setting were the high quality water, natural beauty, good fishing, and accessibility. The things they liked least were much more varied. The three most common complaints were crowding, litter, and the noise and traffic from nearby roads (Table 30).

Table 29. Best Liked Things about the Farmington River and Corridor

Response	Frequency[5]	Percent[6]
High Quality Water	75	17.4%
Beauty/Scenery	60	14.0
Good Fishing	54	12.6
Good Accessibility	41	9.5
Natural Setting	38	8.8
Abundant Wildlife	30	7.0
Undeveloped	24	5.6
Well Managed	22	5.1
Peaceful/Quiet	21	4.9
Solitude	15	3.5
Wilderness	10	2.3
Nearby Amenities & Recreation Activities	10	2.3
Friendly People/Community	8	1.9
Rapids	8	1.9
Relaxation/Enjoyment	7	1.6
Other	7	1.6
Total	430	100.0%

Table 30. Least Liked Things about the Farmington River and Corridor

Response	Frequency[5]	Percent[6]
Crowded	33	14.9%
Litter	28	12.7
Traffic & Road Noise	26	11.8
None/Nothing	19	8.6
Development	19	8.6
Access Restricted	16	7.2
Conflicts with Other Users	16	7.2
Water Level	13	5.9
Management	10	4.5
Lack of Restrooms & Garbage Cans	9	4.1
Bait Fishing	5	2.3
Lack of Parking	4	1.8
Other	23	10.4
Total	221	100.0%

[5] Respondents could indicate more than one item
[6] Represents the % of all responses

In the mail-back questionnaire, respondents were provided with a list of potential problems and asked to rate each on a 7-point scale where one indicated "not a problem" and seven indicated the item was a "major problem." Responses are summarized in Table 31. Overall, the extent of problems experienced was low. In fact, none of the items even reached the midpoint on the 7-point scale. Of those examined, crowding, lack of manager presence on the river, conflicts and litter were the biggest issues.

Table 31. Extent to Which Certain Issues were a Problem

	Not a Problem						Major Problem			
Issues	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Mean	Standard Deviation	n
Too crowded	16.8	10.9	19.3	21.9	18.1	7.1	5.9	3.6	1.7	238
Too few rangers/management staff on river	26.2	17.3	10.1	13.5	11.4	10.1	11.4	3.4	2.1	237
Conflicts between different types of visitors	25.5	13.4	13.8	16.3	18.0	9.2	3.8	3.3	1.8	239
Litter on the river banks	20.2	21.4	17.2	10.9	17.2	7.1	5.9	3.3	1.8	238
Reckless behavior of river users	26.0	19.4	12.8	15.0	14.1	8.4	4.4	3.1	1.8	227
Litter in the river	23.6	21.5	16.9	13.5	11.0	8.9	4.6	3.1	1.8	237
Not enough restrooms along the river	32.9	13.9	11.4	13.9	10.6	10.6	6.8	3.1	2.0	237
Development visible from the river	25.6	19.7	19.2	14.1	11.5	5.6	4.3	3.0	1.7	234
Traffic noise from nearby roads	25.0	22.4	16.5	12.2	15.2	6.3	2.5	3.0	1.7	237
Noisy/rowdy people	31.8	23.9	17.6	14.2	7.1	2.9	2.5	2.6	1.6	239
Evidence of human waste	33.0	24.8	17.4	8.3	9.6	4.8	2.2	2.6	1.6	230
Lack of drinking water	44.4	17.2	10.0	10.9	8.8	5.0	3.8	2.5	1.8	239
Trampled vegetation along the river banks	32.9	31.2	16.5	9.7	7.6	2.1	0.0	2.3	1.3	237

Table31. Extent to Which Certain Issues were a Problem (Continued)

	Not a Problem						Major Problem			
Issues	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Mean	Standard Deviation	n
Erosion of river banks	35.3	30.2	14.5	13.6	2.1	2.6	1.7	2.3	1.4	235
Not enough parking at access points	45.5	19.6	12.8	9.8	4.7	4.3	3.4	2.3	1.7	235
Not enough access points	52.4	19.3	11.2	7.7	4.7	2.2	2.6	2.1	1.5	233
Polluted water	52.4	23.6	9.9	7.3	2.6	1.7	2.6	2.0	1.4	233
Muddy water	49.0	26.1	16.0	5.1	2.1	0.8	0.8	1.9	1.2	237
Trails visible from river	52.3	25.5	11.1	6.0	3.8	0.0	1.3	1.9	1.2	235
Too many rules and regulations	55.3	20.9	11.5	8.1	2.6	0.4	1.3	1.9	1.3	235
Lack of information to plan visits	55.1	21.8	11.5	6.4	3.0	1.3	0.9	1.9	1.3	234
Logging of forests visible from river	57.5	24.3	10.2	3.8	2.1	1.3	0.9	1.8	1.2	235
Lack of direction signs	60.3	20.3	9.1	3.5	4.3	1.3	1.3	1.8	1.3	232
Lack of services (food & drink, equipment, etc.)	58.5	21.4	9.2	5.7	3.1	1.3	0.9	1.8	1.3	229
Lack of public trans between access points	62.8	19.9	6.9	3.5	3.0	1.3	2.6	1.8	1.4	231
Feelings of being unsafe/insecure	65.4	19.7	8.6	5.1	0.4	0.9	0.0	1.6	1.0	234

In spite of the fact that the West Branch was a Wild and Scenic River, there were still many respondents who were not aware of that fact. Just over half did not know the segment they visited was part of the wild and scenic river system (Figure 11). However, after a brief description of wild and scenic designation and the protections the status provides, the vast majority felt that designation was quite important for the west branch (Table 32).

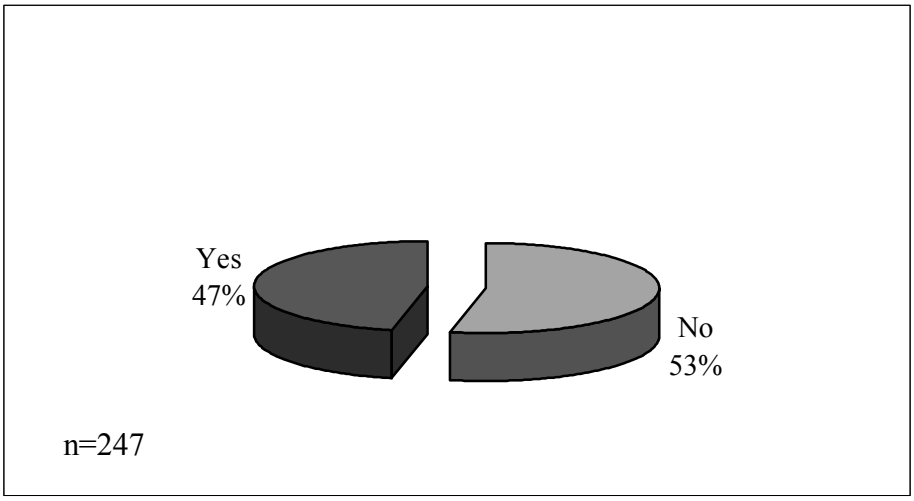


Figure 11. Was Respondent Aware the West Branch of the Farmington River is Designated Wild & Scenic?

Table 32. Importance of Farmington River's Wild and Scenic Designation

Not at all Important			**Moderately Important**			**Very Important**			
1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Mean	Standard Deviation	N
0.8	1.2	1.2	8.2	6.5	11.0	71.0	6.4	1.2	245

Users were provided with a very brief description of the "partnership model" whereby the locally based Farmington River Coordinating Committee (FRCC) relies primarily on local municipal zoning and coordination with existing groups. Users were then asked how *appropriate* they felt this approach was in managing the river and the lands along it. Overall, users felt the approach was appropriate. Over half rated the appropriateness at the six and seven levels on the 7-point scale (Table 33). Users were then asked to rate the *effectiveness* of wild and scenic designation for the Farmington, first in terms of the river and, then, in terms of its adjacent lands. The majority of respondents felt designation had been moderately to extremely effective in

preserving the river's free-flowing character and outstanding features (Table 34). Although respondents were slightly less convinced about the effectiveness of designation in controlling harmful activities in the corridor of land along the river, the majority still felt designation had been moderately to extremely effective in this regard (Table 35).

Table 33. Appropriateness of "Partnership Model" for Managing Farmington River

Not at all Appropriate			**Moderately Appropriate**			**Very Appropriate**			
1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Mean	Standard Deviation	n
1.2	1.2	2.9	23.7	19.9	22.0	29.1	5.4	1.4	241

Table 34. Effectiveness of Wild and Scenic Designation for Farmington River

Not at all Effective			**Moderately Effective**			**Very Effective**			
1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Mean	Standard Deviation	n
1.3	1.3	2.9	20.0	25.4	29.6	19.6	5.3	1.3	240

Table 35. Effectiveness of Current Protection Efforts on Lands within 100ft of the River

Not at all Effective			**Moderately Effective**			**Very Effective**			
1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Mean	Standard Deviation	n
2.9	3.8	5.4	22.2	25.1	22.6	18.0	5.0	1.5	239

When asked to rate the importance of 10 potential benefits that the West Branch might have for surrounding communities, three benefits were rated as extremely important overall: fish and wildlife habitat, preserving undeveloped open space, and aesthetic beauty. Although the potential river benefits of tourism and business development, and traffic reduction and

transportation alternatives were rated the least important overall, even these were rated higher than the midpoint on the 7-point scale, indicating that they were considered to be at least somewhat important benefits provided by the river (Table 36). Similarly, respondents reported that the river was quite important to their participation in their primary activity (Table 37).

Table 36. Importance of Farmington River in Providing Potential Benefits

	Not at all Important						Extremely Important			
	1	2	3	4	5	6	7		Standard	
Potential Benefits	(%)	(%)	(%)	(%)	(%)	(%)	(%)	Mean	Deviation	n
Fish and wildlife habitat	0.0	0.0	1.2	4.5	5.3	14.8	74.0	6.5	0.8	243
Preserving undeveloped space	0.0	0.0	1.2	6.1	9.8	21.2	61.6	6.3	0.9	245
Aesthetic beauty	0.0	0.0	1.2	6.1	8.6	22.9	61.0	6.3	0.9	244
Community pride	1.7	2.5	4.1	13.8	18.4	22.1	37.2	5.6	1.4	239
Public education about nature and the environment	0.8	2.9	5.0	17.0	16.6	25.4	32.0	5.5	1.4	240
Public recreation opportunities	1.6	2.8	8.6	14.0	19.0	23.5	30.1	5.3	1.5	242
Health and fitness	4.6	2.9	10.1	18.5	17.7	21.1	24.8	5.0	1.6	237
Access for persons with disabilities	2.5	5.8	8.8	21.7	18.8	19.6	22.5	4.9	1.6	239
Tourism and business development	10.8	8.3	13.3	18.4	17.1	12.9	18.8	4.3	1.9	239
Traffic reduction and transportation alternatives	10.6	6.7	11.4	27.1	13.5	11.8	18.6	4.3	1.8	236

Table 37. Importance of Farmington River to Respondent's Participation in their Primary Activity

Not at all Important			Moderately Important			Very Important			
1	2	3	4	5	6	7		Standard	
(%)	(%)	(%)	(%)	(%)	(%)	(%)	Mean	Deviation	n
0.8	1.2	2.9	13.5	15.1	21.6	44.9	5.9	1.3	245

Perhaps most revealing of users' attitudes toward the West Branch and its adjacent lands were the two final questions in this section that asked users to rate their overall satisfaction with river resources. The vast majority was moderately or extremely satisfied with the river and land along it (Tables 38 and Table 39).

Table 38. Respondent's Overall Satisfaction with the Farmington River

Very Unsatisfied			**Moderately Satisfied**			**Very Satisfied**			
1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Mean	Standard Deviation	n
0.4	1.3	2.1	8.8	22.1	38.8	26.7	5.7	1.1	240

Table 39. Respondent's Satisfaction with the Corridor of Land along the Farmington River

Very Unsatisfied			**Moderately Satisfied**			**Very Satisfied**			
1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	6 (%)	7 (%)	Mean	Standard Deviation	n
0.8	0.8	3.8	22.9	27.1	28.3	16.3	5.3	1.2	240

Attitude Comparisons of Anglers, Tubers and Boaters

Various differences emerged among the major recreation user groups on the West Branch of the Farmington River. This section summarizes some of the key differences. For simplicity, we have combined the many styles of some of the activities into general groupings for comparison purposes. Anglers include all respondents whose primary activity was fishing, regardless of their fishing tackle. This category includes fly, lure, and bait anglers. Likewise, the boating category includes canoes and kayaks.

Table 40 presents a comparison of the three different groups in terms of the extent to which they regarded various issues as problems. Overall, ratings of nearly half of the 26 items were

significantly different across the three groups. In all but one case, tubers were less concerned about the intensity of the problem than one or both of the other two groups. The biggest differences, for example, were regarding perceptions of problems related to litter and conflicts. Tubers saw these issues as significantly less problematic than anglers or boaters. Far fewer differences were found when the attitudes of the three groups were compared in terms of the importance of the benefits provided by the Farmington River. Of the ten benefits examined, only two were significantly different across the three groups--preserving undeveloped open space and providing fish and wildlife habitat. In both cases, the anglers felt these benefits to be more important than did the tubers (Table 41).

A similar picture emerged when the three groups were compared regarding their attitudes toward river resources and management. In only two of the group comparisons were there significant differences. In both cases, the anglers felt more strongly than one of the other two groups. Anglers felt that the wild and scenic river designation was more important than did tubers. Anglers were also significantly more satisfied with the Farmington River than were boaters (Table 42).

Table 40. Differences Among User Groups Regarding Perceptions of River Conditions

Problem	Anglers[1]	Tubers	Boaters	n	Differences[2] Among Groups
Litter in the river	3.4[a]	1.7[b]	3.4[a]	221	14.1***
Litter on river banks	3.5[a]	2.0[b]	3.3[a]	222	10.7***
Conflicts between user groups	3.6[a]	2.0[b]	3.4[a]	223	10.4***
Reckless behavior of river users	3.4[a]	2.0[b]	2.6	212	9.1***
Too few rangers/management	3.7[a]	2.4[b]	2.7	223	6.5***
Evidence of human waste	2.7[a]	1.8[b]	2.9	214	4.4*
Not enough restrooms along river	3.3[a]	2.2[b]	3.3	220	4.1*
Lack of information to plan visits	1.8[a]	1.7[a]	2.7[b]	218	4.0*
Development visible from river	3.0	2.5[a]	3.7[b]	219	3.2*
Not enough parking at access points	2.4	1.8	2.9	220	3.2*
Lack of public transportation	1.7[a]	1.7	2.5[b]	216	3.2*
Trampled vegetation along river	2.4	1.8	2.6	221	3.1*
Muddy water	1.9	1.5	2.3	221	3.0
Erosion of river banks	2.3	1.8	2.3	221	2.4
Polluted water	2.0	1.6	2.5	217	2.3
Too crowded	3.7	3.1	3.7	222	2.2
Logging of forests visible	1.8	1.4	2.1	219	2.2
Traffic noise from nearby roads	3.0	2.7	3.7	221	1.9
Feelings of being unsafe/insecure	1.5	1.7	1.9	218	1.8
Lack of services	1.7	2.1	2.0	215	1.5
Too many rules and regulations	1.9	1.6	1.9	219	1.1
Lack of drinking water	2.6	2.2	2.4	222	0.9
Not enough access points	2.1	1.8	2.2	218	0.8
Noisy/rowdy people	2.7	2.3	2.6	223	0.7
Trails visible from river	1.9	1.7	2.1	219	0.6
Lack of direction signs	1.8	1.7	2.0	217	0.3

Note. Means with different lettered superscripts are significantly different at the .05 level.
[1]All variables in table coded on a 7-point scale from *no problem* (1) through *big problem* (7)
[2]Values reported are *F* statistics and level of statistical significance of the difference among the three groups where * indicates the difference is significant at the .05 level and *** indicates the difference is significant at the .001 level.

Table 41. Differences Among User Groups Regarding River Benefits

Potential Benefit	Anglers[1]	Tubers	Boaters	n	Differences Among Groups[2]
Fish and wildlife habitat	6.7[a]	5.9[b]	6.4	228	10.8***
Preserving undeveloped open space	6.4[a]	6.0[b]	6.2	230	3.2*
Public recreation opportunities	5.2	5.8	5.8	227	2.9
Health and Fitness	4.9	5.3	5.5	223	1.7
Aesthetic beauty	6.4	6.2	6.3	229	0.8
Public education about nature	5.4	5.4	5.8	225	0.5
Traffic reduction and transportation alternatives	4.3	4.5	4.2	222	0.3
Tourism and business development	4.4	4.5	4.2	224	0.2
Community pride	5.6	5.6	5.8	223	0.2
Access for persons with disabilities	5.0	4.9	4.8	225	0.1

Note. Means with different lettered superscripts are significantly different at the .05 level.
[1]All variables in table coded on a 7-point scale from *not at all important* (1) through *extremely important* (7)
[2]Values reported are *F* statistics and level of statistical significance of the difference among the three groups where * indicates the difference is significant at the .05 level and *** indicates the difference is significant at the .001 level.

Table 42. Differences Among User Groups' Attitudes Regarding River Resources and Management

Variable	Anglers[1]	Tubers	Boaters	n	Differences Among Groups[2]
Importance of wild and scenic river designation for the Farmington?	6.5[a]	5.8[b]	6.0	230	7.0**
Overall satisfaction with the Farmington River?	5.8[a]	5.6	4.9[b]	224	4.9**
Overall satisfaction with their visit that day?	7.5	8.1	7.1	230	3.0
Overall satisfaction with the corridor of land along the Farmington River?	5.2	5.4	4.7	224	2.2
Effectiveness of current wild and scenic river protection efforts?	5.3	5.6	4.9	224	1.9
Effectiveness of current protection efforts on the lands within 100 feet of the river?	4.9	5.3	5.2	223	1.0
Appropriateness of the "partnership model" for managing the Farmington River and the lands along it?	5.5	5.2	5.4	225	0.4

Note. Means with different lettered superscripts are significantly different at the .05 level.
[1]All variables in table with the exception of the last one were rated on 7-point scales with one representing the weakest rating and seven the strongest. The last variable (overall satisfaction with their visit) was rated on a 10-point scale where 10 was the "best possible trip." The exact wordings and scale anchors can be seen in the mail questionnaire in the appendix.
[2]Values reported are *F* statistics and level of statistical significance of the difference among the three groups where ** indicates the difference is significant at the .01 level.

Estimate of Total Recreation Use

Understanding the level of use of a park or river segment is important for management and planning. One of the reasons for estimating total river use in this study was that such an estimate is needed for economic impact calculations. There are two common ways to account for recreational use of parks and other natural resource areas – "recreation visits" or "recreation visitor days" (RVD's). A recreation visit is one entry by one person for any part of a day. A recreation visitor day, on the other hand, is 12 visitor hours (e.g., 1 person for 12 hours or 2 people for 6 hours each, etc.). To be consistent with typical National Park Service practice, we estimate the number of recreation visits to the Farmington River. Note that the number of *visits* is not necessarily the same thing as the number of *visitors* since it is common for some people to visit an area multiple times during, say, a season.

The use estimates, presented here, are based on the actual visual counts conducted along the entire wild and scenic river segment by the interviewers during each of the 27 sample days. Because the vast majority of the segment is visible from a public road on one or both sides of the river, we were relatively confident in the accuracy of on-site counts. However, there are some sections of the segment that are difficult to see, and total use had to be extrapolated from the 27 counts and the related trip characteristics from the user survey data. The reported estimates are therefore just that – estimates. Standard errors are reported to help establish confidence intervals that can be placed around the use estimates.

The use estimation procedure is an adaptation of one developed by Schreuder, Tyre, & James (1975). Interval-count sampling techniques are appropriate for large recreation areas like the Farmington River for the following two reasons: River traffic is typically one-way and observer travel time along the river is not negligible (Schreuder, Tyre, & James, 1975). Since we have the users' lengths of stay at the river from the mail back questionnaires and know when the randomly selected onsite samples occurred, the use estimation procedure is considered unbiased. The formula below estimates (i.e., hat sign above the V) the total annual visits (V) to the West Branch,

$$\hat{V} = \frac{L_0}{n} \times \sum_{j=1}^{n} \sum_{i=1}^{c_j} \frac{1}{\mu_{ij}} .$$

The standard error of the estimate of annual visits (seV) is calculated by,

$$se\hat{V} = \sqrt{\frac{L_o^2}{n(n-1)} \times \sum_{j=1}^{n} \left(\sum_{i=1}^{c} \frac{1}{\mu_{ij}} - \frac{1}{n} \sum_{j=1}^{n} \sum_{i=1}^{cj} \frac{1}{\mu_{ij}} \right)^2} .$$

The elements in the equations are defined as,

$\boldsymbol{L_0}$ = length of season in hours (including only those hours when the river is open for use which we assumed to be all daylight hours).
n = number of onsite samples taken.
c_j = count of river users in j^{th} onsite sample (j = 1,...., n).
$\boldsymbol{\mu_{ij}}$ = length of stay reported by the i^{th} person at point j from mail-back questionnaire.

Using the first formula and data from the on-site counts along with the necessary trip characteristics from the intecept surveys; we estimated the number of annual visits to the West Branch to be just over 77,400 visits per year. The majority of that is fishing use at 48,000 visits, followed by tubing at 23,500 visits, and boating (canoes, kayaks, and other craft combined) at 5,900 visits (Table 43). The 1995 Farmington River Wild and Scenic Study Report estimated there were "25,000 fishing trips, 30,000 tubers, and thousands of boaters each year" at that time (U.S Department of the Interior, 1995, p. 31).

Table 43. Estimates of Annual Visits to Wild and Scenic Segment

	Fishing	Tubing	Boating	Total
Annual Visits	48,052	23,510	5,863	77,424
(Standard Error)	(6,015)	(8,298)	(2,464)	
% of Total Visits	62%	30%	8%	100%

Economic Impacts of River Recreation

The economic impact of visitation to a particular resource is the actual expenditures made by visitors and the economic impact of those expenditures on some predetermined local economy. We defined the economic impact area for the wild and scenic segment of the Farmington River as the five "riverfront towns" represented on the Farmington River Coordinating Committee. As noted earlier, the river segment flows through four of these towns and the other is close enough to the river that it is included in the Farmington River Coordinating Committee and in this study. They are the towns of Colebrook, Hartland, Barkhamsted, New Hartford, and Canton.

Expenditure information was gathered from respondents through a series of questions in the mail-back questionnaire asking respondents to report how they handled their trip expenses, how much they spent in various categories, and where they spent their money (inside or outside the five riverfront towns). A map of the five towns and the river was provided in the questionnaire to improve the validity of responses.

Nearly three quarters of respondents paid their own expenses, and 16% shared at least some of their trip expenses with other people in their group (Table 44). The most common group size of those sharing expenses was three people (Table 45). When asked what their average Farmington River trips during the past 12 months cost them, most respondents reported spending $20 or less. The average was just under $41 (Table 46).

Table 44. How Expenses were Handled During this Trip

Group Type	Frequency	Percent
Paid own expenses only	183	73.8%
Group shared expenses	39	15.7
Expenses paid by another	6	2.4
No expenses	20	8.1
Total	248	100.00%

Table 45. Group Size of People Sharing Expenses

Group Size	Frequency	Percent
2	8	33.3%
3	11	45.8
4	3	12.5
> 4	2	8.4
Total	24	100.0%

Mean = 5, Median = 3, Standard Deviation = 8

Table 46. Respondent's Average Cost per Farmington River Trip

Cost	Frequency	Percent
$0-10	65	28.8%
$11-20	52	23.0
$21-30	34	15.0
$31-40	19	8.4
$41-50	19	8.4
$51-100	27	12.0
>$100	10	4.4
Total	226	100.00%

Mean = $40.61, Median = $20.00, Standard Deviation = $85.96

Estimates of the total economic impacts were not based on respondents' average trip expenditures as reported in Table 46. They were based on detailed expenditure information reported in the mail-back questionnaire for the trip the respondent was on when they were contacted by the study interviewer at the river. A software package called the Money Generation Model (MGM2) estimated total economic impacts from the expenditure data. MGM2 is an update of the National Park Service Money Generation Model (Stynes, Propst, Chang, & Sun, 2000).

Because visitor expenditures typically differ greatly depending upon the type of lodging (if any) they use, MGM2 segments respondents by lodging types. The vast majority of Farmington users either were day-users or stayed with friends and relatives. Most (82%) were non-local day-users with another 7% being local day users. Those staying with friends and relatives made up another 4%. Table 47 presents the proportion of use in party nights represented by each of the segments. Average spending across all the segments was $122.68 per party-night.

Table 47. Proportions of Various Group Types

Segment	Share	Party-Nights
Local-Day Users	7.1%	2,114
Non Local-Day User	82.4	24,455
Motel-In Area	0.9	276
Camping-In Area	3.0	899
Motel-Outside Area	0.2	68
Camping-Outside Area	2.3	692
Visiting Friends and Relatives	4.0	1,178
Total	99.9%	29,682

Separate expenditure profiles were developed for each of the seven lodging segments and summed to arrive at total river-related expenditures (Table 48). The non-local day user group spent over $3.1 million, the most overall, in the five river towns. Local day users spent another $1.5 million combined, and those camping overnight in the area spent another $1.4 million. The total direct expenditures made by all river visitors were estimated at $3.642 million for 2001. The largest expenditure type was "other expenses" the biggest part of which was equipment rental, which included rental fees for tubes and boats.

Table 48. Total Spending by Visitors ($000's)

	SEGMENT							
	Local Day Users	***Non-Local Day Users***	***Motel-In***	***Camp-In***	***Motel-Out***	***Camp-Out***	***Visiting Friends or Relatives***	**Total**
Motel, hotel cabin or B&B	0	0	13	0	0	0	0	13
Camping fees	0	0	0	9	0	0	0	9
Restaurants & bars	17	293	5	13	0	7	12	348
Groceries, take-out food/drinks	11	177	3	9	0	3	12	216
Gas & oil	6	245	6	15	0	14	7	292
Other vehicle expenses	0	122	0	0	0	0	26	148
Local transportation	0	0	0	0	0	0	0	0
Admissions & fees	0	538	0	9	0	21	4	571
Clothing	0	0	0	0	0	0	0	0
Sporting goods	21	367	17	11	0	3	18	438
Gambling	0	0	0	0	0	0	0	0
Other expenses	101	1,418	6	72	0	0	9	1,607
Total	156	3,161	50	138	0	48	88	3,642

Estimating total visitor expenditures is the first step in estimating the total economic impact on a local economy. The next step is estimating the direct effect of spending. The direct effects are the expenditures made in the impact area by visitors coming from outside that area. The direct effects of visitor expenditures on sales, jobs, personal incomes and value-added in the five Farmington River towns are presented in Table 49. Total economic impacts are then calculated by applying economic multipliers to estimate the additional indirect and induced effects generated by the direct spending. The total economic impacts for the five-town area from recreation use of the Farmington River are shown in Table 50. Overall, the economic impact by visitors to the Farmington River in 2001 was estimated to be approximately $3.63 million with 63 jobs being supported by river recreation.

Table 49. Economic Impacts of Visitor Spending: Direct Effects

	DIRECT EFFECTS			
Sector/Spending category	**Direct Sales[7] ($ 000's)**	**Jobs**	**Personal Income[8] ($ 000's)**	**Value Added[9] ($ 000's)**
Motel, hotel cabin, or Bed & Breakfast	13	0	5	9
Camping fees	9	0	4	6
Restaurants & bars	348	9	141	205
Groceries, take-out food/drinks	90	0	20	39
Gas & oil	23	--	--	--
Other vehicle expenses	148	1	54	89
Admissions & fees	571	16	245	400
Sporting goods	11	0	3	5
Other expenses	35	0	12	19
Retail Trade	1,073	22	526	887
Wholesale Trade	152	1	63	108
Total	2,473	49	1,073	1,767

[7] Sales are the direct sales in the businesses that receive the visitor spending.
[8] Includes wages, salaries, proprietors' incomes, and employee benefits.
[9] Includes personal income, rents, profits and indirect business taxes.

Table 50. Direct and Total Economic Impacts of Visitor Spending

Economic measure	DIRECT EFFECTS	Multiplier	TOTAL EFFECTS
Output/Sales ($ 000's)	$2,474	1.47	$3,630
Personal Income ($ 000's)	$1,072	1.44	$1,545
Value Added ($ 000's)	$1,766	1.43	$2,532
Jobs	50	1.26	63
Total Visitor Spending ($ 000's)	$3,642		
Capture rate		68%	
Effective spending multiplier		1.00	

V. ECONOMIC BENEFITS TO FARMINGTON RIVER USERS

This section presents the results of the estimation of the economic benefits to river recreation users of the Wild and Scenic segment of the West Branch of the Farmington River. Economic benefit analyses are distinct from estimates of economic impacts, such as those presented in the previous section. We clarify this distinction below and discuss the methods used to estimate economic benefits for the Farmington River. We then present the results of the benefit analyses themselves.

Economic impact analyses attempt to measure what people *spend* to use a resource, economic benefit analyses estimate what that resource is actually *worth* to people. The economic impact analysis of the Farmington River, discussed earlier, focuses on the spending behaviors of users and not the economic value of the Farmington River, which attracted visitors to the river in the first place.[10] An economic impact is a change in economic activity generated by users spending money while visiting a particular area. Economic impact is an estimate of users' *expenditures* in a particular geographical area and the effects these expenditures have on the local economy. These economic effects are actual changes in sales revenues, jobs, net incomes, and tax revenues in the local economy. This economic impact reflects the gain in the economic base of the area that supplies the primary users with the resource and other goods and services related to the use of that resource.

The economic impact of river use does not measure the economic *benefits* of the river to primary users. The measure of the economic benefit to a recreational user of visiting the Farmington River is derived from that user being able to take trips to the river at the same *price* each time. The price usually consists of two costs for each user. The round-trip travel costs associated with the operation of a vehicle, if any, and the travel time (opportunity cost of time) associated with a user having to drive or walk to the site and return. We evaluate the statistical relationship between the number of trips to the river during the past year and the price per trip to generate a demand curve for river trips.

This method of estimating economic benefits is referred to as a travel cost model. The resulting analysis leads to the computation of an economic benefit per trip over and above what it might have cost that user to visit. Users obviously do not receive dollar payments or direct adjustments in their annual incomes that are equivalent to the benefit amounts. Rather, the estimated benefits attempt to quantify the dollar value of the site benefits that users receive from having visited the river. Simply put, economic benefit analyses estimate the *total social value* of the Farmington, over and above what it might cost people to visit it. Economic benefits are typically aggregated for all users of a particular resource (like the Farmington River) to compute the aggregate benefits provided by that resource, over and above what it cost users to visit.

[10] Preservation or non-use economic values are not addressed in this study.

Individuals visit the Farmington River seeking water-related activities such as fishing, tubing, canoeing, kayaking, and swimming. As a nationally significant asset and publicly protected resource, individuals are not excluded from using the river, and one's use of the river does not reduce its availability to anyone else. For the purposes of benefit analyses, access to the Farmington River is considered open to all users at zero prices. Since no price exists for an individual's access to the Farmington River, a willingness-to-pay or surrogate price called a *trip price* is computed for each user consisting of an opportunity cost of travel time and average out-of-pocket expenses for round-trip travel from home to the Farmington River. It must be emphasized that users' willingness-to-pay for Farmington River trips is not necessarily related to any true costs-per-user paid by government agencies or others to protect and manage the Farmington River.

Farmington River Recreation Demand

A measure of the willingness-to-pay in the travel cost model is the minimum expenditure required to travel from home to the Farmington River and return. Recreation planners assume that a travel cost must be paid in order to enjoy time spent at the Farmington River (Loomis and Walsh, 1999). Simply stated, without travel to the Farmington River, the river has no recreation value to an individual. Without the ability to spend time at the river, the river has no recreation value to the individual. Moreover, without a reason to spend time at the river, the individual has no reason to pay the travel costs to get there.

A trip price consists of the round-trip, travel costs plus the average cost per trip. Trip price is a critical determinant of recreation demand. If, for example, the price was to increase by a certain amount, the user will take fewer trips to maintain the household budget. In fact, if the price became large enough, it would drive the number of trips demanded to zero. Similarly, there is a weak complimentary condition between travel cost and travel expenditures. Like the travel cost, if average trip expenditures were to increase, the number of trips would decrease. Average costs per trip were imputed for non-respondents to the follow-up, mail-back questionnaires from the available information gathered in the on-site interviews.[11] Respondents were asked to, "Think back to all the recreation trips you have taken to the Farmington River in the past 12 months, what was the *average* cost per trip of these trips?" By including travel expenditures, the analytical requirement is avoided that all visits are day-trips, and allows for the separation of daily trip expenditures from travel costs (Parsons & Wilson, 1997).

The round-trip, travel cost is the product of two calculations. First, the miles from respondents' homes to where they accessed the West Branch of the Farmington River that day are multiplied by the number two (for round-trip travel), and then multiplied by $0.14 a mile for vehicle operating expenses and road wear.[12] Second, the opportunity cost of travel is computed using

[11]Of the 461 on-site interviews, there are 215 mail responses acceptable for these statistical analyses. From average cost per trip responses on the follow-up, mail questionnaires, the imputation estimator in the statistical software Stata (Verison 7) estimates the average cost per trip with data from on-site interviews.

[12] The $0.14 per mile does not include depreciation and insurance. It is just the reported cost to operate a vehicle at $1.22 per gallon of gas (Autoweek , April 1, 1996, p. 9).

annual household income and the reported hours worked per week from completed mail-back questionnaires.[13] Annual household income is divided by the product of 50 workweeks in a year multiplied by the hours worked per week to obtain the household hourly wage rate. The computed wage rate is multiplied by the customary value of one-third to reflect the value of travel time multiplied by the amount of time the respondent reported that it took to travel from home to where they access the river then multiplied by two (round-trip).[14] The operating travel cost and opportunity cost of time are summed to equal the round-trip travel cost.

Users value their Farmington River trips based on the benefits that they perceive are received from their visits. The difference in expected benefits among individuals is responsible for the amount of demand the river receives each year, which determines how frequently, if at all, individuals visit there. The recreation demand curve in Figure 12 illustrates the willingness-to-pay (trip prices) for different numbers of annual trips to the Farmington River.[15] In fact, the market demand for the Farmington River is equal to the total willingness-to-pay for annual trips, which is the total area under the demand curve in Figure 12. The recreation demand curve in Figure 12, below, depicts a cost per trip for a corresponding number of annual trips. Its downward slope indicates that higher trip prices reduce the quantity of seasonal trips demanded.

[13] Household hourly wage rates are imputed for non respondents to the follow-up, mail questionnaires. The number of hours worked per week for those responding (n = 209) ranged in value from 0 to 80 hours per week with a mean value of 42.6 hours per week *(SD = 17.49)*. Mean household income for those responding (n = 212) is $73,301 (SD = $50,235). The average household hourly wage is $33.83 per hour, which is assigned to non respondents in the computation of the opportunity costs of time in travel to the Farmington River from an origin and return from the time in-transit and one-way miles from on-site interview responses (Feather & Shaw, 1998).

[14]Defining travel costs in travel cost models continues to be a subject of debate among analysts. Using mileage rates, reported for the operation of a vehicle, reduces the information needed from respondents while presuming linearity between cost and mileage. The proportion of hourly wages to in-transit costs implies that respondents can easily substitute between working increased hours (foregoing income) at their norm wage rates and leisure time. We act to delimit this problem by asking respondents to record on average, the number of hours worked per week. The one-third rate as the shadow cost of time is based on theoretical considerations rather than empirical results (McConnell, 1992).

[15] The supply curve for a user to visit the Farmington River is horizontal and not considered in analysis because the distance from an origin to the river, which determines the cost of access to the river, is fixed, and hence, the number of river trips from home does not influence the travel cost per trip.

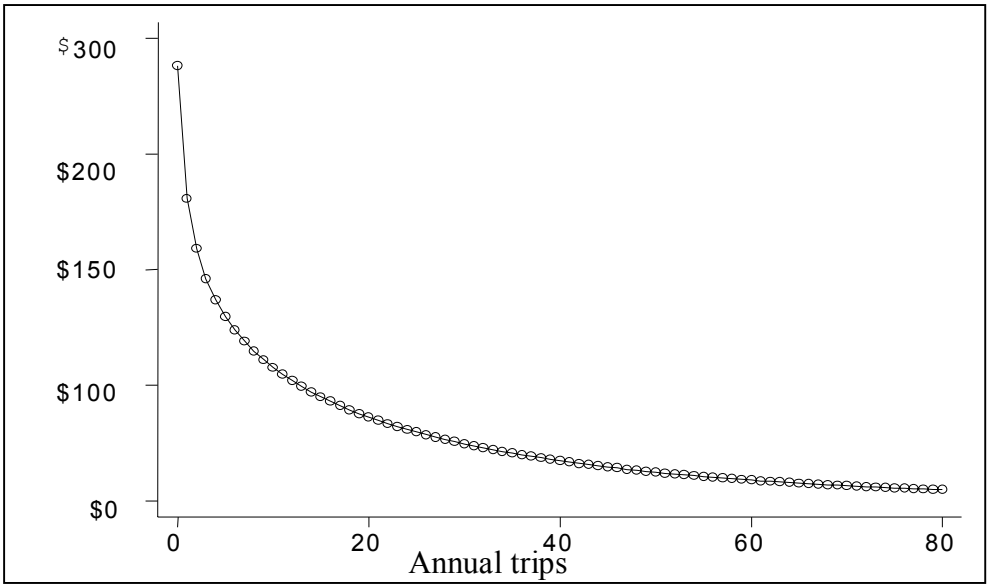


Figure 12. User Willingness-to-Pay for Varying Numbers of Annual Trips to the Farmington River

Estimates of users' willingness-to-pay for the various numbers of Farmington River trips (shown in Figure 12) allow for the calculation of the net economic benefit per river trip. An individual will not take a particular trip if the expected benefit is less than the trip price. On the other hand, a trip is taken when the expected benefit meet or exceed the trip price. The net benefit of the Farmington River to river users is estimated through the computation of consumer surplus to reflect the dollar value of the river to a user (Bockstael, Hanemann, and Strand, 1984).

Specifying the Demand Equation

In theory, each individual has a unique recreation demand curve reflecting the amount of satisfaction to be gained from choosing an optimal quantity of annual trips to maximize outdoor recreation experiences at the Farmington River. The user's demand is for the Farmington River, and is based on the following determinants of demand:

$$TRIPS = f(PRICE, INCOME , QUALITY, ACTIVITY)$$

TRIPS are a function of the trip price, annual household income, quality of the Farmington River, and river recreation activities. Since this demand function is for a single-site, the West Branch of the Farmington River, river quality measures are omitted from demand analysis because site conditions are assumed the same for all river users.

The on-site questionnaire asked users how many trips they expected to make to the West Branch of the Farmington River over the next 12 months. This intended trip information is needed in the single-site benefit modeling process to surmount the lack of variation in single-site quality

measures and to incorporate user satisfaction with current on-site experiences. Recreation choice theory proposes that individuals choose recreation sites and activities based on their satisfaction relative to a site's characteristics and attributes. Quality then influences each user's decision about a quantity of trips per season. The problem is that quality measures, like the number of park acres, do not vary across individual users visiting the same recreation site. Hence, all users are experiencing the same level of site quality. This makes incorporating quality into a single-site demand model a difficult task because there simply is no variation in the same site quality measures across users. The more direct way to incorporate recreation activity preferences and quality into the modeling process is to extend the demand analysis by directly incorporating the number of *intended* future trips as was done in this study. By combining the current (trips taken during the past 12-months) and the intended trip behavior data, the West Branch of the Farmington River experience and site qualities can be incorporated into the demand analysis.

The average number of trips users had taken during the previous 12 months (current behavior) was 26.57 (SD = 54.32, n = 461). Respondents stated that they intended to take an average of 29.38 trips (SD = 55.82, n = 461) during the next 12 months.[16] A two-sample Wilcoxon rank-sum (Mann-Whitney) test indicated that the difference between the number of actual trips and intended trips with current quality conditions was not significantly different at the $p <. 01$ levels. However, there is evidence of hypothetical bias. Intended trips may be overstated due to the enhanced quality of current river conditions over past trips or simply the optimistic intentions of respondents. When unexpected constraints materialize, the full extent of users' good intentions may not be realized. For example, annual incomes may decrease during the coming year and the number of intended trips may not be taken by the user. Based on this result, we estimate recreation demand with a dummy variable indicating whether the trip and cost information for that observation is current data (*CURRENT* = 1) or intended trips data (*CURRENT* = 0). As stated previously, the true demand for the West Branch of the Farmington River by users should be reflected in both the current and contingent (intended) behavior questions posed in the survey. The empirical consistency of the current and contingent data is assessed by the influence of the variable *CURRENT* to distinguish between the quantity of seasonal trips during the past 12 months and intended trips for the next 12 months.

Statistical Analysis

Hellerstein (1991) describes statistical analysis and data treatment for non normal data attributes of trip counts such as those used as the dependent (trips) variable in this analysis. We follow this approach by evaluating the combinations of current counts of seasonal trips with those intended trip counts per case (respondent) with the application of a panel data estimator as described by Englin and Cameron (1996). The panel count-data estimator explicitly deals with multiple observations per respondent (i.e., current and intended trips); zero intended trips, and the counts of annual trips that are entirely nonnegative integers. The data are restricted to users who provided a complete set of observations on the demand data when intercepted and interviewed by on-site interviewers and when completing the follow-up mail-back survey questionnaires. The sample size of 922 is derived from the two observations per respondent multiplied by 461

[16]Note that the standard deviations are nearly twice as large as the mean trip counts.

complete cases (respondents) from on-site interviews. A random-effects negative binomial model is applied to the entire data set to account for the over dispersion in trip count data (M = 26.59, SD = 54.32, n = 461) and to estimate recreation demand functions for the West Branch of the Farmington River to explain users' activity behaviors and to compute consumer surplus values. A random-effects specification is proposed for the panel data over a fixed-effects approach because we want to recover the coefficients on the determinants of recreation demand and to randomly distribute the over dispersion parameter across respondents (Cameron and Trivedi, 1998). A negative binomial estimator for panel count data is applied to the sample data specifying that the observations are independent across cases but not within the multiple observations per cases (Cameron and Trivedi, 1998, p. 288).

Intended Behavior Questions

Recreation choice theory proposes that individuals choose recreation sites and activities based on their satisfaction relative to a site's characteristics and attributes. Trip prices and site quality influences each user's decision about the number of seasonal trips to the West Branch of the Farmington River. Contingent behavior analysis is useful to managers because it infers the willingness by users to increase or decrease their participation under different hypothetical circumstances, particularly, if users are familiar with the site. West Branch of the Farmington River users tend to be familiar with the river segment designated as a wild and scenic river (Mean = 26.57 annual trips). Further, frequent users are accustomed to making trade-offs among the site characteristics of different recreation areas such as congestion, quality of the resources, presence of facilities, travel times, etc. In short, respondents are able to react better to hypothetical questions that require them to measure changes in their intended trips when considering their past trip behaviors, as opposed to traditional contingent fee questions involving hypothetical increases or decreases in trip prices to the West Branch of the Farmington River where there is no access fee charged.

We test the sensitivity of the impact of the hypothetical changes on the trip behaviors of users by combining the current and the intended trip counts in a recreation demand model. We also include the corresponding changes in the intended trip data from respondents' reactions to alternative hypothetical trip price and site quality changes. The impacts are evaluated in terms of the annual trip counts and the recreation economic benefits between the different scenarios, below.

Scenario A. Current trip price and hypothetical price increases of 50% and 100% at current quality.

Respondents were asked to supply their intended trips during the next 12 months through the following three hypothetical questions:

1. *Current price.* "About how many trips do you expect to take to this segment of the West Branch of the Farmington River during the next twelve months?"

2. *50% increase*. "Travel expenses change over time. For example, gas prices increased last year. If your cost per trip were to increase by one-half (50%) over the amount you just reported, how many trips would you probably take to the West Branch of the Farmington River during the next 12 months?"

3. *100% increase.* "If your cost per trip were to double (100% increase) from the amount you just reported, how many trips would you probably take to the West Branch of the Farmington River during the next 12 months?"

Trip prices are modified to account for hypothetical increases in costs of 50% and 100% by multiplying the current price by 1.5 and 2.0, respectively. Hypothetical changes in prices and the associated quantities of intended trips for the next 12 months are incorporated along with data on current trips at current prices and quality.

Scenario B. Current site quality and hypothetical impairment of recreational and scenic features at current price.

Respondents to the mail-back questionnaires were asked to supply their intended trips during the next 12 months through the following two hypothetical questions:

1. *Current quality.* "About how many trips do you expect to take to this segment of the West Branch of the Farmington River during the next twelve months?"

2. *Man-made or natural disaster impairment to West Branch of the Farmington River.* "Suppose the recreational and scenic features at the West Branch of the Farmington River were impaired by a man-made or natural disaster that left the river nearly impassable and significantly lowered water quality. How many trips would you probably take to the West Branch of the Farmington River during the next 12 months?"

Hypothetical Changes in Trip Behavior and Management Concerns

Wild and scenic rivers are important natural resources that generate important recreation experiences and economic activity associated with tourism and outdoor recreation. Concern for protecting and managing wild and scenic rivers is motivated, in part, by human impacts, such as water pollution, shore erosion from unauthorized river access, and encroachment of residential and commercial development along river corridors, which adversely impact river health. The desire to mitigate such impacts requires resource managers to weigh the recreation benefits generated by wild and scenic rivers against the costs associated with river protection and management. Valuing the benefits and recreation use of the river is a necessary step for the West Branch of the Farmington River Coordinating Committee and other authorities to make comparisons of the benefits and costs of management decisions.

Contingent behavior methods can be used to value quality at a single site and predict user responses to changes in trip prices. Of relevance to decision-makers are the reactions by users to future management plans that weigh trade-offs between trip prices and site quality. Contrasting

users' reactions to hypothetical changes in prices and site quality should enable West Branch of the Farmington River managers to focus on those actions most critical to the successful protection and management of the river corridor. Given the proximity of the West Branch of the Farmington River to the city of Hartford, CT, and other densely populated areas, we speculate that a hypothetical decrease in site quality would lead to a greater shift in the demand for seasonal trips to the West Branch of the Farmington River than a hypothetical increase in trip prices.

West Branch of the Farmington River Demand Specification

The general recreation demand model is specified as a random-effects negative binomial or is characterized by statisticians as an over-dispersion model. The preliminary analysis of the on-site and mail-back questionnaire data are statistically significant determinants of recreation demand. The specification includes an indicator variable, *CURRENT*, to identify observations in cases having the current trips from the past 12 months in each case. Variables dropped from preliminary statistical analysis because they were limited in data or found not to be statistically significant included annual household income, amount of time on-site, substitute sites, and an indicator variable identifying users who took side-trips (rather than primary trips) to the Farmington River.

The resulting demand specification estimates the expected quantity of annual trips, *E[TRIPS]*, by incorporating the current trips during the past 12-months and the intended trips for the next 12-months at current quality and trip prices. The panel data sample is balanced, meaning that the analysis is restricted to respondents providing a complete set of two observations on the trip demand data when intercepted and interviewed by on-site interviewers. Taking advantage of the repeated observations of trip responses (i.e., current and intended), we estimate the expected annual river trips with the following demand model below:

$$E[Trips] = \exp(\alpha 0 + \alpha 1(CURRENT) + \beta 0(PRICE) + \beta 1(PRICE \times CURRENT) + \beta 2(TUBING) + \beta 3(PRICE \times TUBING) + \beta 4(FISHING) + \beta 5(PRICE \times FISHING))$$

The equation includes both a constant ($\alpha 0$) and a slope shift parameter ($\alpha 1$) to distinguish between the demand for the current seasonal trips and the intended trips given the fact that both involve the same trip price, site quality, and activity variables. The three interaction terms, *PRICE* ***x*** *CURRENT*, *PRICE x TUBING, and PRICE x FISHING* introduce different levels of flexibility into the equation allowing the slopes of the demand curve to differ across the river activities and the current and intended trip counts. Analysis revealed that the current and intended demand models with current quality and trip prices were indeed significantly different from zero. Also of interest are the magnitudes and the differences in trip price responses among river activities, indicating a statistically significant difference in trip prices among the different river activities examined.

In testing the effects of the various scenarios on recreation demand, the panel data are unbalanced meaning that responses to some of the hypothetical questions were either ignored by respondents or incomplete. Of the 239 follow-up, mail-back questionnaires, 199 were acceptable

for statistical analysis for hypothetical increases in trip prices (Scenario A) and 181 respondents provided complete responses to a decrease in site quality (Scenario B). From a statistical perspective, the unbalanced panel size poses no problem.

Findings

Estimation results are displayed in Table 51. The *PRICE* coefficient is significantly different from zero at the 0.01 level and negative in sign, which means that as trip prices increase the quantity of trips decrease and vice versa. The two recreation dummy variables are significantly different from zero and are compared to other boating activities on the West Branch of the Farmington River. The expected trip count for *TUBING* is negatively related to boating, while *FISHING* is positively related to higher trip counts. Of interest are the magnitudes of the differences in trip price responses among river activities, specifically, the joint hypothesis $(\beta 0 = \beta 3 = \beta 5 = 0)$. Testing the joint hypothesis indicates a statistically significant difference in prices among participants in the different river activities. The inverse of the over dispersion in trip counts follows a Beta distribution as shown in Table 51, which describes the common variation in individual responses across both the current and intended trip behavior formats. The dummy variable or intercept shifter, *CURRENT*, is negative and significantly different from zero at the 0.01 statistical level. The coefficient on the interaction term between the *CURRENT* dummy variable and *PRICE* is positive, but not significantly different from zero. It was dropped from statistical analysis and was not shown in Table 51.

By maintaining the *CURRENT* dummy variable as a demand shifter, the current and intended data can be combined after the hypothetical bias is calibrated. In other words, the current and intended data represent the same underlying behavior at the current site quality and prices after accounting for the shift in current trip demand. Table 51 includes a likelihood-ratio test, which compares the panel estimator with the pooled estimator (i.e., a negative binomial estimator with constant dispersion) and the panel estimator is significantly different from the pooled estimator.

The estimation for the two hypothetical scenarios is also displayed in Table 51. The Wald chi-squares (χ^2's) are significant indicating all three recreation demand equations adequately model the trip behaviors of West Branch of the Farmington River users, and there is common variation in individual responses across current and intended trip demands. The dummy variable, *CURRENT*, is statistically significant in the three demand models indicating the slopes of the current trip demand curves are different from intended trip demand curves. The sign is negative for hypothetical price increases, like current trip prices. This probably reflects the fact that over 50% of the respondents traveled less than 31 miles one-way to visit the West Branch of the Farmington River and trip prices present a relatively minor impact on foregone earnings. The sign on the variable *CURRENT* is positive for the hypothetical man-made or natural impairment to river quality at current trip prices, as expected, meaning that the demand for current trips is greater than for intended trips with a river impairment.

Table 51. Random Effects Negative Binomial Estimator Results for Current and Hypothetical Recreation Demand Models of the West Branch of the Farmington River. Dependent Variable: Number of Annual Trips

	Current Site Quality and PRICE (n = 992)[a]		*Hypothetical Increases in Cost at Current Quality (n = 1134)[b]*		*Hypothetical Impairment to Quality at Current Cost (n = 1372)[c]*	
Variables	*Coefficient*	*Mean*	*Coefficient*	*Mean*	*Coefficient*	*Mean*
CONSTANT (α0)	2.6661640** (0.2437755)	1.00	2.416901** (0.1930999)	1.00	0.598083** (0.190328)	1.00
CURRENT[d] (α1)	-0.1759774** (0.0254092)	50.00%	-0.147430** (0.0244121)	33.60%	0.152905** (0.0441154)	40.65%
PRICE (β0)	-0.0092976** (0.0023379)	$80.27	-0.0078726** (0.0018604)	$93.65	-0.0052305** (0.0019956)	$81.17
TUBING[e] (β2)	-1.5584580** (0.2568980)	21.69%	-1.273696** (0.2323792)	20.35%	-0.8440261* (0.2190188)	21.07%
TUBINGx PRICE (β3)	0.0081672** (0.0024769)	$25.37	0.0055712** (0.0020521)	$27.28	0.0041697* (0.0021345)	$24.74
FISHING[e] (β4)	0.6331128** (0.2264159)	65.73%	0.0602364** (0.1929569)	68.07%	0.4140892* (0.1922995)	66.93%
FISHING x PRICE (β5)	0.00051731* (0.0024304)	$46.45	0.9946945** (0.0019058)	$57.80	0.0020216 (0.0020792)	$48.36
Beta(r, s)[f]	(2.03, 1.75)		(1.84, 1.75)		(1.25, 4.70)	
Summary statistics						
Wald $\chi2(6)$	363.08 **		352.59**		168.36**	
Log likelihood	-3,190		-4,557		-4,035	
Likelihood ratio versus pooled:	$\chi2$ (1) = 1042**		$\chi2(1)$ = 1896**		$\chi2(1)$ = 654**	

Notes. Standard errors are in parentheses. The χ^2 (chi-square) values in the estimators assert that there is common variation in individual responses across current and intended behaviors. The random effects model for current site quality and PRICE are balanced with two trip responses per respondent. The remaining estimators are unbalanced.

[a] Sample size is 922 observations (2 observations per 461 respondents to the on-site interviews).
[b] Intended trip responses are for the costs per trip remaining the same, 50% increase, and doubling (100% increase) from the average cost per trip amount just reported by respondents.
[c] Intended trip responses are in reaction to the site quality remaining the same or to a hypothetical change with the question, "Suppose the recreational and scenic features at the West Branch of the Farmington River were impaired by a man-made or natural disaster that left the river nearly impassable and significantly lowered water quality. How many trips would you probably take to the West Branch of the Farmington River during the next 12 months?"
[d] Current variable equals 1 for current data; else 0. The interaction variable PRICE x CURRENT is not significant.
[e] TUBING variable equals 1 for individuals current by doing the activity; else 0.
FISHING variable equals 1 for individuals current by doing the activity; else 0.
[f] The inverse of dispersion in trip counts is assumed to follow a Beta(r, s) distribution. The error distribution has a mean of r / (r + s) and variance of rs / [(r + s +1) (r + s)^2].
*$p < .05$. **$p < .01$.

The coefficients on the variable, PRICES, are significant and negative in their signs indicating that trip counts decrease as trip prices increase. The magnitudes of the PRICE coefficients for the two hypothetical scenarios are smaller than the PRICE coefficients at current trip prices and site quality. The lower magnitudes in the sizes of the PRICE coefficient values for the hypothetical scenarios indicate that respondents are reacting to the changes in trip conditions by taking fewer trips.

The elasticity of demand is a measure of the change in trips demanded in response to a change in an explanatory variable (Table 52). The price elasticity of demand is the percentage change in seasonal trips divided by the percentage change in trip prices (*PRICES*). The higher the price elasticity of demand, the more responsive the demand for trips is to a change in price (i.e., price elasticity of demand ranges from zero to a unitary value of negative one). For example, reviewing the variable, CURRENT, in Table 52, Columns 1 and 2, there is an elasticity of a negative 0.0879 % ($E_{CURRENT}$ = -0.176 x 0.50) or approximately 9% difference between current and intended trips demanded.

The price elasticities of demand at current site conditions and prices are in Table 53 and are compared with the two hypothetical change scenarios in site quality and trip prices. The price elasticity of demand for West Branch of the Farmington River trips is quite inelastic (i.e., price elasticity is near –1.00). Elasticity values range in Table 52 from -0.75 at current site conditions (Column 2) to -0.42 for the hypothetical impairment to site quality. Overall, the price elasticities of demand for West Branch of the Farmington River trips are relatively low because trips are taken frequently. The price elasticities of demand under current site quality, even with hypothetical increases in access costs, are almost the same, but an estimate of the expected trip count under current site conditions is greater than for trips demanded to the West Branch of the Farmington River with a diminished site quality. User demand for river trips under diminished quality circumstances is not as sensitive to changes in trip prices as is user demand with current quality conditions. The smaller percentage of users' income spent on fewer river trips means that it simply is not worthwhile for users to waste time worrying about trip prices under diminished site quality conditions. With current site quality, users are more sensitive to changes in prices and are willing to spend additional money, demanding frequent trips to the West Branch of the Farmington River.

However, from Table 52, the price elasticity differences under current site conditions (E_{PRICE} = -0.75) and the 50% and 100% hypothetical increases in prices (E_{PRICE} = -0.73) suggests that the expected changes in the demand for trips is not sensitive to the hypothetical increases in trip prices. In fact, the current demand for river trips would be only slightly affected, if at all, by increased trip prices. Such increased could be in the form of increased costs or even the imposition of an access fee.

Table 52. Elasticity, Consumer Surplus and Predicted Trips from Current and Contingent Behavior Data Sample for Hypothetical Increases in Prices and Site Quality Impairment

	Current PRICE and Site Quality	*Hypothetical Increases in Cost at Current Quality*[a]	*Hypothetical Impairment to Quality at Current Cost*[b]
Price elasticity[a]	**-0.75**	-0.73	-0.42
Mean PRICE	**$80.23**	$93.65	$81.17
Trips per season	**10.56**	9.06	1.71
	Consumer surplus Point Estimates		
Per season[b]	**$1,136.20**	$1,151.56	$326.76
Per user per season[c]	**$371.58**	$376.61	$106.86

[a] Price elasticities of demand are implied because they are calculated at the means of the explanatory variables multiplied by their coefficients *β's* because the negative binomial specification is log-linear.
[b] The consumer surplus per trip values are point estimates derived from formulas described by Englin and Cameron (1996). For the current trips, the point estimate formula is *TRIPS* / β0.
[c] Mean number of users per trip from on-site interviews is 3.057732 users per trip.

The expected trip counts decrease from the current count level of 10.56 per year to 1.71 trips per year if the West Branch of the Farmington River incurred a hypothetical impairment in quality. Again, the approximately one trip per year decrease in trips between the current prices and hypothetical increases in prices represents the fact that increased prices have relatively little impact on foregone earnings of users.

The negative binomial panel estimator imposes a semi-logarithmic functional form on recreation demand (See Figure 13). Englin and Cameron (1996) provide consumer surplus point estimates corresponding to semi-logarithmic demand specification. Consumer surplus (*cs*) per trip represents the net economic value of the West Branch of the Farmington River and is a primary input into benefit-cost analysis. Consumer surplus per year is calculated as the negative inverse of the slope of the demand curves. The seasonal economic benefits under current conditions (*cs = $1,136*) and the hypothetical scenario of increases in trip prices are similar (*cs = $1,151*). Consumer surplus estimates drop dramatically with a hypothetical man-made or natural impairment to site quality (*cs = $326*).

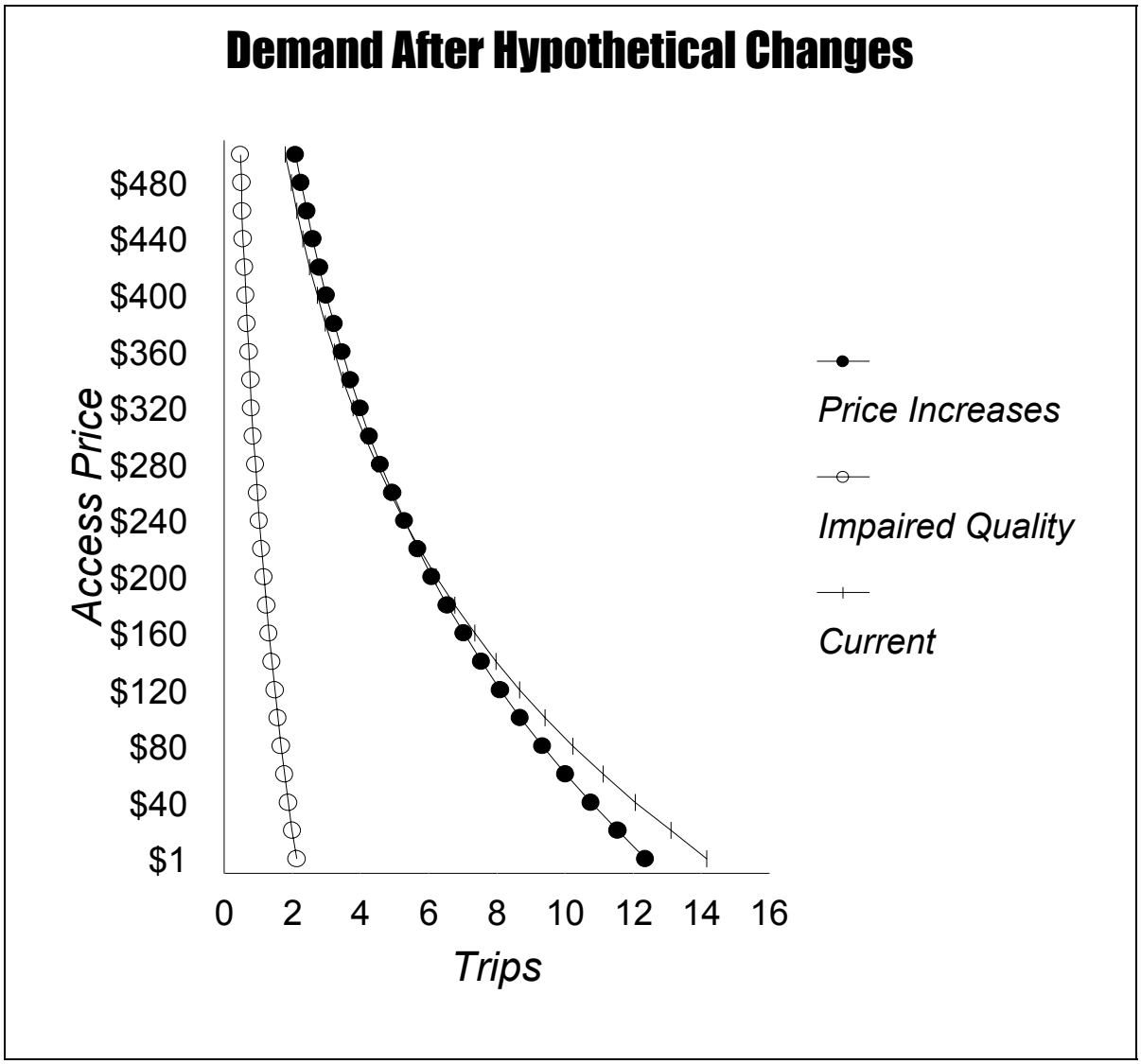


Figure 13. Demand after Hypothetical Changes

Earlier, we discussed the importance of wild and scenic rivers, like the West Branch of the Farmington River, to tourism and outdoor recreation, and the necessary attentions of authorities to protecting and managing river resources. By combining current and intended trip data in demand analyses, we are able to infer changes in trip and benefit values for trip price and site quality changes. In contrast to current site conditions and trip prices, trip counts decrease for both the hypothetical scenarios, but most dramatically for the scenario of diminished site quality. Price increases, it is estimated, would affect seasonal trip counts by only one trip per year. However, users would demand significantly fewer seasonal trips (10.56 trips versus 1.71 trips), if either a natural or a man-made disaster were to impair the Farmington. Similarly, the current economic benefits to users would drop dramatically from $1,136 per season to $326 per season if the river were impaired, while increased prices would have very little effect (*cs* = $1,151 per year). Our conclusion is that the protection and maintenance of the West Branch of the Farmington River's natural, scenic, and recreational resources are most critical to the recreation

experiences of users. Therefore, the quality of river resources should be the highest priority for river authorities. Even the imposition of fees, for example, would not deter use or decrease benefits as significantly as a deterioration of the river's site quality.

Demand Analysis of River Activities

In order to identify and test for differences in price responses among the different river activities, activity interaction variables are introduced into Equation 2 to permit the slope of the demand curves for activity participants to differ. The interaction variables are the product of the average prices for each activity and the activity dummy variables. The responsiveness of the trips demanded to a change in annual trips and prices are computed at the mean values of the explanatory variables. We earlier rejected the joint hypothesis that the river activities have identical demand curves. Approximately 21% of the respondents either rented tubes or brought their own tubes to float the West Branch of the Farmington River, while 66% who visited the river participated in fishing, and the remaining 13% went canoeing or kayaking. Given the significance of the coefficients and their signs on the TUBING and FISHING dummy variables in Table 51, fishing users demand $E_F = (\beta 4 \times 0.6573) = (0.4161 \times 100) = 41.61\%$ more trips than boating users and tubing users of the river demand $E_F = (\beta 2 \times 0.2169) = (0.338 \times 100) = 33.80\%$ fewer seasonal trips than boating users.

On average, we expect anglers to demand 20.48 trips per season, tubers to demand 2.69 seasonal trips, and boaters to demand 7.08 seasonal trips. Table 53, Columns 2 through 4, displays this summary information about expected trip counts by river activities. Columns 5 through 7 show expected trip counts for hypothetical increases in trip prices, and Columns 8 through 10 displays the expected trip counts for a hypothetical man-made or a natural impairment to recreation use at the West Branch. Users are not very willing to change their trip behavior due to hypothetical increases of 50% and 100% in trip prices. The results are dramatically different when users are presented with the hypothetical impairment diminishing the qualities of river resources.

Consumer surplus per trip is calculated as the negative inverse of the slope of the demand curves. The coefficients on PRICE ($\beta 0$) and the interaction variables ($\beta 3$, $\beta 5$) are displayed in Table 51. The consumers' surplus for fishing is \$4,967 [*TRIPS* / ($\beta 0 + \beta 5$)], for tubing is \$2,383 [*TRIPS* / ($\beta 0 + \beta 3$)], and for boating is \$107 (*TRIPS* / $\beta 0$). The consumer surplus results (Table 53, Columns 2 through 4) suggest that a policy of encouraging relatively greater tubing participation on the river would be judged as being more efficient from an economic standpoint (i.e., fewest trips in relation to economic benefit). However, when placed on a per user perspective, the benefits to fishing users (\$2,656) and tubing users (\$368) are not comparable (Figure 14). The total willingness-to-pay or economic benefit of the West Branch of the Farmington River is highest for fishing at \$6,230K from the annual use estimate of 48,052 fishing visits, next is tubing at \$3,214K from the 23,510 annual tubing visits, and finally boating at \$1.9K from the 5,863 annual boating visits. The total economic benefit of the three activities combined was, therefore, \$9.45 million in 2001.

Table 53. Predicted Trip Counts and Consumer Surplus of Current and Intended Data by River Recreation Activities

	Current Site Quality and Trip price			*Hypothetical Increases in Price at Current Quality*			*Hypothetical Impairment to Quality at Current Price*		
	Fishing (2)	Tubing (3)	Boating (4)	Fishing (5)	Tubing (6)	Boating (7)	Fishing (8)	Tubing (9)	Boating (10)
Expected trips per season	20.48	2.69	7.08	16.21	2.80	5.96	2.50	.81	1.36
cs per party per year[a]	$4,967	$2,383	$759	$5,102	$1,218	$757	$781	$764	$260
cs per user per year	$2,656	$368	$230	$2,728	$188	$229	$417	$118	$79

Notes.

[a] Consumer surplus per party per year values are point estimates derived from formulas described by Englin and Cameron (1996). For the current trips, the point estimate is $TRIPS / \beta 0$, and for the activity of tubing, for example, the formula is $TRIPS / (\beta 0 + \beta 3)$ from Equation 2.

[b] The mean numbers of users per trip by activities is 1.87 (fishing), 6.47 (tubing), and 3.30 (boating).

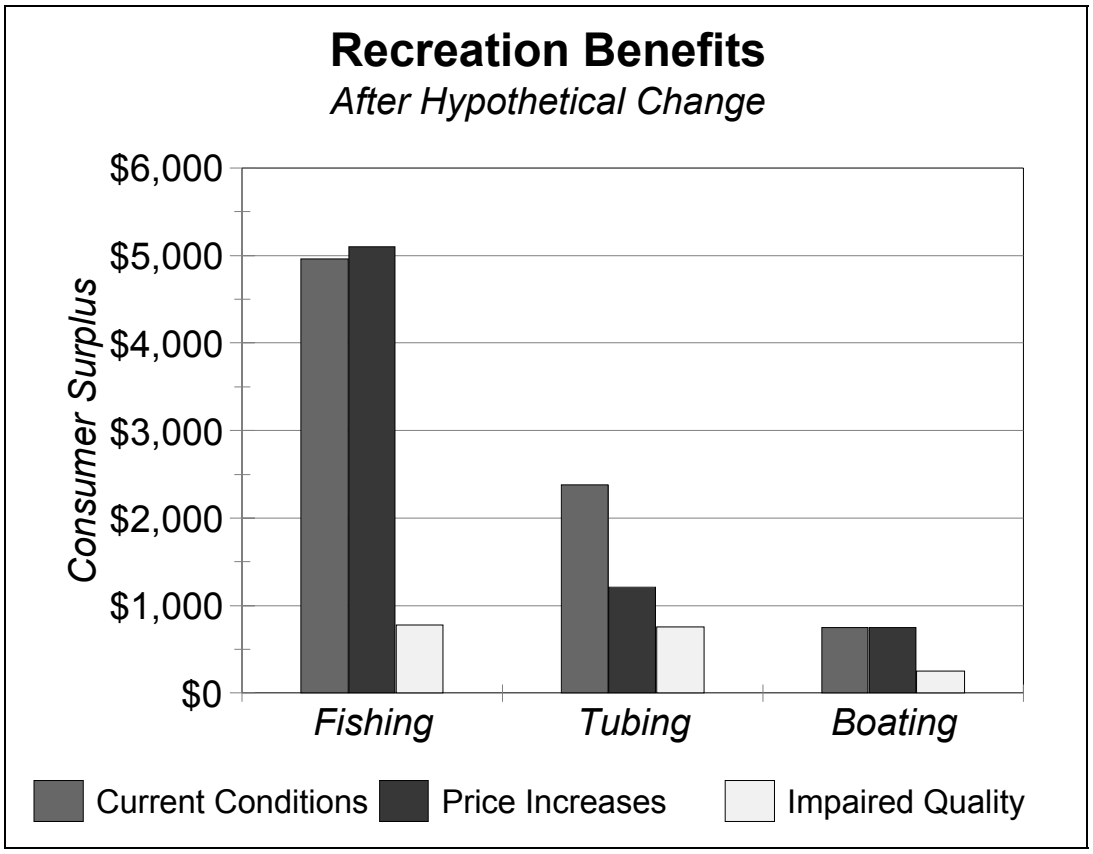


Figure 14. Recreation Benefits After Hypothetical Changes

VI. ECONOMIC BENEFITS TO NEARBY RESIDENTIAL PROPERTY OWNERS

The fourth study objective was to estimate the economic benefit of the Wild and Scenic segment of the West Branch of the Farmington River to residential land owners in a six-mile area surrounding the river. In general, two approaches can be used to estimate the effects of an environmental amenity on property values. The first is to ask experts such as appraisers, real estate agents or the property owners themselves about their experience or opinions regarding the effects. The other is to analyze real estate sales data and attempt to isolate the effect of the amenity (in this study, the Wild and Scenic West Branch of the Farmington River). We selected the latter approach because it would produce more valid and reliable results. Recent hedonic valuation studies include a variety of different setting and environmental issues. Lutzenhiser and Netusil (2001) examined the relationship between the proximity to different open spaces—parks, cemeteries and golf courses—and real estate prices. Reynolds and Regalado (2002) discussed the effects that wetlands have on land values. Mahan, Polasky and Adams (2000) studied the value of urban wetlands in relation to real estate prices. Hamilton and Quayle (1999) estimated the impact of riparian greenways on housing values.

We began by observing the real estate prices of recently sold properties as a function of the proximities of select properties near the West Branch of the Farmington River. Next, we inferred the economic benefits to land owners as the marginal price per foot from the river. We followed a theoretical framework applied widely to housing markets for estimating the benefits and costs of environmental quality characteristics on real estate prices (Pompe & Rinehart, 1995). In application, this hedonic pricing method attempted to isolate the effects of the real estate proximity to real estate prices by controlling for the variations in land, structural housing, and neighborhood characteristics. As an outcome from the estimation process, the implicit price of the quality characteristic was interpreted as a contribution to the property's value as perceived by the purchaser.

Land Valuation Method

A computer software product and data set containing residential property sales information for Litchfield and Hartford Counties from1986 through 2001 was purchased from a private firm specializing in nationwide real estate data. The duration of time was chosen to account for the designation of the West Branch as a Wild & Scenic river in 1994. The housing market was a six-mile zone on either side of the West Branch of the Farmington River. A sample of properties was extracted from housing sales data for Barkhamsted (19%), Canton (3%), Colebrook (3%), Hartland (29%) and New Hartford (46%) townships. We assumed that the housing market was homogeneous meaning that data for a single residential housing market was sufficient in identifying how the same property owner would respond to different prices and incomes (Palmquist, 1992).

The distance variable was the proximity of the West Branch of the Farmington River to each of the residential properties identified from the sales data for the past 15 years. Distance from the river was measured with a straight-line distance in feet (Mean = 10,546 feet, Range of 117 to 28,732 feet). We began by locating the addresses of residential properties on an extremely

accurate digital map (i.e., geocoded). The address points were then analyzed with ArcView 3.0 (a geographic information system) as "shape-files" along with the location of the river (i.e., a line feature). In addition, copies of the assessors' property records were obtained containing the necessary housing information on parcel acreage and housing characteristics (e.g., square footage in homes, number of rooms, and year built) for homes sold during the past 15 years.

In land valuation studies, the dependent variable consists of the sale prices of residential properties or vacant lots. The dependent variable in this study was limited to residential land values, as if the houses did not exist on the parcels (Parsons, 1990). First, we specified the housing market to be within a six-mile zone on either side of the West Branch of the Farmington River and assumed that the supply of residential land was fixed. Consequently, the positive benefits of a wild and scenic river cannot be shifted to other housing markets in different locations. We therefore expected to find the majority of the land valuation effects of the river reflected in this six-mile housing market. We measured them by observing associated changes in land values. Second, we reasoned that purchasing more land does not increase the owner's access to the West Branch of the Farmington River; rather, it reduces the amount of land available for others to enjoy access from that location. The reduced availability is considered a user cost. User costs are accounted for in sale prices, and result in weighting environmental amenities in land valuation functions (Parsons).

Researchers have formulated land valuation regressions using the value per acre as a dependent variable and the environmental amenities in proximity to that land as independent variables (Diamond & Tolley, 1982). Land values were computed as follows: Residential land value = (assessed land value / total assessed value) * sale price. Weighting the land values by dividing them by their parcel sizes allowed the West Branch of the Farmington River (x) distances to vary across properties in proportion to the land acres in the parcel.

Results

Data were limited to a sample of 253 residential real estate transactions from 1986 to 2001. The limited number of data points coupled with the volatility in land sale prices resulted in a mean value per acre of $50,837 and a standard deviation of $30,268. In other words, land values would vary between $20,569 (= $50,837 - $30,268) and $81,110 (= $50,837 + $30,268) 68% of the time. The mean parcel size was 2.7247 acres and ranged from .08 to 49.8 acres. The over-dispersion in land values per acre in relation to the distances of the West Branch of the Farmington River to residential lands is displayed in Figure 15.

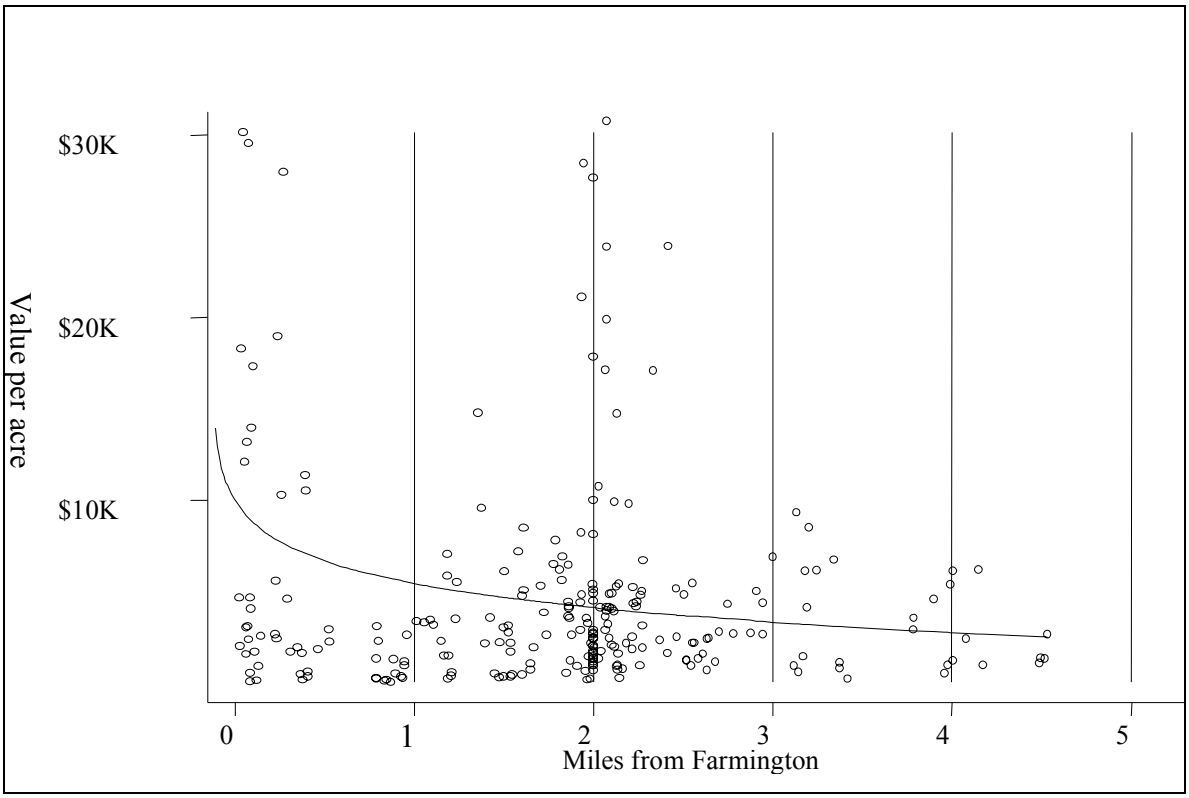


Figure 15. Estimation of the Economic Benefits of the Farmington River to Residential Land Values

The dots in Figure 15 represent the intersections between the land values per acre and proximity to the Farmington Wild and Scenic River. The solid curved line reflects estimated land values as a function of distances to the West Branch of the Farmington River. Data are from 1986 to 2001.

The estimation of land values was a function of the parcel distances from the West Branch of the Farmington River, and estimated with the following equation:

$$y = a - b(x) + e,$$

y = residential land value / parcel size (acres)
a = constant value
b = coefficient on independent variable
x = distance in feet from the West Branch of the Farmington River to the residential parcel
e = error term.

The resulting land value equation was:

$$y = 226{,}892 - 19{,}829.94 * \ln(x)$$
(37,394) (4,177) (Mean Square Error = $76,132)

The standard errors of the coefficients are in parentheses. The constant and the independent variable coefficient were significant at the 0.000 level of statistical significance. The land valuation model was statistically significant, with F-value (1, 251) = 22.53, probability > F-value = 0.000. The symbol, ln, is the natural logarithm of distance (x). The natural logarithm of the independent variable was taken due to the nonlinearity of the estimation through the data points, displayed in Figure 15. A variable representing the wild and scenic river designation in 1994 was not significant statistically in explaining land values, and was dropped from analysis. The root mean square error of the estimated mean per acre value was $76,132, indicating the estimated mean land value ranged from $25,295 and $126,969 per acre. Overall, the land valuation model explained approximately 8% of the residential land value.

Implications

An estimation of the beneficial effect of the West Branch of the Farmington River on residential land values was obtained with the negatively signed value for the distance from the river coefficient. The resulting value was negative because as the distance from the residential property to the river decreased, the land value per acre increased as an inverse relationship. Generally, the closer the of residential land was to the river, the greater was the influence on land values of the river. For example, residential lands closest to the river had a distance of 118 feet. The estimated value was $168.05 per foot and the parcel size was .69 of an acre. Therefore, the economic benefit of the river's proximity to that residential land value was $13,697 (= $168 * 118 feet * .69 acre) or 42% (= $13,697 / $32,243) of the land price.[17] Typically, the economic benefit of an environmental amenity on a land's value is the reported at the mean value of the amenity when the estimation process is nonlinear. A proportional increase or decrease in the value per foot cannot be assumed by the analyst. The mean distance from residential properties in the six-mile zone to the West Branch of the Farmington River was 10,546.93 feet. Disregarding the negative sign on the coefficient's value, the resulting economic benefit was $1.88 (= $19,829.94 /10,546.93) per foot. We estimated that the proximity of the West Branch of the Farmington River to residential land one mile (5,280 feet) away contributed $3.76 (= $19,829.94 / 5,280) per foot to the value of that land. The West Branch of the Farmington River's influence on residential lands two miles from the river was approximately $1.88 per foot, three miles was $1.25 per foot, four miles was $0.94, five miles was $0.75, and six miles was $0.63. In summary, the West Branch of the Farmington River, as an environmental attribute, has an implicit value to residential property owners. Property owners that demand properties near the West Branch of the Farmington River place a higher economic value on the river than those at more distant locations.

[17] The first derivative of the independent variable, distance (x), to obtain the marginal value per foot from the Farmington River, was d/dx [-b ln(x)] = -b / x, and x was the distance measured in feet.

VII. CONCLUSIONS AND RECOMMENDATIONS

This section summarizes and highlights the key study findings. It also draws conclusions and makes recommendations based on them.

In the broadest terms, the wild and scenic river segment of the West Branch of the Farmington River is a day use river frequented most by anglers, tubers, and boaters. Over half of all users travel 30 miles or less one-way to get there and 90% are on day trips rather than staying overnight. Being primarily a day-use river does not mean that the West Branch of the Farmington River is lightly used. We estimate that there are over 77,400 visits to the segment annually. Sixty-two percent of the visitors are anglers, 30% are tubers, and another 8% are boaters.

Regardless of why people visit the West Branch of the Farmington River, it is clear that visitors to the West Branch of the Farmington River generate a large economic impact in the five river towns. The total economic impact of river recreation is approximately $3,630,000 annually with an estimated 63 jobs supported by river recreation in the area. This is especially large considering the impact area is relatively small and generally rural. This impact is also large considering that only 10% of the visitors to the West Branch stay overnight. Lodging expenses from overnight stays are typically one of the largest expenditure categories in economic impact estimations in outdoor recreation settings. The West Branch of the Farmington River's economic impact would have been higher had the impact area been expanded to include all of the two counties through which the wild and scenic river segment passes. This study limited the impact area to the five river towns corresponding to the jurisdictions of the organizations represented on the West Branch of the Farmington River Coordinating Committee.

The total economic benefits (consumer surplus values) to visitors of the West Branch were also quite large amounting to over $9.45 million for three river activities—angling, tubing, and boating--in 2001. Remember that total economic benefits are an estimate of the total social value of the recreational use of the river, and are not directly related to expenditures. Anglers received the majority of the total benefits followed by tubers then boaters. An important conclusion of the analyses of the contingent behaviors of the river users was that maintaining the high quality of river resources is the most important aspect of their recreational demand for visits to the West Branch. This is consistent with the Wild and Scenic Rivers Act's emphasis on free flowing conditions and "outstandingly remarkable" resource values.

In general, West Branch of the Farmington River users tended to be well-educated, middle-aged males with relatively high household incomes. Two characteristics of river users are worth noting. The small percentage of women using the river (16%) was a surprise. The uneven gender breakdown is probably related mostly to the fact that fly-fishing still tends to be a male-dominated activity. This situation is changing and the proportion of West Branch of the Farmington River users who are female will likely grow accordingly. The other somewhat unexpected finding was that the second most common occupation among users was "retired" (20%). This sizable segment of users will likely be growing as the population in the northeast continues to age.

A proportion of the West Branch of the Farmington River user base was still relatively new to the river. Over 40%, was either on their first visit there or had made their first visit 5 years ago or less. This represents both a challenge and an opportunity for managers. These new users will need to be informed of river policies, regulations and etiquette, particularly in terms of protecting river resources and minimizing conflicts among user groups. The fact that newcomers represent such a large group presents an opportunity for managers, as well. Many of these users are still developing expectations and habits related to using the river and should be more flexible when it comes to changing any behaviors that might cause problems. In addition, a sizable group has been associated with the river for a very long time. Over a quarter of those contacted made their first visit more than 25 years ago. This was, of course, nearly two decades before the segment was designated as a wild and scenic river. Some of these long-time users may be excellent candidates for involvement as river volunteers, monitors, or other roles that require knowledge and dedication to the river corridor.

Although many users are new to the West Branch of the Farmington River, they are not new to river recreation. Most are quite skilled and active in their respective river activities. Perhaps related to this, most do not use the services or equipment of either of the commercial outfitters that serve the segment. This is less true of the tubers, of course. Most of them do rent tubes and use the shuttle provided by Farmington River Tubing.

The river does appear to be providing the kinds of setting and experiences intended by the framers of the National Wild and Scenic Rivers Act of 1968. The nature-oriented motives of enjoying the river views, being close to nature, and experiencing the river itself were the three most important reasons people visited the West Branch. It is clear that conserving the natural river environment is important to Farmington users' experiences and that the protections and intent of the Act to conserve river settings like the Farmington are extremely important in this regard. This does not necessarily mean that users regard the West Branch as wilderness, however. In fact, most describe it as an "undeveloped recreation area." Over a third, however, do feel it is "semi-wilderness." This study did not examine how users viewed the river in terms of the "wild," "scenic," and "recreational" river categories set forth in the Wild and Scenic Rivers Act. Rather, the categories in this study reflect development levels, not the presence or absence of wild and scenic values.

The fact that the seven most important motives overall for people visiting the river were also the top seven experiences attained should be encouraging to West Branch of the Farmington River managers and supporters. This is one indication that current river visitors are getting what they are seeking there and that conservation efforts being effective. This result should be viewed with some caution though. If some earlier users have been unsatisfied enough to decide not to return, they would not have been contacted through the on-site sampling used in this research. The extent of such displacement (if any) is difficult to measure directly on site.

The unique importance of the West Branch as a destination is hinted at by a number of findings. For example, 90% of the respondents indicated their activities or the West Branch of the Farmington River were the most important reasons for their visits. It is clear that some users regard the West Branch as the best place for certain kinds of experiences. Perhaps more

revealing is the fact that 10% of users say they would have simply stayed home if the river had not been available to them that day. There is apparently no substitute for that river segment in their eyes. The closest substitutes for other users appear to be parts of the Housatonic and Salmon Rivers. Over a third of respondents said they would have gone to one of these if the West Branch of the Farmington River had not been available to them that day. Remember that the West Branch is the only wild and scenic segment in the area and the most accessible one to the majority of the people in that part of the region.

Satisfaction was high or very high for most users. Consistent with this, levels of crowding and other problems were quite low on average. A small number found problems with the river. Crowding, too few rangers/management staff, conflicts, and litter were the biggest of these generally minor problems. "Too few rangers/management staff on the river" and "not enough restrooms along the river" had more widely dispersed responses (higher standard deviations) than other river management issues. There were strong feelings on both extremes for these two issues. Management should be careful when considering making changes that some users would consider improvements when others feel strongly those changes are inappropriate.

There is an indication that river conditions are improving in the eyes of users. While 60% of repeat visitors said the quality of visiting the wild and scenic segment had stayed the same since their first visit, 31% felt conditions had improved rather than gotten worse (9%). This should be encouraging. The actions taken by local communities, the CT DEC, and private landowners to improve the wild and scenic segment are being noticed by users.

It was surprising that only about half (47%) were aware that the West Branch of the Farmington River is a designated Wild and Scenic River. At the time of the study, this segment had been designated as a wild and scenic river for nearly 7 years, but over half of the visitors contacted did not know it was part of the Wild and Scenic River System. Although the question was not actually asked, it is likely that some of these users were not even aware that a Wild and Scenic River System exists at all. After reading a brief description of wild and scenic designation provided in the questionnaire, however, the vast majority of respondents felt the Farmington's River designation was important or very important. The obvious question is--Why don't more users know about the wild and scenic designation? In addition, how important is it that they know? The results of this study indicate that when users are aware of what designation is and what protections it affords, they feel strongly that it is important. It seems likely that giving users a greater awareness of wild and scenic river designation and its benefits could lead to greater support for the river and potentially greater support for similar protections for other segments in the region.

Similarly, most felt the partnership model was appropriate for the management of the West Branch and that wild and scenic river designation was effective in maintaining the river's free-flowing character and preserving its outstanding natural, cultural, and recreational features. Most also felt designation was effective in minimizing potentially harmful activities within the 100-foot corridor of land on either side of the river. Again, it seems that when users are aware of how the wild and scenic river segment is protected, they are appreciative and supportive. West Branch users appear to be a well-educated and thoughtful group. Keeping users informed and

involved as much as possible could be particularly helpful when public support is needed to help achieve the objectives of wild and scenic river designation and protection.

There are strong feelings among users that the river does provide important benefits to surrounding communities, particularly fish and wildlife habitat, preserving undeveloped open space, and aesthetic beauty. All of these are consistent with the purposes of the Wild and Scenic Rivers Act. It is interesting that "tourism and business development" was the next to the least important to users on average (although still just above the scale midpoint). Evaluating the economic impacts of river use was one of the four key objectives of this research, but apparently not an issue that is particularly important to the river users themselves. Which of the many river benefits managers choose to emphasize or promote depends in large part on the audience they wish to target. West Branch of the Farmington River users are most concerned about the aspects of the setting that they see when they visit. The economic impacts on local communities of visitors are likely more important to the people who live and work in the surrounding communities than they are to river users themselves.

Users were generally satisfied with the river and the corridor of land along it, but less so with the corridor of land than the river itself. This may reflect user's priorities in some regards. The river is the most important feature to them, in that their activities are not possible without a free-flowing, high quality river, but their experiences are made more pleasant with a natural corridor setting. The natural corridor may be a second priority to many users, but still very important to them. It is also likely that users are noticing some readily visible developments and changes along the river that detract from the natural character that the wild and scenic river designation attempts to maintain. More management attention may be warranted to assure the naturalness of the corridor of land adjacent to the river.

It is interesting that crowding led the list of issues users liked least and was the highest rated problem on average. On average, the level of crowding was actually relatively low (3.4 on a 9-point scale). The situation in terms of user conflicts was similar. Conflicts among the different types of visitors were the third greatest problem, noted by respondents, but its levels were also low. High user satisfaction and low levels of problems is a common finding in outdoor recreation research, but this does not mean that management can be complacent. Crowding and conflict are social concerns that should continue to be monitored along the West Branch of the Farmington River, even though a minority of users reports serious social problems.

One reason that problems with user conflicts and related social issues are minor along the West Branch is due to the segregation of the users encouraged by the CT Department of Environmental Conservation (DEC) policies and operations. Tubers are concentrated on the lower portions, a well-suited location for that activity where DEC has allowed the tubing concessionaire to operate. Similarly, the DEC Trout Management Area (TMA) is located several miles up river from the main concentration of tubers. This unofficial "zoning" of the West Branch is particularly effective because it is not imposed on users. Users may freely choose which sections of the river best suit their recreation endeavors even though conditions have been created that draw different users groups to different parts of the river.

There are differences among the major user groups on the West Branch of the Farmington River. Tubers are less sensitive to social problems like litter, evidence of human waste and lack of restrooms along the river than are anglers or boaters. In a number of cases, the anglers proved to be the group that was most sensitive overall. Part of this is probably because anglers are less mobile than the other two groups. Therefore, it is not surprising that people fishing are more concerned with these social problems than tubers who move through the area without focusing as much on the conditions over the corridor. It is important to remember, though, that all of these problems were minor on average.

Anglers felt the West Branch of the Farmington River was significantly more important in providing fish and wildlife habitat and preserving undeveloped open space than did tubers. This is not surprising since fishing is much more dependent on both of these aspects of the natural setting. This may be one of the reasons why anglers felt wild and scenic river designation for the West Branch of the Farmington River was significantly more important than did tubers. Although all three groups were satisfied, on average, anglers were significantly more satisfied with the West Branch of the Farmington River than were boaters. The difference may be due to the joint effects of wild and scenic river designation and the trout management area (TMA), which was created and managed by the Connecticut Department of Environmental Conservation (DEC). The TMA helps make the segment an outstanding fishery with few, if any, substitutes within reasonable distances for most respondents. Boaters, on the other hand, have alternative substitute sites for their activities. It may be that the West Branch is simply not considered the best boating river in the area for some types of paddling and boaters' satisfaction ratings are reflecting this.

The same attributes that make the West Branch a successful example of a partnership to conserve a wild and scenic river also make it complex to determine the extent to which the actions of each partner contributes to the experiences and benefits that result from conserving the segment as a whole. Some river benefits result from the existence and high quality of the trout management area, some result from the state forest and state recreation area lands in the corridor, and some come directly from the designation and management of the segment as a National Wild and Scenic River. In reality, the distinctions across these different areas and jurisdictions are probably not very important to most users. Based on the experiences they seek and benefits they receive, it appears that conserving the river corridor and maintaining the high quality of its resources, regardless of who does it and how it is achieved, are the most important things to users. What wild and scenic designation brings with it is a management plan for the entire 14-mile segment and the existence of Farmington River Coordinating Committee. These help provide the connections that tie the many river areas and programs together to make the conserved river segment more than the sum of its parts in terms of both resources and benefits for users and neighbors.

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APPENDIX A

RESPONDENTS' OPEN-ENDED COMMENTS

The following comments are transcribed as written by respondents to the final questionnaire statement: "Please use this space for any additional comments about the Farmington River, your river experience or for any suggestions you might have for improving the river or its management."

About the only thing I could think of to improve the Farmington is to abandon the salmon-stocking program. I believe it is ineffective. Replace the salmon with more trout.

All these answered would be the same by my children & grandchildren: 42,21,19,16 &10

Clean up the picnic area at Satan's Kingdom. Make sure all changing rooms & toilets have locks.

Buy new life vests.

Extend the catch & release area!

Farmington River is one of many rivers we use for white water kayaking

Get rid of bait & hardware tackle use in the catch & release area! It is very harmful to the fish mortality - keep it catch & release fly fishing only!! Barbless hooks only!!

Get the bait fisherman out of the catch & release area - it's a joke, a lot of them take fish!!!

Great experience. People very nice. Most of my "tubing" time has been on the Esopas in NY.

How do I get information on other activities on the river? I heard about tubing via word of mouth from friends.

I kept hitting rock under the surface of water. Note: this was not fun, but overall I enjoyed the river.

I like that the Farmington is varied, clean, close to home, and easily accessible.

I live in MA and only fish every once in a while. I have noticed a significant amount of river users, which does somewhat; take away from the experience at times. Especially recently w/tubers and canoeists making noise and being disrespectful to others interests.

I spend much more time along the Farmington River in Avon, Simsbury and Windsor. I wish the same protections would be put in place in these communities.

I started fishing this beautiful river while in high school, was away for 4 yrs while in service, and have been back to it ever since. I have enjoyed tubing, canoeing, and fishing with my family many times. It is nature in it finest.

I think the management group is doing a great job. More education is always needed.

I think the salmon program is a waste of time and money.

I would like to see more trophy management also wild trout if possible.

I would like to see some patrols by law enforcement because of wild drivers and break-ins in vehicles. Also there were no canoeists or tubers on the day I was there but they are usually later on the river. Some canoeists respect fishermen but usually tubers don't! They will run into you with no problem and think it's funny. They also show no respect for the river.

I would like to see the catch limit set at 2 fish, too many anglers take out too many.

I'm planning on buying property along/near this river, as it is a major attraction in my life.

Increase the trout management area - get rid of the Atlantic salmon program.

It's nice to have such a nice trout fishery in CT - we enjoy visiting it whenever our travels take us to CT. Please keep this resource & its environment protected.

Keep high grass cut along river.

Keep out the huge groups, camps, town services from surrounding towns send in day campers by the hundreds.

Keep up the good work. The Farmington River is a beautiful river.

My dad & I come here when we can. We love the river and it's beauty. We dive 3.5 to 4 hours to get here (one-way) and try to stay 2 or 3 days a year to fly fish. You must restrict canoeists & float tubers to different area.

Over all, the river is a great place but could use more handicap spots & toilets. Maybe use scouts to help pick up after slobs - I personally try to take some of somebody else's trash with me. Please feel free to contact me if you have any questions.

So clean 2. Keep land trim so won't get weedy 3. Take large trees or limbs that are in water out 4. Put trash cans around river

Stock more fish!

The federal government needs to rethink its program for stocking salmon in the river. The daily limit should be reduced. This seems to be a problem primarily w/people who are using spinning rods - they ALL seem to take their limit and stay in a site all day limiting access to other fishermen/women.

The rental tubing area - it would be nice to have a better picnic area with other activities - volleyball, horseshoes, etc. We drive a long distance and would like to spend the day - the actual tubing doesn't take that long. We'll return every year it's great fun! Thanks

The river itself, I think is the best overall for fishing, tubing, recreation; it's everything you could want in a nature corridor. I'm very happy we have it!

There are a lot of violations (fishing) along the river but there are not enough wardens to patrol.

There are many violations of the buffer zone and uncontrolled development in the wild and scenic area. This is because local governments only use this as a guideline. Wild and scenic should have more stringent controls so the guidelines are followed. Enforcement should be part of the designation. The minimum flow on the Farmington is too low. If this flow is used for any length of time it will kill much aquatic life.

We need more wardens to enforce existing laws, also impose large fines for leaving trash. This valuable jewel should be protected forever no matter what the cost.

We take an annual trip. Love this river love the flow. I live only about 5 miles to NC St. Univ. go to Asheville frequently to fish rivers and this river compares or is better than any river in Asheville including the Davidson. We caught big trout this year. It’s very clear & clean. Beautiful surroundings.

Within booklet on the Farmington River I would be interested in knowing more about places to park. 2) More education of river users of one another (fishermen, canoeists & rubber flotation devices)

APPENDIX B

RESPONDENTS' REPORTED CHANGES IN RIVER QUALITY

Respondents who reported that the overall quality of visiting the wild and scenic segment of the West Branch of the Farmington River since their first there, gave the following responses to the question: "What is the main reason the quality has changed?" Responses are organized into reasons for improvements in quality and reasons quality has gotten worse.

Reasons that Overall Quality Has Improved:

Area was very clean, less cans & paper left around
Because of catch & release, but fish are small
Better access also a little cleaner
Better fishing, more fish, great no kill area
Better management
Better septic systems, trout management areas
Care, management, motivation toward healthy ecology
Catch & release trout management area. The fly-fishing is better.
Cleaner
Cleaner - less litter
Cleaner water
Cleaner water
Cleaner water, good stocking program
Cold water releases
Colebrook dam
Colebrook Dam
Conservation group efforts
Cool water later in season, tail water release
Dams and clean water regulation
Declared a wild & scenic river
Effort to keep clean
Flood control
Great fishing, walkways that were put in
Greater overall concern
High water-release from dam
Industrial waste decreased
Installation of dam
Less people
Lifeguards in kayaks
More fish
More fish
More fly fishers - less junk
More water in river
Most people don't want to ruin the river

No factories pollution
Road improvement, parking along the river
River cleaned up
River is cleaner
Septic systems no longer run into the river
Sewer plants upstream improved, better monitoring
Stocking more larger trout
The fishing is better
The fishing is better now
The fishing is much better
The fishing is much better all year long
The river is fishable all year; very clean clear excellent water quality
Things seem cleaner
Three dams still river & 2 on Farmington, no pollution
Very clean
You don't see very much litter. People care more about the river

Reasons that Overall Quality Has Gotten Worse:

(Less fish) everything else about the same
Canoeists, kayaks, tubers and swimmers
Commercialization and home construction
Crowded
Erosion of banks, recent development of housing along river banks and surrounding woodlands, overuse of the river
Garbage and too many people
Housing developments nearby, less scenic and natural areas, more river users
Life vests were dirty
Low water level
Many more fishermen
More litter
Too many fishermen
Too many people but fishing about the same.
Too many people fishing the TMA
Too many people use the river for business and dumping trash
Too many tubers and canoeists
Water quality/Litter - worse than 1965 but better than mid 80's
Way too many people

APPENDIX C

STUDY CONTACT INFORMATION

NORTH CAROLINIA STATE UNIVERSITY

Roger L. Moore, Associate Professor
Department of Parks, Recreation and Tourism Management
Box 8004
North Carolina State University
Raleigh, NC 27695
(919) 515-3698
E-mail: Roger_Moore@ncsu.edu

Chris Siderelis, Professor
Department of Parks, Recreation and Tourism Management
Box 8004
North Carolina State University
Raleigh, NC 27695
(919) 515-3276
E-mail: Chris_Siderelis@ncsu.edu

AMERICA RIVERS

Jack Hannon
American Rivers
1025 Vermont Avenue, NW, Suite 720
Washington, D.C. 20005
(202) 347-7550
E-mail: jhannon@americanrivers.org

NATIONAL PARK SERVICE

Elizabeth Porter
National Park Service
Rivers, Trails and Conservation Assistance Program
1849 C Street, NW (2220)
Washington, D.C. 20240
(202) 354-6900
E-mail: Beth_Porter@nps.gov

FARMINGTON RIVER WATERSHED ASSOCIATION

Eric Hammerling, Executive Director
Farmington River Watershed Association, Inc.
749 Hopmeadow Street
Simsbury, CT 06070
(860) 658-4442
E-mail: frwa@snet.org

FARMINGTON RIVER COORDINATING COMMITTEE

Farmington River Coordinating Committee
P.O. Box 161
Pleasant Valley, CT 06063
(860) 379-0282

APPENDIX D

STUDY QUESTIONNAIRE