

Tuckasegee River Angling Flow Study
East Fork, West Fork, and Dillsboro Hydroelectric Projects
FERC #'s 2698, 2686, 2602
October 16-20, 2001

Introduction

Duke Power-Nantahala Area, a Division of Duke Energy Corporation (Duke) is in the process of relicensing its hydroelectric projects with the Federal Energy Regulatory Commission (FERC). The East Fork (FERC # 2698), West Fork (FERC # 2686), and Dillsboro (FERC # 2602) Projects are located on the Tuckasegee River in southwestern North Carolina. The area includes rural mountainous terrain and sections of small rural communities and features river sections that currently provide excellent angling opportunities. Duke Power is utilizing a modification of the traditional relicensing process involving the use of Technical Leadership Teams (TLT). In this study Duke Power assessed the angling experience on five sections of the river and determined how flows affect the angling experience. Duke worked closely with the North Carolina Wildlife Resources Commission, Trout Unlimited, local government representatives and other organizations as well as the TLT in this effort. This document describes study goals and objectives, the area, methodology, and results of the study.

Study Goals and Objectives

This study assessed angling experiences on five reaches of the Tuckasegee River. This was done with a small group of anglers using a variety of gear types – fly, bait, spin/lure. These anglers used their experiences in this study and their experience of other rivers to assess various flows and determine their acceptability for angling on these reaches. They further identified how flow levels affect various factors that make up the angling experience.

Specific objectives of the study included:

- Description of current access to each section
- Description of key angling areas
- Development of relationships between flow levels and quality of angling experience for the five study reaches and identification of flows acceptable for angling
- Identify other recreation opportunities and assess the relative impacts of angling flows on these activities

Study Area

Both forks of the Tuckasegee River arise in the Blue Ridge Mountains of southwestern North Carolina in the area between Highlands and Brevard. The river flows through the cities of Cullowhee, Sylva, and Bryson City before it joins the Little Tennessee River in Fontana Reservoir almost fifty miles from the headwaters.

Five Duke Hydropower Developments (the East and West Fork Projects) are located about 20 miles above the Dillsboro Project. The Tuckasegee Plant and Thorpe Plant (FERC # 2686), located on the West Fork, are operated in tandem. The usual release from the Tuckasegee Plant (the downstream plant) is about 205 cfs plus a continuous release of 10 cfs from Cedar Cliff (when it is not generating) for a total of about 215 cfs in the riverbed at the Confluence from power generation and continuous releases. Average annual runoff in the West Fork (at the Little Lake Glenville Reservoir) is about 158 cfs with significant seasonal variations. The Tennessee Creek, Bear Creek, and Cedar Cliff developments (FERC # 2698) on the East Fork are operationally linked to each other and are operated as such. The usual release from the Cedar Cliff Plant (the downstream plant) is about 480 cfs plus a continuous release of 20 cfs from the West Fork for a total of about 500 cfs at the Confluence from power generation and continuous releases. Average annual runoff in the East Fork (at Cedar Cliff Reservoir) is about 249 cfs with significant seasonal variations. The Dillsboro Project does not significantly affect flow levels in the Tuckasegee River. Water either flows through the generator(s) and back into the riverbed below the 12-foot high dam or it runs over

the dam or both. The average annual runoff at Dillsboro is about 779 cfs with significant seasonal variations.

A map of the study area is provided in Appendix H (to be supplied later). The following river sections were analyzed in this study.

Reach	Study Dates	Description	Miles
1	10/18/01	East Fork: Cedar Cliff Powerhouse to Mainstem	2.0
2	10/18/01	West Fork: Tuckasegee Powerhouse to Mainstem	1.5
3	10/19-20/01	Mainstem: Forks to Wayehutta Cr. (Cullowhee backwater)	7.5
4	10/19-20/01	Mainstem: Cullowhee Dam to NC 116 bridge at Webster	6.0
5	10/16-17/01	Mainstem: Barkers Creek to Camp Creek above Whittier	4.5

Other than Reaches 1 and 2, which are short, the other Reaches are of similar length. The Tuckasegee “gorge” area (4.5 miles between Reaches 4 and 5) was omitted from this study because most of it is away from public roads and would require permission from multiple landowners to gain access across private land. The ponded water from Cullowhee Dam and Dillsboro Dam was not included in the study. The stretch below Whittier was not included since the impact of dam releases is minimal in this section as it is 35 to 40 miles downstream of the Cedar Cliff and Tuckasegee Powerhouses (J Knight. 2002. Zone of Peaking Influence Study; in Progress). Also, a separate study would have been needed in order to have water in the section during daylight hours.

Reach 4 (“delayed harvest” section) is the most popular angling section with local, regional, and out-of-state anglers using the resource in the area around Webster, NC where the river is wide with many small ledges. Commercial fishing guides use this area frequently, utilizing drift boats as well as wading. Both private and commercial anglers utilizing drift boats and wading also use Reaches 3 and 5 regularly. Mostly local anglers utilize Reaches 1 and 2.

Methodology

A controlled flow assessment technique (Whittaker, et al., 1993) was used to evaluate opportunities for angling at a range of flow conditions. A specified group of study participants fished the river at base flow (no water from hydro generation) and at one to three additional flow conditions. Participants completed two survey forms as a means of documenting the quality of the angling experience.

Upon completion of each test release each angler filled out a Single Flow Survey (Appendix A) to help him/her describe the quality of the angling experience specific to each flow. Specifically, participants were asked to rate the flow with regard to (1) angling experience characteristics, (2) how well suited it was for different skill levels, (3) their overall experience rating, (4) whether they would prefer a higher or lower flow level, (5) whether they would choose to fish the level again in the future and (6) the top 3 advantages and disadvantages as related to the angling experience characteristics. They were also asked to describe safety hazards, outstanding angling features, and provide any other comments they wanted to make.

After fishing each section at all the test flows, participants filled out a Comparative (Overall) Survey (Appendix B) to evaluate the flows. Specifically, they were asked to (1) rank the importance of the angling experience characteristics, (2) to rank the flows in order of preference as regards each experience characteristic and (3) make an overall evaluation of the flows. They were also asked to add anything they desired about fishing on the Tuckasegee River. Survey responses were compiled in spreadsheets (Appendix C) and compared across the different flow conditions to see how the flows affected the quality of the angling experience and to determine acceptable flow levels. All written comments made on the surveys were compiled (Appendix D).

Anglers were recruited utilizing the state and local Trout Unlimited organizations, newspaper articles about the study, state fish and game employees, Duke employees, regional angling outfitters, and non-affiliated private anglers. The study was extended over 5 days to allow for maximum participation with a reasonable

time commitment. All participants signed a waiver (Appendix E) and participated in a short orientation to the study that included an explanation of the questionnaires including Definitions of Terms (Appendix F), a safety briefing, and a briefing on the duration of each test flow for a given reach of the river. The gear options were fly, bait, and spin/lure. Anglers could access the river from the bank, by wading the stream channel, by boat, or a combination. Participant study schedules for each reach are provided in Appendix G.

Two flow levels were studied in Reaches 1 and 2 – (1) base flow and (2) 60 cfs (targeted) - with 1 to 1.5 hours to fish each flow level. On Reach 1 (East Fork), the targeted flow was obtained by opening the tainter gate and spilling into the river channel. On Reach 2 (West Fork) the targeted flow was obtained by operating Thorpe Power Plant at a very low flow. This flow cannot be maintained for long periods of time because of harm to the equipment. The release target of 60 cfs was chosen based on the narrow river channel in each section. Four flow levels were studied in Reaches 3, 4, and 5 – (1) Flow 1 is base flow, (2) Flow 2 is base flow + 205 cfs from generation at Thorpe Powerhouse + 10 cfs continuous flow from Cedar Cliff, (3) Flow 3 is base flow + 440 cfs from generation at Cedar Cliff Powerhouse + 20 cfs continuous flow from the West Fork, and (4) Flow 4 is base flow + 205 cfs from generation at Thorpe plus 440 cfs from generation at Cedar Cliff. Two to four hours were allotted to fish each flow level. These flows are “best efficiency flows” for these facilities and it is difficult to maintain significantly different flows for long periods of time without harming the equipment. The flow duration was sufficient for participants to fish several locations within each reach or to fish the reach by means of a boat. Participants were told what the approximate flow conditions would be in terms of which hydro plant was generating the flow. In all sections the flow progression was from the lowest flow (base flow) to the highest flow.

Flows were measured at the following locations:

- Reach 1 – East Fork – 1.0 mile downstream from Cedar Cliff Powerhouse
- Reach 2 – About 100 yards downstream of Tuckasegee Powerhouse
- Reach 3 – About 200 yards downstream of Moody Bridge
- Reach 4 – About 300 yards upstream of Webster Bridge
- Reach 5 – At the Barker’s Creek Bridge

Results and Discussion

Results from this angling recreation flow study are presented below. These results are taken from the two survey instruments used: the Single Flow Survey, filled out after each flow experience, and the Comparative Survey, filled out after the completion of the last flow condition. Actual flow was measured for each reach at each flow during the angling experience. Actual flow (in cfs) is provided in the data tables but discussion of flows uses the Flow1, Flow 2, etc. terminology. Each Reach is presented and discussed separately beginning with Reaches 3, 4, and 5 where 4 different flows were evaluated followed by Reaches 1 and 2 where two flows were evaluated. Despite the considerable effort made to involve participants, the number of anglers in each study was relatively low and thus no detailed statistical analysis was done. Even so, participant responses to the surveys were very similar so the report is useful in providing insight to angling flow preferences. Of equal importance, most of the anglers were intermediate to advanced in skill level, which also lends weight to the study since their responses are based on considerable experience. The tables often present the number of participants responding to different questions. The number can vary depending upon whether participants answered a given question and whether the participant filled out all the surveys.

Reach 3 General

This 7.5-mile river section starts at the confluence of the East and West Forks of the Tuckasegee and ends in the town of Cullowhee, North Carolina above the pond formed by a run of the river dam in Cullowhee. An abandoned powerhouse is located at the dam and The Tuckasegee Water and Sewer Authority currently uses the pond area above the dam as a water intake for water supply purposes. Anglers are often seen fishing below the dam. This section is well known to local and regional anglers but is generally not utilized as much as the better known delayed harvest area of Reach 4.

Measured flows during this study are shown below for Reach 3. Flows were measured just downstream from the confluence of the East and West Forks of the Tuckasegee River. Flow 1 is base flow, Flow 2 is base flow + generation from Thorpe Powerhouse on the West Fork, Flow 3 is base flow + generation from Cedar Cliff Powerhouse on the East Fork, and Flow 4 is base flow + generation from both Cedar Cliff and Thorpe.

	Flow 1	Flow 2	Flow 3	Flow 4
Actual cfs	75	285	656	769

Access

As with all sections of the Tuckasegee, public access sites are limited and sites that provide easy access for small boats, particularly those with trailers, are practically unknown.

Public access is available at:

- ❑ Moody Bridge. Located about 1.25 miles downstream from the confluence of the two forks, there are small dirt pull-offs on both sides of the bridge with parking for about twelve cars.
- ❑ Jackson County Recreation Park at the confluence with Caney Fork Creek is about 2.25 miles downstream from Moody Bridge. Parking and rest rooms are available as well as a short trail to the river that can be used to launch small boats such as canoes and small fishing boats.
- ❑ Western Carolina University/Tennessee Valley Authority Access Area at the old Cullowhee powerhouse site in the ponded area about 100 feet above the dam. There is a small parking area and small boats could be taken out here.
- ❑ Small pull-offs along county roads 1002 (old Highway 107) and 1732 where these roads parallel the river for about 3.5 miles.
- ❑ All other access is across private land with the permission of the landowner.

Information from Single Flow Surveys and Comparative Surveys

Participant Information

Table 1 provides information about the participants. Seven anglers participated in the study in Reach 3. One participant fished only Flows 1 and 2 and filled out the Single Flow Survey but did not fill out a Comparative Survey. A second participant fished only Flows 3 and 4 and filled out both the Single Flow Surveys for those two flows and the Comparative Survey. There was a mix of skill levels as well as frequency of fishing each year. Four of the participants were familiar with the Tuckasegee River having fished it eleven or more days in the past. While all used flies initially, several utilized spin/lure equipment at the higher flows.

Table 1. Tuckasegee River Reach 3. Participant Information

Participants	All Fly Fishermen - 7
Skill Level	Novice – 2; Intermediate – 4; Advanced – 1
River Access	Wading – 7
Times Fished the Tuckasegee before the Study	<5 days = 2; 11-20 days = 3; >30 = 1
Times Fished Any River/Year	<5 days = 1; 5-10 days = 1; 11-20 days = 1; 21-30 days = 1; >30 = 2

Angling Experience Characteristics

Participant ratings from the Single Flow Survey for angling experience characteristics under the four different flow conditions are shown in Table 2. The mean rating for all experience characteristics was above neutral for Flows 1 and 2 and at neutral or below for Flows 3 and 4. The exception was “fishing from a boat” where Flow 1 rated “poor”. The overall trend is a strong preference for Flows 1 and 2 for the characteristics that make up an angling experience.

Table 2. Tuckasegee River Reach 3. Mean Rating of the Four Flows for Angling Characteristics

Participants used a 5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Characteristic	Flow 1 75 cfs	Flow 2 285 cfs	Flow 3 656 cfs	Flow 4 769 cfs	No. Who Rated Characteristic
Walk Shoreline	1.2	0.3	0.0	-1.0	6
No. Quality Fishing Spots	1.3	1.3	-0.2	-1.5	
Walk in Channel	1.3	0.8	-1.0	-1.8	
Ability to Cast	1.5	1.2	-0.3	-1.3	
Aesthetic Quality	1.7	1.5	0.0	-0.8	6 5 at Flow 3
Ability to See Fish	1.5	0.3	-0.3	-1.3	6
Ability to Land Fish	1.2	1.2	-0.8	-1.6	6 5 at Flows 3 & 4
Challenge	1.0	1.5	-0.4	-1.2	6 5 at Flow 1 & 3
Fish From Boat	-1.3	0.8	-0.5	-1.5	3 at Flow 1; 4 at Flow 2; 2 at Flows 3 & 4

Participants were asked in the Comparative Survey to rate the importance of the same angling characteristics used in the Single Flow Survey plus the characteristics of fishing success, driving distance to the river, crowdedness, and water temperature (Table 3). The most important characteristics (participant mean rating of 4 or 5) are shown in order of importance (high to low) in Table 3 along with a rating of the four flows on a scale of 1 to 4. While participants were asked to rank order the flows (must rank them in order of preference; i.e., only one flow can be a “1”, etc.), only two of the six who filled out the Comparative Survey used the rank ordering while the other four rated the flows on a 4-point scale (i.e., more than one flow could be rated a “1”). All responses were treated as ratings and the results indicate a strong preference for Flows 1 and 2 for all characteristics except crowdedness. This preference for Flows 1 and 2 is similar to that shown in Table 2, which uses a different rating scale.

Table 3. Tuckasegee River Reach 3. Mean Rating of Flows For the Most Important Angling Characteristics

Importance Scale: 5-Point Scale where 1 is Not Important; 3 is Somewhat Important; 5 is Very Important

Flow Rating Scale: 4-Point Preference Scale from 1 (Highest) to 4 (Lowest)

Characteristic	Importance of Characteristic Mean Score	Flow 1 75 cfs	Flow 2 285 cfs	Flow 3 656 cfs	Flow 4 769 cfs
Walk in Stream Channel	5	1	2	4	4
No. Quality Fishing Spots	4	1	1	3	4
Crowdedness	4	2	2	2	2
Ability to Cast	4	1	1	3	4
Ability to See Fish	4	1	2	3	4
Fishing Success	4	1	2	4	4
Aesthetic Quality	4	2	2	3	3
Ability to Land Fish	4	1	1	3	4
Challenge	4	2	1	3	4

Suitability for Different Skill Levels

When asked to rate the suitability of each flow for different skill levels there was a “good” rating for all skill levels for Flows 1 and 2 except for a “neutral” rating for novices at Flow 2. Flows 3 and 4 were “poor” or “unacceptable” for all skill levels (Table 3).

Table 3. Tuckasegee River Reach 3. Mean Rating of Flows for Different Skill Levels

5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Skill Level	Flow 1 75 cfs	Flow 2 285 cfs	Flow 3 656 cfs	Flow 4 769 cfs	No. Who Rated Characteristic
Novice	1.2	0.3	-1.7	-2.0	6
Intermediate	1.0	0.8	-1.0	-1.8	
Advanced	1.0	0.8	-0.5	-1.3	

Overall Evaluation of Flow and Flow Preference

The ratings of overall experience from the Single Flow Survey and the Comparative Survey show similar trends (Table 4). Flows 1 and 2 are definitely preferred (rated “good” or “excellent”) over Flows 3 and 4 (rated “poor” or “unacceptable”). Participants indicated a greater preference for Flow 2 over Flow 1 on the Comparative Survey after fishing all four flows. Participants preferred higher water at Flow 1, no change at Flow 2 and much lower water at Flows 3 and 4. Five out of six participants would return to fish at Flows 1 and 2 but none of the participants would do so at Flows 3 and 4. This indicates not only a preference for these flows but a desire to return to fish them again. Tables 5 and 6 indicate participant response trends are similar whether the results include all who filled out a Single Flow Survey or only those who fished all four flows.

Table 4. Tuckasegee River Reach 3. Mean Ratings for Overall Experience and Flow Preference

Overall Rating Scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; 1 = Good; 2 = Excellent

Flow Preference Scale: 1 = Much Lower; 2 = Lower; 3 = No change; 4 = Higher; 5 = Much Higher

Questions	Flow 1 75 cfs	Flow 2 285 cfs	Flow 3 656 cfs	Flow 4 769 cfs
Single Flow Overall Rating	1.2	1.0	-1.2	-1.8
Flow Preference – Higher or Lower Levels	3.7	2.7	1.3	1.0
Fish Again?	Yes = 5 No = 1	Y = 5 N = 1	Y = 0 N = 6	Y = 0 N = 6
Comparative Overall Rating	0.8	1.4	-0.8	-1.8

Table 5. Tuckasegee River Reach 3. Overall Experience Rating at End of Each Single Flow

5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Participant Type	Flow 1 75 cfs	Flow 2 285 cfs	Flow 3 656 cfs	Flow 4 769 cfs	No. Who Rated Flows
Participated in All 4 Flows	1.0	0.8	-1.0	-1.8	5
All Participants	1.2	1.0	-1.2	-1.8	7

Table 6. Tuckasegee River Reach 3. Flow Level Preferences at Each Flow Level

5-point scale: 1 = Much Lower; 2 = Lower; 3 = No Change; 4 = Higher; 5 = Much Higher.

Participant	Flow 1 75 cfs	Flow 2 285 cfs	Flow 3 656 cfs	Flow 4 769 cfs	No. Who Rated Preference
Participated in All 4 Flows	3.6	2.6	1.4	1.0	5
All Participants	3.7	2.7	1.3	1.0	7

Advantages and Disadvantages for Reach 3

Advantages and Disadvantages tended to be similar for Flows 1 and 2 and for Flows 3 and 4. Advantages frequently noted at Flows 1 and 2 included the number of quality fishing spots, the ability to walk in the stream channel, the ability to cast, the aesthetic quality, and challenge. Participants noted few advantages at Flows 3 and 4. Frequently noted disadvantages for the two higher flows included the number of quality spots, the ability to walk in the stream channel, and the ability to cast.

Safety for Reach 3

At Flow 1 there were no hazards noted other than those associated with normal wading such as needing a walking stick in some spots. At Flow 2 participants noted the increased flow, deeper water in the narrow channels, stepping more carefully, and that anglers should have some experience with walking in a river prior to wading this flow. At Flows 3 and 4 all participants noted that the current was too fast for safe wading.

Outstanding Angling Features or Opportunities

Flow 1 was noted as a good resource for a novice, easy to see fish, and many good areas where the water flowed to a narrow spot. At Flow 2 participants generally noted the increase in fishable spots with the higher water. Participants noted no positive opportunities at Flows 3 and 4 other than it was a beautiful day.

Additional Comments From Single Flow Survey and Comparative Survey

Several participants indicated that Flow 1 was too low for good fishing opportunities and for good fish habitat and that they would prefer a flow between Flows 1 and 2. One interesting perspective was that the river was fishable at all four flows for those with good fishing skills but it just wasn't worth the effort to fish the two higher flows.

Conclusions for Reach 3

Reach 3 of the Tuckasegee River is characterized by a fairly continuous average gradient of 8 feet per mile and a rocky bedrock river channel with shoals, pools and deeper moving water. The banks are generally vegetated with shrubs or small trees and are both steep and high along sections of the river. Other sections provide relatively easy access to the river from short trails through light or no vegetation. The river flows through rural mountain farmland from the reach's start at the confluence of the East and West Forks to its end at the backwaters of the Cullowhee Dam.

Roads parallel this reach through most of its 7.5 miles and public access is mainly at bridge crossings and along road right-of-ways. Parking along these roads is mostly in the form of small single car dirt pull-offs. There is good access at the Jackson County East LaPorte Recreation Park. Much land along the river is private property with access still possible for anglers with the permission of the landowner.

The results of the controlled flow study indicate acceptable flows for angling occur at Flow 1 (Base Flow) and Flow 2 (215 cfs) or somewhere in between these flows. At these two flows wading is relatively easy for the novice and experienced angler in most parts of the river though the substrate can be slippery from sediment and some algae growth. Boat fishing, which appears to be increasing in popularity, is an advantage of Flow 2 but would be difficult or impossible at Flow 1. Flows 3 and 4 are too high to wade safely.

Reach 4

General

This 6-mile reach begins below the Cullowhee Dam and ends at the North Carolina 116 Bridge in Webster, N.C. From the dam the river generally follows Old Highway 107 (County Road 1002) for 4 miles until it intersects with the new 4-lane Highway 107. The last two miles of this stretch, running along South River Road from the 4-lane Highway 107 to Webster Bridge (plus an additional two miles below Webster Bridge), are perhaps the best-known stretches of the Tuckasegee River for anglers. Local anglers and out-of-state anglers utilize this "delayed harvest" section of the Tuckasegee River and local and regional angling outfitters bring clients to this part of the river.

Measured flows during this study are shown below for Reach 4. All flows were measured about 300 yards upstream of Webster Bridge. Flow 1 is base flow, Flow 2 is base flow + generation from Thorpe Powerhouse on the West Fork, Flow 3 is base flow + generation from Cedar Cliff Powerhouse on the East Fork, and Flow 4 is base flow + generation from both Cedar Cliff and Thorpe.

	Flow 1	Flow 2	Flow 3	Flow 4
Actual cfs	273	485	764	911

Access

As with all sections of the Tuckasegee, public access sites are limited and sites that provide access for small boats, particularly those with trailers, are practically unknown. There is public access to the river above the Cullowhee Dam at the Western Carolina University/TVA Access Area. In the 3 miles below Cullowhee Dam the river is generally bordered by Old Highway 107 and by several trailer parks and housing developments as well as various commercial establishments that limit access to the river. The last mile of this 4-mile section, though about 30 feet above the river, has several trails to the river and ample parking on the road shoulder between the river and the road. In general the river section along South River Road (a narrow 2-lane dirt road) is within 5 to 20 feet of the river and parking is in small pull-offs along the road. At the upstream end of South River Road there is a small pull-off that can park about four cars and has access to the river for small boats.

Information from Single Flow Surveys and Comparative Surveys

Participant Information

Table 7 provides information about the participants. Eleven anglers participated in part of the flow study and filled out single flow forms for those flows. Six anglers participated in all four flows and filled out all evaluation forms. While there was a mix of skill levels it was skewed toward the advanced level; four anglers were quite familiar with the Tuckasegee having fished it over 30 times. Two anglers fished from a boat for all flows except base flow, one angler waded Flows 1 and 2 and fished from a boat on Flows 3 and 4, and 1 angler fished from a boat for the last two flows only.

Table 7. Tuckasegee River Reach 4. Participant Information

Participants	Fly – 6; Spin/Lure – 5
Skill Level	Novice – 1; Intermediate – 3; Advanced – 7
River Access	Wading – 8; Drift – 3
Times Fished the Tuckasegee before the Study	<5 days = 1; 21-30 days = 1; >30 = 4
Times Fished Any River/Year	5 days = 1; 21-30 days = 1; >30 = 4

Angling Experience Characteristics

Participant ratings from the Single Flow Survey for angling experience characteristics under the four different flow conditions are shown in Table 8. The mean ratings for Flows 1 and 2 were “good” or “excellent” with the exception of “fish from a boat” where Flow 1 was rated “unacceptable”. The ratings for Flow 4 were “poor” or “unacceptable” except for a “neutral” rating for “challenge”. The ratings for Flow 3 were “neutral” or “poor” except for “good” ratings for “fish from a boat”, “challenge”, “aesthetic quality”, and “ability to cast”. The overall trend is a strong preference for Flows 1 and 2 for the characteristics that make up an angling experience.

Table 8. Tuckasegee River Reach 4. Mean Rating of the Four Flows for Angling Characteristics
5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Characteristic	Flow 1 273 cfs	Flow 2 485 cfs	Flow 3 764 cfs	Flow 4 911 cfs	No. Who Rated Characteristic
Walk Shoreline	1.0	1.2	-0.6	-1.4	F1=8; F2=10 F3=7; F4=7
No. Quality fishing Spots	0.9	1.8	-0.2	-1.3	F1=8; F2=10 F3=6; F4=7
Walk in Channel	1.8	1.5	-1.0	-1.9	F1=8; F2=10 F3=7; F4=7
Ability to Cast	1.6	1.7	0.6	-0.7	
Aesthetic Quality	1.3	1.7	0.7	-0.3	
Ability to See Fish	1.1	1.2	-0.7	-1.7	
Ability to Land Fish	1.4	1.5	0.0	-1.0	
Challenge	0.6	1.6	0.9	0.0	F1=6; F2=8 F3=7; F4=7
Fish From Boat	-1.9	0.9	0.9	-0.6	

Participants were asked in the Comparative Survey to rate the importance of the same angling characteristics used in the Single Flow Survey plus the characteristics of fishing success, driving distance to the river, crowdedness, and water temperature (Table 9). The most important characteristics (participant mean rating of 4 or 5) are shown in order of importance (high to low) in Table 9 along with a rating of the four flows on a scale of 1 to 4. While participants were asked to rank order the flows (must rank them in order of preference; i.e., only one flow can be a “1”, etc.), only one did so. One participant provided a number one choice only and the others rated the flows on a 4-point scale (i.e., more than one flow could be rated a “1”). All responses were treated as ratings and the results indicate a preference for Flow 2 with lower preferences for Flows 1 and 3. Participants indicated a greater preference for Flow 3 after experiencing all four flows than they did when rating each flow by itself.

Table 9. Tuckasegee River. Reach 4. Mean Rating of each Flow For the Most Important Angling Characteristics

Characteristic Scale: 1 is Not Important; 3 is Somewhat Important; 5 is Very Important

Flow Rating Scale: 4-Point Preference Scale from 1 (Highest) to 4 (Lowest)

Characteristic	Importance of Characteristic Mean Score	Flow 1 273 cfs	Flow 2 485 cfs	Flow 3 764 cfs	Flow 4 911 cfs
No. Quality Fishing Spots	5	2	1	2	4
Ability to Cast	4	2	1	2	4
Aesthetic Quality	4	3	1	2	3
Crowdedness*	4	4	4	2	1
Challenge	4	3	2	2	3
Walk in Channel	4	1	2	3	4
Walk Shoreline/Bank	4	1	2	3	4
Ability to Land Fish	4	2	1	3	4

*Less than half the participants rated the flows for crowdedness

Suitability for Different Skill Levels

When asked to rate the suitability of each flow for different skill levels, Flow 2 was preferred over all flows for intermediate and advanced anglers and Flow 1 was preferred slightly over Flow 2 for novice anglers. Flows 3 and 4 rated “neutral” to “unacceptable” for all skill levels. There was a “good” rating for all skill levels for Flows 1 and 2 except for a “neutral” rating for novices at Flow 2. Flows 3 and 4 were “poor” or “unacceptable” for all skill levels (Table 10).

Table 10. Tuckasegee River Reach 4. Mean Rating of Flows for Different Skill Levels

5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Skill Level	Flow 1 273 cfs	Flow 2 485 cfs	Flow 3 764 cfs	Flow 4 911 cfs	No. Who Rated Characteristic
Novice	1.3	1.1	-1.1	-1.9	6
Intermediate	0.6	1.6	0	-1.4	
Advanced	0.4	1.7	0	-1.0	

Overall Evaluation of Flow and Flow Preference

The ratings of overall experience from the Single Flow Survey and the Comparative Survey show similar trends (Table 11). Flow 2 is definitely preferred (rated “excellent”) over Flow 1 (rated “neutral” and “good”) and Flows 3 and 4 (rated “neutral”, “poor” or “unacceptable”). Participants preferred higher water at Flow 1, no change at Flow 2, lower water at Flow 3 and much lower water at Flow 4. All participants would return to fish Flow 2, six of eight and five of seven would return to fish Flows 1 and 3, and only one of six (fished from a boat) would return for Flow 4. Tables 12 and 13 indicate participant response trends are similar whether the results include all who filled out a Single Flow Survey or only those who fished all four flows.

Table 11. Tuckasegee River Reach 4. Mean Ratings for Overall Experience and Flow Preference

Overall Rating Scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; 1 = Good; 2 = Excellent

Flow Preference Scale: 1 = Much Lower; 2 = Lower; 3 = No Change; 4 = Higher; 5 = Much Higher

Questions	Flow 1 273 cfs	Flow 2 485 cfs	Flow 3 764 cfs	Flow 4 911 cfs
Single Flow Overall Rating	0.4	1.9	-0.1	-1.4
Flow Preference – Higher or Lower Levels	4.1	2.8	2.0	1.4
Fish Again?	Yes = 6 No = 2	Yes = 10 No = 0	Yes = 5 No = 2	Yes = 1 No = 6
Comparative Overall Rating	0.7	2.0	-0.2	-1.8

Table 12. Tuckasegee River Reach 4. Overall Rating at End of Each Single Flow

5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Participant Type	Flow 1 273 cfs	Flow 2 485 cfs	Flow 3 764 cfs	Flow 4 911 cfs	No. Who Rated Flows
Participated in All 4 Flows	0.3	2.0	-0.2	-1.8	6
All Participants	0.4	1.9	-0.1	-1.4	F1=8; F2=10 F3=7; F4=7

Table 13. Tuckasegee River Reach 4. Flow Level Preferences at Each Flow Level

5-point scale: 1 = Much Lower; 2 = Lower; 3 = No Change; 4 = Higher; 5 = Much Higher.

Participant Type	Flow 1 273 cfs	Flow 2 485 cfs	Flow 3 764 cfs	Flow 4 911 cfs	No. Who Rated Preference
Participated in All 4 Flows	4.2	2.8	2.0	1.3	6
All Participants	4.1	2.8	2.0	1.3	F1=8;F2=10 F3=7;F4=7

Advantages and Disadvantages for Reach 4

Advantages frequently noted at Flow 1 were for “Walk in Channel” and “Ability to See Fish” while frequently noted disadvantages included “Fish from a Boat” and “Number of Quality Spots”. Flow 2 had more advantages noted than the other flows, specifically for “Walk Shoreline”, “Number of Quality Spots”, “Walk in Channel”, “Ability to See Fish”, “Challenge”, and “Fish from a Boat”. There were no frequently noted disadvantages at Flow 2. Only “Fish from a Boat” was a frequently noted advantage for Flows 3 and 4 while frequently noted disadvantages were “Walk Shoreline”, “Walk in Channel” and “Ability to See Fish”.

Safety for Reach 4

The only safety hazards noted at Flows 1 and 2 were broken bottles and wire in the river channel. Flows 3 and 4 were seen as dangerous due to suddenly rising water and too high and pushy to be safe for wading. Flow 4 was noted as too high for fishing from a boat due to the difficulty of navigating in the fast current.

Outstanding Angling Features or Opportunities for Reach 4

Flow 1 was noted as the best level for wading and seeing fish. Flow 2 was generally noted as the best fishing level and that it allows good fishing by wading and from a boat and has the most fishable spots of any of the flows. There were few comments about Flows 3 and 4. One participant noted that these flows did increase the number of places to fish when fishing from a boat.

Additional Comments for Reach 4

Comments included the difficulty of getting accurate information about water flow, the need for increased public access, and the recreational and economic value of a good clean tail water fishery. One participant suggested generating power when it makes the most economic sense and having real time flow information for a number of locations between Tuckasegee and Bryson City so that recreationists could choose when and where to fish or paddle.

Conclusions for Reach 4

Reach 4 of the Tuckasegee River is characterized by a fairly continuous average gradient of about 7 feet per mile and a rocky bedrock river channel with shoals, pools and deeper moving water from Cullowhee Dam downstream to “Jack the Dipper” and 4-lane Highway 107. This section flows through the town of Cullowhee and on through residential areas with mainly trailer parks on both sides of the river. From Highway 107 to the backwaters of the Dillsboro Dam the river drops over a series of small ledges and provides one of the best angling areas on the river. This “delayed harvest” section is the most used section and anglers utilize it throughout the year. This section flows through scattered residential areas and ends just outside the town of Dillsboro.

Roads parallel this reach through most of its 6 miles and public access is located at Dillsboro Dam, just below “Jack the Dipper”, at two bridge crossings, and along road right-of-ways. Parking along the “delayed harvest” stretch is limited to small one-car pull-offs. Most of the land along the river is in private ownership.

The results of the controlled flow study indicate the generally acceptable flow for angling is at Flow 2, particularly for intermediate and advanced anglers. Flow 2 was rated as “good” for novice anglers. Flow 3 rated “poor” to “neutral” but was rated higher by those who fished this flow from a boat. Flow 4 was rated “poor” to “unacceptable”. At Flow 2 (and Flow 1) wading is relatively easy for the novice and experienced angler in most parts of the river though the substrate can be slippery from sediment and some algae growth.

Boat fishing is an advantage of Flows 2 and 3 but would be difficult or impossible at Flow 1. Flows 3 and 4 are too high to wade safely for most anglers.

Reach 5

General

This 4.5 mile reach begins at the Barker's Creek Bridge and ends at the confluence of Camp Creek and the Tuckasegee which is near the 441 Highway interchange with US 74 between Dillsboro and Whittier, N.C. This section is relatively unknown compared to reaches 4 and 3 but is used often by local fishing guides, particularly those using drift boats to access the river.

Measured flows during this study are shown below for Reach 5. All Flows were measured at the just below the Barker's Creek Bridge. Flow 1 is base flow, Flow 2 is base flow + generation from Thorpe Powerhouse on the West Fork, Flow 3 is base flow + generation from Cedar Cliff Powerhouse on the East Fork, and Flow 4 is base flow + generation from both Cedar Cliff and Thorpe.

	Flow 1	Flow 2	Flow 3	Flow 4
Actual cfs	316	468	812	993

Access

As with all sections of the Tuckasegee, public access sites are limited and sites that provide access for small boats, particularly those with trailers, are practically unknown. Reach 5 has public access along the highway right-of-way between the Barker's Creek Bridge and Cullowhee Outfitters and at the State Road 1534 Bridge. Parking is very limited in both areas. Cullowhee Outfitters currently allows parking and access on their property. The river closely parallels Highway 74 along most of the reach with short primitive trails to the river in four or five places. Again, parking in these areas is limited and traffic is relatively heavy in this four-lane section of highway. There is considerable commercial development along Highway 74 that limits, but does not currently preclude, access in these areas.

Information from Single Flow Surveys and Comparative Surveys

Participant Information

Table 14 provides information about the participants. Ten anglers participated in part of the flow study and filled out single flow forms for those flows. Six anglers participated in all four flows and filled out all evaluation forms. While there was a mix of skill levels it was skewed toward the intermediate/advanced level. Two of the six participants who fished all flows had fished the Tuckasegee more than 21 times but neither of them had much experience with this reach. Three anglers fished from a drift boat for Flows 1 and 2. The small drift boat was able to move through the section at base flow though it took advanced level boat handling skills to do so. Two of the drift boat anglers had to leave after Flow 2 (with the boat) and the third boat angler waded Flows 3 and 4. Two anglers fished from a canoe for Flow 3 only and waded the other flows.

Table 14. Tuckasegee River Reach 5. Participant Information

Participants	Fly – 6; Spin/Lure - 4
Skill Level	Novice – 1; Intermediate – 5; Advanced – 4
River Access	Wading – 7; Drift - 3
Times Fished the Tuckasegee before the Study	<5 days = 1; 21-30 days - 1; >30 = 4
Times Fished Any River/Year	< 5 days = 1; 11 – 20 days = 1; 21-30 days = 1; >30 = 3

Angling Experience Characteristics

Participant ratings from the Single Flow Survey for angling experience characteristics under the four different flow conditions are shown in Table 15. The ratings for Flows 1 and 2 were “good” or “excellent” with the exception of “walk the shoreline” which rated “neutral” for both flows. Flow 3 rated “neutral” to “poor” for all characteristics except “challenge” which rated “good”. Flow 4 rated “poor” on all characteristics except “aesthetic quality” which rated “neutral”. The overall trend is a strong preference for Flows 2 and then 1 for the characteristics that make up an angling experience.

Table 15. Tuckasegee River Reach 5. Mean Rating of the Four Flows for Angling Characteristics

5 point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Characteristic	Flow 1 316 cfs	Flow 2 469 cfs	Flow 3 812 cfs	Flow 4 993 cfs	No. Who Rated Characteristic
Walk the Shoreline	0.0	0.4	-0.5	-1.0	F1=9; F2=8 F3=6; F4=6
No. Quality fishing Spots	0.9	1.3	-0.7	-1.5	F1=10; F2=9 F3=6; F4=6
Walk in Channel	0.7	1.2	-1.0	-1.5	F1=10; F2=9 F3=5; F4=6
Ability to Cast	1.5	1.3	0.0	-0.8	F1=10; F2=9 F3=6; F4=6
Aesthetic Quality	1.1	1.4	0.3	0.0	
Ability to See Fish	1.1	1.3	-0.7	-1.2	
Ability to Land Fish	1.1	1.3	0.0	-0.6	F1=9; F2=8 F3=5; F4=5
Challenge	1.1	1.4	0.8	-0.5	F1=10; F2=9 F3=5; F4=5
Fish From Boat	1.1	2.0	-0.5	-0.5	F1=7; F2=4 F3=4; F4=2

Participants were asked in the Comparative Survey to rate the importance of the same angling characteristics used in the Single Flow Survey plus the characteristics of fishing success, driving distance to the river, crowdedness, and water temperature (Table 16). The most important characteristics (participant mean rating of 4 or 5) are shown in order of importance (high to low) in Table 16 along with a rating of the four flows on a 4-point scale. While participants were asked to rank order the flows (must rank them in order of preference; i.e., only one flow can be a “1”, etc.), three of the six who filled out the Comparative Survey rated the flows (i.e., more than one flow could be rated a “1”) on a 4-point scale instead. All responses were treated as ratings and the results indicate a preference for Flow 2 and then Flow 1.

Table 16. Tuckasegee River Reach 5. Mean Rating of each Flow For the Most Important Angling Characteristics

Characteristic Scale: 1 is Not Important; 3 is Somewhat Important; 5 is Very Important

Flow Rating Scale: 4-Point Preference Scale from 1 (Highest) to 4 (Lowest)

Characteristic	Importance of Characteristic Mean Score	Flow 1 316 cfs	Flow 2 469 cfs	Flow 3 812 cfs	Flow 4 993 cfs
No. Quality Fishing Spots	5	2	1	4	4
Walk in Channel	5	1	2	3	4
Ability to Cast	4	1	1	3	4
Walk Shoreline/Bank	4	1	1	3	4
Crowdedness*	4	2	1	2	3
Aesthetic Quality	4	2	1	3	4

*Less than half the participants rated the flows for crowdedness

Suitability for Different Skill Levels

When asked to rate the suitability of each flow for different skill levels, Flows 1 and 2 rated “good” for all skill levels with somewhat higher values for intermediate and advanced level anglers. Flows 3 and 4 were “poor” to “unacceptable” except for a “neutral” rating for advanced anglers at Flow 3 (Table 17).

Table 17. Tuckasegee River Reach 5. Mean Rating of Flows for Different Skill Levels

5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Skill Level	Flow 1 316 cfs	Flow 2 469 cfs	Flow 3 812 cfs	Flow 4 993 cfs	No. Who Rated Characteristic
Novice	1.0	1.0	-1.7	-2.0	F1=10;F2=9 F3=6;F4=6
Intermediate	1.4	1.3	-0.7	-1.5	
Advanced	1.5	1.4	-0.2	-1.0	

Overall Evaluation of Flow and Flow Preference

The ratings of overall experience from the Single Flow Survey and the Comparative Survey show similar trends (Table 18); Flows 1 and 2 (rated “good” or “excellent”) are strongly preferred over Flows 3 and 4 (rated “poor”). Participants indicated a distinct preference for Flow 2 in the Comparative Survey after fishing all four flows (rating moved from “good” to “excellent”). Participants wanted the same water flow at Flows 1 and 2 though the magnitude of the values indicates they wanted a little more water at Flow 1. At Flows 3 and 4 they wanted lower and much lower flows respectively. All participants would return to fish Flows 1 and 2 while only one would return for Flow 3 and none for Flow 4. Tables 19 and 20 indicate participant response trends are similar whether the results include all who filled out a Single Flow Survey or only those who fished all four flows

Table 18. Tuckasegee River Reach 5. Mean Ratings for Overall Experience and Flow Preference

Overall Rating Scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; 1 = Good; 2 = Excellent

Flow Preference Scale: 1 = Much Lower; 2 = Lower; 3 = No Change; 4 = Higher; 5 = Much Higher

Questions	Flow 1 316 cfs	Flow 2 469 cfs	Flow 3 812 cfs	Flow 4 993 cfs
Single Flow Overall Rating	1.1	1.1	-0.7	-1.3
Flow Preference – Higher or Lower Levels	3.4	2.8	1.8	1.2
Fish Again	Yes = 10 No = 0	Yes = 9 No = 0	Yes = 1 No = 5	Yes = 0 No = 6
Comparative Overall Rating	1.4	2.0	-0.7	-1.3

Table 19. Tuckasegee River Reach 5. Overall Rating at End of Each Single Flow

5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Participant Type	Flow 1 316 cfs	Flow 2 469 cfs	Flow 3 812 cfs	Flow 4 993 cfs	No. Who Rated Flows
Participated in All 4 Flows	1.2	0.8	-0.7	-1.3	6
All Participants	1.1	1.1	-0.7	-1.3	F1=10;F2=9 F3=6;F4=6

Table 20. Reach 5. Flow Level Preferences at Each Flow Level

5 point scale: 1 = Much Lower; 2 = Lower; 3 = No Change; 4 = Higher; 5 = Much Higher.

Participant	Flow 1 316 cfs	Flow 2 469 cfs	Flow 3 812 cfs	Flow 4 993 cfs	No. Who Rated Preference
Participated in All 4 Flows	3.3	2.8	1.8	1.2	6
All Participants	3.4	2.8	1.8	1.2	F1=10;F2=9 F3=6;F4=6

Advantages and Disadvantages for Reach 5

Frequently noted advantages at Flows 1 and 2 were “Number of Quality Spots”, “Walk in Channel”, “Ability to Cast”, “Aesthetic Quality”, and “Fish from a Boat” (only for Flow 2). “Fish from a Boat” was one the few disadvantages noted but only for Flow 1. There were few frequently noted advantages at Flows 3 and 4. Frequently noted disadvantages At Flows 3 and 4 were “Number of Quality Spots” and “Walk in Channel”. “Walk Shoreline” had about the same number of advantages and disadvantages for Flows 1 and 2 while Flows 3 and 4 had almost all disadvantages. This may reflect the general difficulty of accessing this reach of the river.

Safety for Reach 5

At Flows 1 and 2 participants noted the normal hazards of wading swift water, low water for canoes and boats (Flow 1 only), and slanted bedrock and deep holes, which could be seen at this water level but would be dangerous at higher flows. At Flows 3 and 4 participants noted the difficulty in walking along the bank due to water in the grass, hazardous wading conditions due to the velocity of the current and underwater obstacles that were hard to see, the difficulty of controlling a canoe well enough to fish, and floating debris. The difficulty of accessing the river from Highway 74 was also mentioned at various flows.

Outstanding Angling Features or Opportunities for Reach 5

The river at Flow 1 was clear, with nice riffles, runs, channels, and overhanging trees. At Flow 2 participants noted the clear water, the ease of keeping lures off the bottom, and more active fish. There were no outstanding features noted for Flows 3 and 4.

Additional Comments from Single Flow Survey and Comparative Survey for Reach 5

Several participants indicated a flow between Flow 1 and Flow 2 would be generally acceptable for fishing and would provide an economic boost for Swain and Jackson Counties while one local participant only fishes the Tuckasegee at Flow 1. The need for public access including trailer access was mentioned as was the futility of fishing the higher flows due to the perception that there is no fishable structure to the river flows.

Conclusions for Reach 5

Reach 5 of the Tuckasegee River is characterized by a fairly continuous average gradient of about 7 feet per mile and a rocky bedrock river channel with shoals, pools and deeper moving water. There is more deep moving water in this section than in Reaches 3 and 4. The banks are heavily vegetated with shrubs and small trees and access to the river is generally limited to small primitive trails in some sections. There is considerable commercial development along other sections including vegetable farming, flea markets, and river outfitters.

Highway 74 (4-lane) parallels this reach closely and public access is mainly at bridge crossings and along road right-of-ways. Pulling on and off the highway is dangerous due to limited sight distance and vehicle speeds of 55 MPH. Most land along the river is private property with access still possible for anglers with the permission of the landowner.

The results of the controlled flow study indicate that the generally acceptable flow for angling is Flow 2, closely followed by Flow 1, or somewhere in between these two flows. At these flows wading is relatively easy for the novice and experienced angler in most parts of the river though the substrate can be slippery from sediment and algae growth. Some mud banks along the river make access somewhat difficult. Boat fishing is an advantage of Flow 2 and is possible at Flow 1 with an experienced boatman. Flows 3 and 4 are too high to wade safely.

Reach 1

General

This 2-mile reach begins at the Cedar Cliff Powerhouse and ends at the confluence with the West Fork of the Tuckasegee River. The channel is relatively narrow with small ledges and riffles in much of its course. This section is relatively unknown compared to the main stem reaches and is mostly fished by local anglers.

Measured flows during this study are shown below for Reach 3. Both flows were measured about one mile downstream from Cedar Cliff Powerhouse. Flow 1 is base flow and Flow 2 is the flow obtained by raising the tainter gate at Cedar Cliff Dam.

	Flow 1	Flow 2
Actual cfs	13	105
Target cfs		65

Access

As with all sections of the Tuckasegee, public access sites are limited and sites that provide easy access for small boats, particularly those with trailers, are practically unknown. Reach 1 has access along the highway right-of-way along Highway 281 on one side of the river and along Shook Cove Road on the other side. Parking is in limited roadside pull-offs. Access across private property is with the permission of the landowner.

Information from Single Flow Surveys and Comparative Surveys

Participant Information

Table 21 provides information about the participants. Three anglers participated in both flows in the study on Reach 1. Two anglers had never fished this reach and one was very familiar with it.

Table 21. Tuckasegee River Reach 1. Participant Information

Participants	Fly – 2; Spin/Lure - 1
Skill Level	Novice – 1; Intermediate – 1; Advanced – 1
River Access	Wading – 3
Times Fished the Tuckasegee before the Study	<5 days = 1; 11-20 days - 1; >30 = 1
Times Fished Any River/Year	<5 days = 1; 11-20 days - 1; >30 = 1

Angling Experience Characteristics

Participant ratings from the Single Flow Survey for angling experience characteristics under the two flow conditions are shown in Table 22. There is a preference for Flow 1 for most characteristics. “Fish from a Boat” was rated “unacceptable” and “poor” and “Number of Quality Fishing Spots” was rated “neutral” and “poor” for Flows 1 and 2 respectively.

Table 22. Tuckasegee River Reach 1. Mean Rating of the Two Flows or River Levels for Angling Characteristics

5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Characteristic	Flow 1 13 cfs	Flow 2 105 cfs	No. Who Rated Characteristic
Walk Shoreline	-0.3	-0.7	3
No. Quality Fishing Spots	0.3	0.3	
Walk in Channel	1.7	-0.7	
Ability to Cast	1.3	0.3	
Aesthetic Quality	1.3	0.0	
Ability to See Fish	1.7	-0.3	

Ability to Land Fish	1.3	0.0	
Challenge	1.3	0.5	2
Fish From Boat	-2.0	-1.0	

Participants were asked in the Comparative Survey to rate the importance of the same angling characteristics used in the Single Flow Survey plus the characteristics of fishing success, driving distance to the river, crowdedness, and water temperature (Table 23). The most important characteristics (participant mean rating of 4 or 5) are shown in order of importance (high to low) in Table 23 along with a rating of the four flows on a scale of 1 to 2. While participants were asked to rank order the flows (i.e., must rank them in order of preference; only one flow can be a “1”), only one of the three rank ordered the flows while the other two rated them on a 2-point scale (i.e., both flows could be a “1”). All responses were treated as ratings and the results indicate some preference for Flow 1.

Table 23. Tuckasegee River Reach 1. Mean Rating of each Flow For the Most Important Angling Characteristics.

Characteristic Scale is 1-5; 1 is Not Important; 3 is Somewhat Important; 5 is Very Important
Flow Rating Scale: 2-Point Preference Scale from 1 (Highest) to 2 (Lowest)

Characteristic	Importance of Characteristic Mean Score	Flow 1 13 cfs	Flow 2 105 cfs
No. Quality Fishing Spots	5	2	2
Walk in Channel	4	1	2
Ability to Cast	4	1	2
Aesthetic Quality	4	1	1
Crowdedness	4	1	1
Challenge	4	1	1
Fishing Success	4	1	1

Suitability for Different Skill Levels

When asked to rate the suitability of each flow for different skill levels there was a “good” rating for all skill levels at Flow 1 and a “neutral” to “poor” rating at Flow 2 (Table 24).

Table 24. Tuckasegee River Reach 1. Mean Rating of Flows for Different Skill Levels.

5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Skill Level	Flow 1 13 cfs	Flow 2 105 cfs	No. Who Rated Characteristic
Novice Average	0.7	-0.7	3
Intermediate Average	0.7	-0.3	
Advanced Average	1.0	0.3	

Overall Evaluation of Flow and Flow Preference

The ratings of overall experience from the Single Flow Survey and the Comparative Survey show similar trends (Table 25); Flow 1 is rated “neutral” and Flow 2 is rated “poor”. Participants preferred a much higher flow at Flow 1 and a lower flow at Flow 2. Two out of three would return to fish this reach again.

Table 25. Tuckasegee River Reach 1. Mean Ratings for Overall Experience and Flow Preference

Overall Rating Scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; 1 = Good; 2 = Excellent

Flow Preference Scale: 1 = Much Lower; 2 = Lower; 3 = No Change; 4 = Higher; 5 = Much Higher

Questions	Flow 1 13 cfs	Flow 2 105 cfs
Single Flow Overall Rating	0.3	-0.7
Flow Preference – Higher or Lower Levels	4.0	2.0
Fish Again?	Yes = 2 No = 1	Yes = 2 No = 1
Comparative Overall Rating	0.3	-0.7

Advantages and Disadvantages for Reach 1

More advantages were noted at Flow 1 and more disadvantages at Flow 2.

Safety for Reach 1

There were no safety concerns at Flow 1. The murky fast water made wading hazardous at Flow 2.

Outstanding Angling Features or Opportunities and Additional Comments for Reach 1

At Flow 1 the angling opportunities were limited with a lot of shallow areas with little structure and not enough water for a good fishery. At Flow 2 one participant felt this was a bad fishing experience with the channel needing much work to support many fish. A second participant felt there needed to be a constant flow of about 60 cfs all year in the channel.

Conclusions for Reach 1

A fairly continuous gradient and a narrow rocky bedrock river channel with shoals, small ledges, and pools characterize Reach 1 of the Tuckasegee River. The banks are densely vegetated in spots with few easy entrances to the river channel in these spots.

The results of the controlled flow study indicate that the acceptable flow is between Flow 1 (13 cfs) and Flow 2 (105 cfs). Though Flow 1 is easy to wade and see fish, it is too low for a good fishing experience and Flow 2 at 105 cfs is too high for a good fishing experience. Informal conversation between the participants indicated the targeted flow of 50 to 60 cfs would probably be close to acceptable.

Reach 2

General

This 1.5-mile reach begins at the Tuckasegee Powerhouse and ends at the confluence with the East Fork of the Tuckasegee River. The channel is generally narrower than the East Fork with many riffle areas. This section is relatively unknown compared to the main stem reaches and is fished mostly by local anglers.

Measured flows during this study are shown below for Reach 2. Both flows were measured about 100 yards downstream from the Tuckasegee Powerhouse. Flow 1 is base flow and Flow 2 is a flow from Thorpe Powerhouse that can't be maintained for long periods of time.

	Flow 1	Flow 2
Actual cfs	16	72
Target cfs		65

Access

As with all sections of the Tuckasegee, public access sites are limited and sites that provide access for small boats, particularly those with trailers, are practically unknown. Reach 2 has access to the river at the Tuckasegee Powerhouse and at Bridge crossings on Grassy Creek and Fred Smith Roads (both within 50 feet of Highway 107). There is a pull-off at the Sanctified Church of God and a few other establishments along Highway 107. Highway 107 has many blind turns and vehicles travel at a high rate of speed relative to the road conditions making turns onto the highway a safety feature. There is a private dirt road on the other side of the river that can be accessed from Grassy Creek Road and Fred Smith Road that are utilized by local anglers. All of these access areas appear to be on private property.

Information from Single Flow Surveys and Comparative Surveys

Participant Information

Table 26 provides information about the participants. Six anglers participated in this study that consisted of two flows. All were intermediate skill level with a variety of fishing experience on the Tuckasegee and other rivers. Only one of the anglers had fished this reach before the study.

Table 26. Tuckasegee River Reach 2. Participant Information

Participants	Fly – 2; Spin/Lure – 4
Skill Level	Intermediate – 6
River Access	Wade – 6
Times Fished the Tuckasegee before the Study	<5 days – 4; 5-10 days – 2; 21-30 days – 1
Times Fished Any River/Year	5-10 days – 1; 11-20 days – 3; 21-30 days – 1; > 30 days – 1

Angling Experience Characteristics

Participant ratings from the Single Flow Survey for angling experience characteristics under the two flow conditions are shown in Table 27. All characteristics were rated somewhat higher at Flow 1 except for “Number of Quality Fishing Spots and “Challenge”. “Fish From a Boat” was “unacceptable” at both flows.

Table 27. Tuckasegee River Reach 2. Mean Rating of the Two Flows for Angling Characteristics.

5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Characteristic	Flow 1 16 cfs	Flow 2 72cfs	No. Who Rated Characteristic
Walk Shoreline	0.7	0.3	6
No. Quality Fishing Spots	0.2	1.0	
Walk in Channel	1.8	0.5	
Ability to Cast	1.0	0.7	
Aesthetic Quality	0.5	0.3	
Ability to See Fish	1.7	0.0	
Ability to Land Fish	1.0	0.5	
Challenge	0.4	0.8	F1=5;F2=6
Fish From Boat	-2.0	-2.0	3

Participants were asked in the Comparative Survey to rate the importance of the same angling characteristics used in the Single Flow Survey plus the characteristics of fishing success, driving distance to the river, crowdedness, and water temperature (Table 28). The most important characteristics (participant mean rating of 4 or 5) are shown in order of importance (high to low) in Table 28 along with a rating of the four flows on a scale of 1 to 2. While participants were asked to rank order the flows (i.e., must rank them in order of preference; only one flow can be a “1”), three participants rank ordered the flows while the other three rated (i.e., both flows could be rated a “1”) them on a 2-point scale. All responses were treated as ratings and there appears to be no clear tendency to prefer one flow to the other. “Crowdedness”, “Ability to Cast” and Aesthetic quality” were rated equally while Flow 2 was preferred for “Number Quality Fishing Spots” and “Challenge” while Flow 1 was preferred for “Walk in Channel”.

Table 28. Tuckasegee River Reach 2. Mean Rating of each Flow For the Most Important Angling Characteristics.

Importance Scale: 1 is Not Important; 3 is Somewhat Important; 5 is Very Important

Flow Rating Scale: 2-Point Preference Scale from 1 (Highest) to 2 (Lowest)

Characteristic	Importance of Characteristic Mean Score	Flow 1 16 cfs	Flow 2 72 cfs
Crowdedness	5	1	1
No. Quality Fishing Spots	5	2	1
Walk in Channel	4	1	2
Ability to Cast	4	1	1
Aesthetic Quality	4	1	1
Challenge	4	2	1

Suitability for Different Skill Levels

When asked to rate the suitability of each flow for different skill levels Flow 1 was “neutral” for all skill levels while Flow 2 was rated “neutral” for novice but “good” for Intermediate and advanced levels (Table 29).

Table 29. Tuckasegee River Reach 2. Mean Rating of Flows for Different Skill Levels.

5-point scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent.

Skill Level	Flow 1 16 cfs	Flow 2 72 cfs	No. Who Rated Characteristic
Novice Average	0.0	-0.2	6
Intermediate Average	0.0	0.7	
Advanced Average	-0.2	1.0	

Overall Evaluation of Flow and Flow Preference

The ratings of overall experience from the Single Flow Survey and the Comparative Survey show similar trends (Table 30); Flow 1 is rated “neutral” and Flow 2 is rated “good” though the numerical difference between Flows 1 and 2 are smaller on the comparative rating. Participants preferred a higher flow at Flow 1 and about the same at Flow 2. One more would return to fish Flow 2 than Flow 1.

Table 30. Tuckasegee River Reach 2. Mean Ratings for Overall Experience and Flow Preference

Overall Rating Scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; 1 = Good; 2 = Excellent

Flow Preference Scale: 1 = Much Lower; 2 = Lower; 3 = No Change; 4 = Higher; 5 = Much Higher

Questions	Flow 1 16 cfs	Flow 2 72 cfs
Single Flow Overall Rating	0	0.7
Flow Preference – Higher or Lower Levels	4.2	2.5
Fish Again	Yes = 3 No = 3	Yes = 4 No = 2
Comparative Overall Rating	0.2	0.5

Advantages and Disadvantages for Reach 2

Characteristics with a high frequency of advantages at both flows were “Walk Shoreline”, “Walk in Channel”, and “Ability to Cast”. “Number of Quality Spots” and “Challenge had a high frequency of disadvantages at Flow 1 and advantages at Flow 2. “Ability to See Fish” had advantages at Flow 1.

Safety for Reach 2

The only concern was the ability to wade in parts of the channel at Flow 2 due to the velocity of the water.

Outstanding Angling Features or Opportunities for Reach 2

Flow 1 was noted for several long glides and pools that were easy to wade/fish and it was characterized as good for beginners. Flow 2 had more surface ripple that made it easier to sneak up on fish, bigger eddies, and there seemed to be larger fish.

Additional Comments From Single Flow Survey and Comparative Survey for Reach 2

Several participants noted that a flow between Flows 1 and 2 would probably have been the most fishable flow since Flow 1 was too low and Flow 2 was too difficult to wade.

Conclusions for Reach 2

A fairly continuous gradient and a narrow rocky bedrock river channel with shoals, small riffles, and pools characterize Reach 2 of the Tuckasegee River. The banks are densely vegetated in spots but there are several easy entrances to the channel.

The results of the controlled flow study indicate that the acceptable flow is between Flow 1 (16 cfs) and Flow 2 (72 cfs).

Literature Cited

Whittaker, et. al. 1993. Instream Flows for Recreation: A Handbook on Concepts and Research Methods. National Park Service Publication, Alaska Region.

Knight, J. 2002. Zone of Peaking Influence Study. Duke Power Relicensing Study for Tuckasegee River Hydropower Projects. Study in Progress.

Appendix A
Single Flow Survey

Tuckasegee Angling Flow Study
October 16-20, 2001

**Tuckasegee River
Angler Flow Evaluation Survey
Single Flow Evaluation**

Date: _____ **Flow Release:** _____

Name: _____

Gear Type: (circle) **Bait** **Fly** **Spin/Lure**
Skill Level (circle) **Novice** **Intermediate** **Advanced**
Indicate (circle) **Bank** **Wade** **Drift Boat**
Reach Fished: **1** **2** **3** **4** **5**

Please answer each of the following questions based on your own experience or reaction to the river at this flow. If you have no opinion, about a particular item, please write "NA". Please do not discuss the questions with other study team participants.

1. Rate the flow or water level with regard to the following characteristics. For each one that you rate as "poor" or "unacceptable", indicate whether the flow was "too high" or "too low". Check one value for each characteristic.

Characteristic	Unacceptable -2	Poor -1	Neutral 0	Good +1	Excellent +2	Water Too Low	Water Too High
Ability to Walk Shoreline/bank							
Number of quality Fishing spots							
Ability to walk in Stream Channel							
Ability to Cast							
Aesthetic quality Of river							
Ability to see fish							
Ability to land fish							
Challenge							
Ability to fish from a boat							

2. How would you rate the suitability for a novice, intermediate, and advanced angler at this flow? If you used a rating of "poor" or "unacceptable", then indicate whether the flow was "too high" or "too low". (check one value for each skill level)

Skill Level	Unacceptable -2	Poor -1	Neutral 0	Good +1	Excellent +2	Water Too Low	Water Too High
Novice							
Intermediate							
Advanced							

3. Please indicate the top 3 advantages and top 3 disadvantages of this flow from your perspective for your gear type. Use 1, 2, and 3 to indicate priority with 1 being the highest priority.

Characteristic	Advantage	Disadvantage
Ability to walk shoreline/bank		
Number of quality fishing spots		
Ability to walk in stream channel		
Ability to cast		
Aesthetic quality of river		
Ability to see fish		
Ability to land fish		
Challenge		
Ability to fish from a boat		
Other		
Other		
Other		

4. How would you rate the overall angling experience at this flow? (*circle one value*)

Unacceptable Poor Neutral Good Excellent
 -2 -1 0 +1 +2

5. Compared to this flow level, would you prefer a level that was higher, lower, or about the same? (*circle one value*)

Much Lower Lower No Change Higher Much Higher
 1 2 3 4 5

6. Given the opportunity to fish here again, *at the same flow level*, would you choose to return?

Yes No Briefly explain why?

7. Did you observe any specific safety hazards *at this flow*? If so, please describe them below.

8. Did you observe any outstanding angling features or opportunities *at this flow*? If so, please describe them below.

9. Additional Comments:

Thank you for your participation.

**Appendix B
Comparative Survey**

**Tuckasegee Angling Flow Study
October 16-20, 2001**

(Surveys are the same for each reach except dates and number of flows)

5. Provide an overall evaluation for each of the flows you experienced during the study. Make this evaluation based on the type of gear you used. Please give consideration to all the conditions that make up a high quality trip. (*check one rating for each flow*)

Releases	Unacceptable -2	Poor -1	Neutral 0	Good +1	Excellent +2
Base Flow Tue AM					
Release # 1 Tue PM					
Release # 2 Wed AM					
Release # 3 Wed PM					

Please add anything you'd like to tell us about fishing on the Tuckasegee.

Thank you very much for your participation.

Tuckasegee River Angler Flow Evaluation Study Comparative Evaluation

Date: _____

Name: _____

Gear Type: (circle) **Bait** **Fly** **Spin/Lure**
Skill Level: (circle) **Novice** **Intermediate** **Advanced**
Indicate: (circle) **Bank** **Wade** **Drift Boat**
Reach Fished: (circle) **1** **2** **3** **4** **5**

Please answer each of the following questions based on your own experience or reaction to the river at each of the flows tested. If you have no opinion about a particular item, please write "NA". *Please do not discuss these questions with other study team participants.*

1. How many times have you fished on the Tuckasegee River before this study?
(check one)

<5 5-10 11-20 21+-30 >30

2. Which category best describes how many days you go fishing each year?

<5 5-10 11-20 21-30 >30

3. A number of characteristics can affect your satisfaction with a fishing trip. How important are each of these characteristics when you take a fishing trip? (check one number for each characteristic)

Characteristic	Not Important 1	2	Somewhat Important 3	4	Very Important 5
Ability to walk shoreline/bank					
Number of quality fishing spots					
Ability to walk in stream channel					
Ability to cast					
Aesthetic quality of river					
Ability to see fish					
Continued	On	Next	Page		

Characteristic	Not Important 1	2	Somewhat Important 3	4	Very Important 5
Ability to land fish					
Challenge					
Ability to fish from a boat					
Fishing success					
Driving distance to river					
Crowdedness					
Water Temperature					
Other					
Other					

4. Please rank the flows in order of preference based on how the flows best met each of the following characteristics (*use ranks 1-4 where 1 is the highest rank and 4 is the lowest*). If you have no opinion, or the characteristic does not apply, leave the space blank.

Characteristic	Base Flow Tue AM	Flow # 1 Tue PM	Flow # 2 Wed AM	Flow # 3 Wed PM
Ability to walk shoreline/bank				
Number of quality fishing spots				
Ability to walk in stream channel				
Ability to cast				
Aesthetic quality of river				
Ability to see fish				
Ability to land fish				
Challenge				
Ability to fish from a boat				
Fishing success				
Driving distance to river				
Crowdedness				
Water Temperature				

				Single Flow Evaluations for Reach 4 - Tuckasegee Angling Flow Study - October 19-20, 2001																																																																			
				Question 1																																																																			
				Rate Flow From Unacceptable (-2) to Excellent (+2)																																																																			
				5 Point Scale: -2 = Unacceptable; -1 = Poor; 0 = Neutral; +1 = Good; +2 = Excellent																																																																			
				Walk Shoreline				No. Quality Spots				Walk in Channel				Ability to Cast				Aesthetic Quality				Ability to See Fish				Ability to Land Fish				Challenge				Fish From Boat																																			
Participant	(1) Gear	(2) Skill	(3) Where																																																																				
Flow				1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																																
Anderson	F	A	W			0	0			2		0			-1	-1			1	1			1	1			-1	-1			1	2	0	0			1	1			1	2																													
Angold	L	A	D	2	1	0	-2	-1	2	2	-2	2	2	0	-2	1	2	2	0	1	2	2	-2	1	1	1	-2	0	2	2	0	-1	2	2	0	-2	2	2	-2	2	2	-2																													
Baxter	F	A	D		2				2				2				2			2				2					2					2				2																																	
DeWeese	L	I	W	-1	1	1	-1	1	2	0	0	2	0	-1	-2	2	1	1	0	0	2	0	-1	-1	1	0	-2	2	1	0	-1	1	2	1	0	-2	-1	0	1																																
Forrest	F	A	W	2	1	-1	-2	1	2	0	-2	2	1	-1	-2	2	2	0	-2	1	2	0	-2	2	1	-1	-2	2	2	0	-2	1	2	1	-2	-2	0	2	-2																																
Hasell	L	I	W	2	2	-1	-2	2	2	-1	-2	2	2	-1	-2	2	2	0	-2	2	1	0	0	2	2	-1	-2	2	2	-1	-2	2	2	0	0	-1	-1	1	0																																
Hydaker	L	A	D	-1	-1	-2	-2	1	2	-2	-2	1	1	-2	-2	1	1	0	-2	1	1	0	0	1	1	-2	-2	1	1	-2	-2	0	2	0	0	-2	2	0	-2																																
Johns	L	N	W	1	1	-1	-1	1	2	0	-1	2	2	-1	-2	2	2	0	0	2	2	2	2	1	1	-1	-1	2	2	1	0	1	2	1	1	-2	1	0	-1																																
Morgan	F	A	W	1	1			1	1			1	1			1	1			1	1			1	1			1	1		0	0																																							
Parrott	F	A	W		2				2				2				2				2				2				2			2					2																																		
Shelton	F	I	W	2	2			1	1			2	2			2	2			2	2			2	0			1	0			1	0																																						
Sum				8,0	12,0	-4,0	-10,0	7,0	18,0	-1,0	-9,0	14,0	15,0	-7,0	-13,0	13,0	17,0	4,0	-5,0	10,0	17,0	5,0	-2,0	9,0	12,0	-5,0	-12,0	11,0	15,0	0,0	-7,0	5,0	16,0	6,0	0,0	-11,0	7,0	6,0	-4,0																																
Average				1,0	1,2	-0,6	-1,4	0,9	1,8	-0,2	-1,3	1,8	1,5	-1,0	-1,9	1,6	1,7	0,6	-0,7	1,3	1,7	0,7	-0,3	1,1	1,2	-0,7	-1,7	1,4	1,5	0,0	-1,0	0,6	1,6	0,9	0,0	-1,8	0,9	0,9	-0,6																																
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Appendix D
Written Comments
From
Single Flow Surveys and Comparative Surveys
Reaches 1 to 5

Tuckasegee River Angling Flow Study
Written Comments – Single Flow Surveys and Comparative Surveys
Reaches 1 to 5 – October 16-20, 2001

Reach 1 – Written Comments – Single Flow Surveys

Question 6: Given the opportunity to fish here again, *at the same flow level*, would you choose to return?

Flow 1 – Base Flow:

Johns – Yes. Still have a lot to learn about fishing.

Knight – No. Very few good fishing spots. Very shallow – very limited cover for fish. Area need more structure, logs, rocks, etc.

Sullivan – Yes. It is fishable but needs a little more water.

Flow 2 – Base Flow + Targeted 60 cfs:

Johns – Yes. Lot to learn at all levels.

Knight – No. Water very murky, hazardous to walk. May look like more fish structure but deceiving when compared to base flow.

Sullivan – Yes. I would need to be very careful wading, but, I might catch a big brown trout. This would limit fishing to very few people.

Question 7: Did you observe any specific safety hazards at this flow? If so, describe them below.

Flow 1 – Base Flow:

Johns – no

Knight – No safety hazards (slippery rocks)

Sullivan – no

Flow 2 – Base Flow + Targeted 60 cfs:

Johns -- no

Knight – Cannot walk in stream bed. Murky, slippery, fast, deep.

Sullivan – Water became very muddy. I had difficulty to see the bottom to wade.

Question 8: Did you observe any outstanding angling features or opportunities *at this flow*? If so, please describe them below.

Flow 1 – Base Flow:

Johns – no

Knight – Angling opportunities very limited – a lot of shallow areas with little structure.

Sullivan – no

Flow 2 – Base Flow + Targeted 60 cfs

Johns -- no

Knight – I thought this was the worst fishing experience to date on this study. The whole channel needs work to support many fish.

Sullivan – NO! Not at 105 cfs. But, at 60-70 cfs it would be gone. This would need to be a constant flow all year.

Question 9: Additional Comments

Flow 1 – Base Flow:

Johns – Lack of good access points.

Knight – no

Sullivan – This at base is not enough water for a fishery.

Flow 2 – Base Flow + Targeted 60 cfs

Johns – no

Knight – no

Sullivan – We need to meet min. flow of 60-70 cfs on this reach year round.

Reach 1 – Written Comments – Comparative Survey

Question 6. Please add anything you'd like to tell us about fishing on the Tuckasegee.

Johns – NA

Knight – I had never fished this reach before. I was optimistic when I looked at the channel but was really disappointed when I got in it. Very shallow at Base flow. Saw one fish. High flow – tried for about 5 minutes at the “best” spot I had fished during base flow. I wouldn’t waste my time fishing East Fork Reach 1 at 60+; probably would never fish it again.

Sullivan – Base is OK (12 cfs) but I thought I was going to fish at 60-70 cfs. It was more than 70cfs (105 cfs). That is a little too much for this reach if you are wading.

Reach 2 – Written Comments - Single Flow Surveys

Question 6: Given the opportunity to fish here again, *at the same flow level*, would you choose to return?

Flow 1: Base Flow

Goudreau – Yes. Easy to wade and cast.

Green – No. Water was too low at base level.

Reed – No. River was too shallow with few quality fishing spots.

Wishon – No. Current too slow, not enough quality fishing holes.

Zgavec – yes. The challenge of not spooking the fish, and the ease of spotting them.

Ziegler – Yes, but I would likely choose the area above the Tuckasegee powerhouse. The aesthetics below the powerhouse are not that great. The river (referring to aesthetics) itself is fine, but a lot of houses and debris on riverbanks. Also a lot of barking dogs.

Flow 2: - Base Flow + Targeted 60 cfs

Goudreau – Yes. Still very fishable.

Green – yes

Reed – No. Most runs still too shallow; still few quality fishing spots.

Wishon – Yes. Better fishing spots, more runs with faster water.

Zgavec – Yes. Fish are less spooky.

Ziegler – No. Would like to fish a wider channel at this flow. Something like the delayed harvest section.

Question 7: Did you observe any specific safety hazards at this flow? If so, describe them below.

Flow 1 – Base Flow:

Goudreau – no

Green – no

Reed –no

Wishon - no

Zgavec – no

Ziegler – no. River was relatively easy to wade. There were a couple of dogs on the loose and one of them was also wading on the river. No threat to safety on this day but the potential is there.

Flow 2 – Base Flow + Targeted 60 cfs

Goudreau – no

Green – no

Reed – no

Wishon - no

Zgavec – The ability to wade.

Ziegler – Wading in the stream channel is difficult in spots.

Questions 8: Question 8: Did you observe any outstanding angling features or opportunities *at this flow*? If so, please describe them below.

Flow 1 – Base Flow:

Goudreau – Good for beginners.

Green – Hard to fish at this level.

Reed – no

Wishon - no

Zgavec – Ease of ability to wade.

Ziegler – There were several long glides and pools that were easy to wade/fish. Great for the novice.

Flow 2 – Base Flow + Targeted 60 cfs

Goudreau – More surface ripple makes it easier to sneak up on a fish.

Green – no
Reed – no
Wishon - no
Zgavec – Big eddys and the river seems to be able to hold larger fish. More shoreline cover.
Ziegler - no

Question 9: Additional Comments

Flow 1 – Base Flow:

Goudreau – Very clear water makes it easy for fish to see anglers.
Green – no
Reed – River is too shallow at this flow.
Wishon - no
Zgavec – no
Ziegler – The best feature was the ability to easily wade and fish the river. I would have liked the opportunity to fish a slightly higher flow as some of the riffles would have been a little deeper. The second flow that came through was too high for my angling ability and some of the spots would have been difficult to wade. This is a good area/flow for novice fly fishers to practice.

Comments at Flow # 2:

Goudreau – As water rose, lots of leaves were disturbed and floated, making it difficult to present a fly. A flow slightly lower may be better.
Green – no
Reed – The higher flow brought lots of leaves that interfered with spin fishing...was catching leaves on every 2nd or 3rd cast.
Wishon – Too many leaves in water.
Zgavec – no
Ziegler – I only had the opportunity to fish at this flow for about 15 minutes. Given more time I may have found some spots more suitable to my abilities.

Reach 2 – Written Comments – Comparative Survey

Question 6. Please add anything you'd like to tell us about fishing on the Tuckasegee.

Goudreau – Overall both flows were very good. A flow somewhere in between is probably best.

Green – NA

Reed – For spin fishing the section of the West Fork I fished the experience would be significantly improved with a flow between the 2 evaluated...at 1/2 to 2/3 of 2nd flow.

Zgavec – Just before the water turned “tea color” the fish were active.

Ziegler – NA

Wishon – NA

Reach 3 - Written Comments – Single Flow Surveys

Question 6: Given the opportunity to fish here again, *at the same flow level*, would you choose to return?

Flow 1 – Base Flow

Goudreau – Yes. Enjoyable experience, no problems/hazards.

Grajzar – Yes. Ease of access, varied shoreline and water depths.

Hampton – Yes. Beautiful spot, easy access and parking, quiet

Knight – Yes. Good experience. Fished two very different habitats. Have to pick spots based on experience of past fishing.

Sullivan – yes

Walls – No, other better quality streams in region with a consistent flow.

Flow 2 – Base Flow + Thorpe Release:

Goudreau – Very good for fishing.

Grajzar – Yes, a varied riverbed and depth allows a novice a wide range of challenges.

Hampton – No, water was up 10-12". Water was fast, couldn't see fish.

Knight – Yes, more of a challenge, excellent water clarity, felt safe, just limited fish, have had to fish it prior to maximize effort.

Sullivan – Yes, water flow is very desirable to fish. Water flow would be very beneficial to biology of the fishery in general (aquatic life and fish reproductivity).

Walls – This flow gave many options in which the experience was very good. A little more water (around 100 cfs) may be ideal for myself, but this level would work for most people.

Flow 3 – Base Flow + Cedar Cliff Release:

Goudreau – No, limited number of group fishing spots. Water velocity too much.

Grajzar – Didn't fish this flow.

Hampton – No, water was too high and too fast. Dangerous wading conditions. Fish from shore was acceptable but saw no fish.

Knight – No, can't fish it. Poor experience.

Rogers – No, I never saw a fish. No one caught a fish.

Sullivan – No, water too high.

Walls – No, water level was a bit high for a good experience, and with the other options available it would not be my first choice.

Flow 4 – Base Flow + Cedar Cliff and Thorpe Release:

Goudreau – No, way too high.

Grajzar – Didn't fish this flow.

Hampton – No, too high dangerous.

Knight – No, couldn't fish it. Very few spots maybe.

Rogers – No, not fun when water is high and fast.

Sullivan – No, water too high. Water not safe to wade.

Walls – No, the flow was too high.

Question 7: Did you observe any specific safety hazards at this flow? If so, describe them below.

Flow 1 – Base Flow:

Goudreau – no

Grajzar – no

Hampton – At spots, rocks were difficult—needed walking stick but downstream rocks were smaller.

Knight – Not really, just normal wading.

Sullivan – no

Walls – yes, access to river.

Flow 2 – Base Flow + Thorpe Release

Goudreau – In places where narrow channel, water goes too deep.

Grajzar – no

Hampton – More difficult to walk in stream as water rose.

Knight – Have to pick your steps more carefully but I didn't think any undue risk.

Sullivan – no

Walls – High, faster water. The individual should have some experience with walking in a stream/river.

Flow 3 – Base Flow + Cedar Cliff Release

Goudreau – Wading is unsafe in many areas.

Grajzar – Didn't fish this flow.

Hampton – Yes, water too high and too fast. Waders could fall with serious consequences.

Knight – Very hazardous to wade.

Rogers – Current was very swift and above my hips.

Sullivan – Yes! Higher water.

Walls – Yes, the depth and speed of the water at this flow.

Flow 4 – Base Flow + Cedar Cliff and Thorpe Releases

Goudreau – Very unsafe to wade.

Grajzar – Didn't fish this flow.

Hampton – High water, fast water.

Knight – Couldn't wade 99% of the river.

Rogers – High and fast water.

Sullivan – Yes, water too high.

Walls – Yes! The water level was too deep and fast.

Question 8: Did you observe any outstanding angling features or opportunities at this flow? If so, please describe them below.

Flow 1 – Base Flow:

Goudreau -- no

Grajzar – Good area for novice like me

Hampton – Lots of areas where water flowed to a narrow spot, good “dry fly” access. In middle, it was easy to cast without worry of trees, etc.

Knight – I enjoyed fishing this flow. Technical but challenging.

Sullivan – Water clear; you can see fish.

Walls – no

Flow 2 – Base Flow + Thorpe Release

Goudreau – Wide riffles and ledges were excellent habitat.

Grajzar – Yes, varied depth, overhanging brush.

Hampton – Only the scenic views.

Knight – Good experience, just trickier to fish (more challenge)

Sullivan – Yes, water is spread over the entire river bed. This allows more fishable spots in given area.

Walls – no

Flow 3 – Base Flow + Cedar Cliff Release

Goudreau – no

Grajzar – Didn't fish this flow.

Hampton – Water was clear (but no sighted fish). Beautiful day.

Knight – Very poor fishing experience. Very hard to fish.

Rogers -- no

Sullivan – no

Walls – no

Flow 4 – Base Flow + Cedar Cliff and Thorpe Releases

Goudreau – no

Grajzar –

Hampton – no

Knight – Very poor.

Rogers -- no

Sullivan – no

Walls – No!

Question 9: Additional Comments

Flow 1 – Base Flow:

Goudreau – Pocket water slightly too small. Need a little more variety to present flies better.

Grajzar – Enjoyed the lack of traffic and ready accessibility.

Hampton – Cold morning—30 degrees. Leaves becoming a problem when casting.

Knight – My concern is the ability to support much fish at this flow.

Sullivan – no

Walls – The flow was a bit too low for an excellent experience. I am looking forward to 200 cfs in the afternoon!

Flow 2 – Base Flow + Thorpe Release

Goudreau – Prefer a flow about halfway between this flow (200 cfs) and base flow, that should give most fishable area for entire river.

Grajzar – no

Hampton – As water rose, it became much more difficult to wade, see fish and move around. More concern with safety than fishing. Definitely prefer lower water.

Knight – About 100 cfs above base would be good balance between base and this flow.

Sullivan – I would like to see a min. flow of 150-200 cfs year round. Base flow is too low for a quality fishery.

Walls – no

Flow 3 – Base Flow + Cedar Cliff Release

Goudreau – Water was too high for flies or spinners.

Grajzar –

Hampton – Water was too high. Would not fish under these conditions. Wading was almost impossible.

Knight – no

Rogers -- no

Sullivan – no

Walls – I tried a fly rod to be consistent but found that to be pointless. Upon switching to a spin/lure the experience was better but not enough to return at this flow.

Flow 4 – Base Flow + Cedar Cliff and Thorpe Releases

Goudreau – no

Grajzar –

Hampton – Not fun.

Knight – Couldn't fish it, very discouraging.

Rogers – I didn't enjoy fishing at this water level.

Sullivan – no

Walls – Water level was too high!

Reach 3 - Written Comments - Comparative Survey

Question 6: Please add anything you'd like to tell us about fishing on the Tuckasegee.

Goudreau – Flow between base and 200 would be best.

Hampton – Great river when water is low (base). Please expand delayed harvest to areas above Existing harvest.

Knight – NA

Rogers – Only participated on Sat. Water too high!

Sullivan – This river could be a great cold water fishery if min. flow was about 125-200 cfs.

I would like to see the Dillsboro Dam removed.

Walls – Fishing the Tuck is an interesting experience! The river is “fishable” at any level but to Different people. To fish higher flows the individual must be more advanced and knowledgeable of walking in stream, but at the same time it was not worth that effort at the higher flows. The experience is good, but not when put in perspective to the region.
THANK YOU!

Reach 4 - Written Comments – Single Flow Surveys

Question 6: Given the opportunity to fish here again, *at the same flow level*, would you choose to return?

Flow 1 – Base Flow:

Angold – No, at this low flow, fish not very active. Flow too low for good canoe float; need to fish from bank/stream – not the best method for this stream.

DeWeese – Yes, easy to get around on streambed.

Forrest – Yes, fishing was good at base flow but fish “spook” easily. This makes for more of a challenge.

Hasell – Yes, fishing good.

Hydaker – No, wading limits how much of the river you get to fish. Limited access is a problem.

Johns – Yes, lots to learn and I caught a fish.

Morgan – Yes

Shelton – Yes, even though the water was a little too shallow, the fishing was still good overall.

Flow 2 – Base Flow + Thorpe Release

Angold – Yes, river is a pleasure to float. Enough water to move along and fill pools, but rate of flow makes wading comfortable as well.

Baxter – Yes, capable of fishing more waters than certain pools; as if water was not generating.

DeWeese – Yes.

Forrest – Yes, best flow rate for the river.

Hasell – Yes, fishing is still good at this level.

Hydaker – Yes, ability to float a long section of river – cover a lot of good spots without being rushed.

Johns – Yes, base and 200 cfs were both good levels. Would prefer a flow in between – say 100 cfs.

Morgan – Yes

Parrott – Yes, gives experienced and non-experienced anglers good floatable and wadeable spots to fish. This flow also gives fish (trout/bass) good water level to stimulate oxygen and correct aquatic wildlife.

Shelton – Yes

Flow 3 – Base Flow + Cedar Cliff Release

Angold – Yes, provides better fill of some shoreline fishing spots. Water moves at a nice speed for floating. Lovely on such a pretty day.

Anderson – Yes, all else being equal, I’d rather be on the water.

DeWeese – Yes, it would be better than not fishing, but this level is tiring.

Forrest – No, water level too high.

Hasell – No, water level too high.

Hydaker – Yes, if I wanted to fish I could make it work at this level.

Johns – Yes, would need to scout for good places to fish/wade. Presumably would be less good spots. Also might learn to fish a higher level.

Flow 4 – Base Flow + Cedar Cliff and Thorpe Release

Angold – No. Miserable! River pelting along. No time to think about casting. Unless you know the structure from lower flow days, little idea available because mass of water obscures features.

Anderson – Yes, I love to fish. It beats work.

DeWeese – No, too much water, hard to find fish, almost impossible to wade. No place to put boat in or take it out on this stretch. Close to unfishable.

Forrest – No, water level too high.

Hasell – No, water too high!

Hydaker – No, too much water to fish.

Johns – No, I might try to boat fish it. But, it is too high and fast to wade and there were few spots seen that would work, ie scouting for good spots would be difficult.

Question 7: Did you observe any specific safety hazards at this flow? If so, describe them below.

Flow 1 – Base Flow:

Angold - no

DeWeese – no

Forrest – no

Hasell – no

Hydaker – Trash in river eg, broken bottles, wire can be dangerous when wading.

Johns – no

Morgan – no

Shelton – no

Flow 2 – Base Flow + Thorpe Release:

Angold - no

Baxter -- no

DeWeese – no

Forrest – no

Hasell – no

Hydaker – Trash always presents hazards.

Johns – no

Morgan – no

Parrott -- no

Shelton – no

Flow 3 – Base Flow + Cedar Cliff Release:

Angold - no

Anderson—While in the boat it made it hard to see rocks. If you don't know the water is coming up you might get caught in a dangerous place.

DeWeese – Yes, enough water to begin using a boat but occasionally struck submerged objects. Difficult to wade, easy to lose balance.

Forrest – High water level made wading somewhat difficult.

Hasell – Strong current.

Hydaker – The water is pushy.

Johns – Could get swept off feet easily if lose footing.

Flow 4 – Base Flow + Cedar Cliff and Thorpe Release:

Angold – Wading a dangerous proposition in many otherwise good spots.

Anderson -- Submerged rocks. No warning of rising water.

DeWeese – Yes, dangerous to wade. Hard to fish and navigate a boat.

Forrest – This water level is quite dangerous in my opinion for wading.

Hasell – Water level – current – much too high for safe wading!

Hydaker – The water is pushy—not safe for wading.

Johns – Wading would be hazardous.

Question 8: Did you observe any outstanding angling features or opportunities at this flow? If so, please describe them below.

Flow 1 – Base Flow:

Angold - no

DeWeese – no

Forrest – Challenge of fishing easily “spooked” fish.

Hasell – no

Hydaker – This is probably the best level to wade.

Johns – no

Morgan – no

Shelton – The ability to spot fish was good.

Flow 2 – Base Flow + Thorpe Release:

Angold – A very pretty angling experience. Casting relatively easy, and the river's dynamics are nicely revealed without high water creating haste and difficulties.

Baxter – The water level at 200+ base creates one of the best fisheries in the East. This gives the general public miles of easy access and wading/floating.

DeWeese – Yes, there are plenty of fishable spots at this flow without a lot of danger from swift currents.

Forrest – At the point we first noticed the 200 cfs flow arriving at our location we started catching fish on almost every cast for about ½ hour. Probably due to flow stirring up larvae and providing cooler water. Great fishing @ this flow!

Hasell – no

Hydaker – More fishable water. At this level fish can move into more places and are not restricted.

Johns – no

Morgan – no

Parrott – Good water level. Spreads water out, giving fish more room to hold and feed.

Creates less pressure on select fish. Allows more people to fish different pieces of water.

Shelton – no

Flow 3 – Base Flow + Cedar Cliff Release:

Angold - no

Anderson – From a boat, it increased the places to fish.

DeWeese – Fish became more active. Had more water to feed in.

Forrest – no

Hasell – no

Hydaker – Not really.

Johns – no

Flow 4 – Base Flow + Cedar Cliff and Thorpe Release:

Angold - no

Anderson – From a boat you could get to more holes.

DeWeese – no

Forrest – no

Hasell – no

Hydaker -- none

Johns – no

Question 9: Additional Comments

Flow 1 – Base Flow:

Angold – Stream at this flow more suitable for hiking than fishing.

DeWeese – The fish tend to group at this level. They tend to be skittish and easy to spook at this level. Probably the safest level.

Forrest -- no

Hasell -- no

Hydaker – The biggest problem I experience is not having any way to know what the water level will be. The current number to call gives inaccurate or outdated information.

Johns – Need more public access to the river.

Morgan -- no

Shelton – no

Flow 2 – Base Flow + Thorpe Release:

Angold - no

Baxter – Please pass this discussion. We, the fishermen, floaters, tubers, general public need a good clean tail water to depend on for recreation and economic value. Look at the Madison River, MT, Holston, Watauga River, NC/TN.

DeWeese – This is what I consider ideal flow for the wading fisherman. This flow is what I would consider “natural” flow for this size riverbed. (Normal flow in this channel before any of the reservoirs were built.)

Forrest -- no

Hasell -- no

Hydaker – Reliable and current stream flow information is essential. The current “non-information” for the week is unreliable. Daily information that is accurate is a huge need.

Johns – no

Morgan – Caught more fish at lower flow base. Caught bigger fish at 200 cfs. Fairly dangerous to wade at higher flows than 200 cfs. Thin Tuckasegee and Mills River are best angling rivers in the region.

Parrott -- no

Shelton – no

Flow 3 – Base Flow + Cedar Cliff Release:

Anderson -- no

DeWeese – This flow was too high to wade fish comfortably. A sustained flow of this size would probably support many more fish/mile than are currently present.

Forrest -- no

Hasell -- no

Hydaker – Accurate water flow information on a daily basis is essential. The current system is broke!

Johns – no

Flow 4 – Base Flow + Cedar Cliff and Thorpe Release:

Angold – Stream not worth fishing. Would go somewhere else, or just stay home.

Anderson -- no

DeWeese – We need fisherman/boater access points along the river. For Reach 4, it would be nice to have a put-in at mouth of Cullowhee Creek or just below dam and have a take-out at Webster or even lower (above Dillsboro Reservoir).

Forrest -- no

Hasell -- no

Hydaker – Accurate day to day water flow information is needed. The current system is not accurate and is useless.

Johns – no

Reach 4 - Written Comments - Comparative Survey

Question 6: Please add anything you'd like to tell us about fishing on the Tuckasegee.

- Angold – This is a lovely stretch of a lovely river. However, at 650 cfs I think it's pretty much unfishable – certainly I'd rather go somewhere else. At base flow, it's too low to float effectively. between 200 and 450 cfs on a good day the river is a fishing delight.
- DeWeese – 200 cfs seemed to be ideal flow for the wade fisherman. 450 cfs seemed to be the ideal flow for the boat fisherman. One suggestion I have to reach a compromise between all the interested parties: rather than try to tailor flows around what the fisherman/paddler/etc likes, inform the public of exactly what flow the river is at and let them plan accordingly. Generate power when it makes the most economic sense and allow all parties to plan around this. This can be done by having real time flow measurements posted on the internet for a number of locations between Tuckasegee and Bryson City, have water travel times listed, and anticipated flow rates at each location posted for a 24hr period. (A simple computer program using the data that John Knight has collected could tell you the flow in Dillsboro one afternoon if the generators were brought on in the morning). Another piece to this puzzle would be to add access points along river (similar to the one at the mouth of Scott's creek) at approximately 5 mile intervals from Tuckasegee to Bryson. These two things would allow the user to plan around expected flows and bring the proper equipment to deal with them. This would allow the generators to operate at ideal times while allowing the recreational user the most opportunity to plan an enjoyable trip.
- Forrest – NA
- Hassell – NA
- Hydaker – Before Duke bought the company I could call the powerhouse and get accurate information on stream flow. Duke's system does not work! Now you get a pre-recorded message for the week that is often inaccurate. I can understand that the flow will change and all I want is accurate information. A minimum stream flow is needed. There are days when the "baseflow" is just too low.
- Johns – NA

Reach 5 - Written Comments – Single Flow Surveys

Question 6: Given the opportunity to fish here again, *at the same flow*, would you choose to return?

Flow 1 – Base Flow:

- Brett – yes. The river is fishable wading at many spots. It also can be fished from a small boat.
- Gabel – yes. Water quality was excellent. Clear with great workability for lure fishing. Could see fish and good fishing spots well.
- Howell – yes. I would like to see a constant steady flow 24/7
- Johns – yes. As a beginner level angler, I have lots to learn here at this level.
- Johnson – yes. It was nice weather, beautiful river, fishing not so good, but otherwise just good to be outside!
- Knight – yes. Had a good time – The biggest advantage was the ability to see the “holes” or “runs” and selectively cast where you wanted to – or, spot a way over to the selected spot.
- Parrott – yes. Level is good for drift or wade fishing. Need better or some public access points for wading, also trailer access.
- Stenzel – yes. Fishing was good – effort required was minimal.
- Sullivan – yes. Can float or wade
- Walls – yes. Good opportunity to work on skills.

Flow 2 – Base Flow + Thorpe Release:

- Gabel – yes. Still wadeable with little problems. Water still clear. Hole still easy to pick out.
- Howell – yes. Water was clear stable as easy to navigate.
- Johns – yes. Just as easy to wade as flow#1 but more depth made it easier to cast without hooking a rock.
- Johnson – yes. This level was good for fishing. Bank access is a problem, no matter how much flow.
- Knight – yes. Good fishing experience – just a little more difficult to wade at higher flow. I really didn’t see an increase in the holes to fish – just harder to wade to.
- Parrott – yes. Gives floaters and waders great opportunities to fish.
- Stenzel – yes. There was no difficulty in wading and water was clearer than base flow.
- Sullivan – yes. Able to fish it.
- Walls – yes. If no others available or equal. This river, to me, just doesn’t compare to the other streams and rivers in the area.

Flow 3 – Base Flow + Cedar Cliff Release:

- Gabel – yes. Fishing from bank yes but not from a boat. Water gets too fast to float fish. Fishing from the bank is more difficult but still easy enough.
- Johns – no
- Knight – no. Very hard to fish and very hard to identify areas where fish would hold. Hard to control boat and line to fish holes.
- Stenzel – no. Lack of good reachable fishing spots.
- Sullivan – no. Water is too high to wade safely—you cannot see the bottom well enough to be safe.
- Walls – no. This flow takes away too many options and spots to fish.

Flow 4 – Base Flow + Cedar Cliff and Thorpe Release:

- Gabel – no. Still could fish slow reaches fine. Bank fishing was limited somewhat due to strong currents. Access along bank was more difficult. You lost the ability to walk around some things near the water level. Water quality was still good, clear with only slight staining. I would not drive far to fish this level but I would still try it if I arrived here without knowing it was this high.
- Johns – no. A friend who is a Master Fisherman says you can catch fish at this water level if you know where to go and what to do. I don’t have that skill. And I think the flow study should focus on average fishing ability.

Knight – no. Can't fish it without tremendous effort. Do not think it is worth it.
Stenzel – no. It is too dangerous! Warnings should be posted at these flows for novices and even casual waders.
Sullivan – no. Water too high.
Walls – no. Water was just too high.

Question 7: Did you observe any specific safety hazards at this flow? Is so, describe them below.

Flow 1 – Base Flow:

Brett – no.
Gabel – Nothing outside of normal hazards associated with wading swift water.
Howell – Low water for canoes and boats.
Johns – no.
Johnson – Deep holes, rock shelves, drop offs.
Knight – Slanted bedrock and could usually see it at this flow. Blackberry thorns.
Parrott – no.
Stenzel – no.
Sullivan – no.
Walls – yes. Poor access! Bedrock difficult to wade.

Flow 2 – Base Flow + Thorpe Release:

Gabel – None other than what naturally occurs in swift rocky water.
Howell – No.
Johns – No.
Johnson – Bank access. Deep holes (but easier to see).
Knight – As long as the water is clear – no; but under more turbid conditions – the velocities and depths were greater.
Parrott – No.
Stenzel – No.
Sullivan – No.
Walls – Yes, quality access.

Flow 3 – Base Flow + Cedar Cliff Release:

Gabel – Water gets up in the grass/weeds so walking along the bank gets trickier.
Johns – Just the highway.
Knight -- Hard to control canoe in stationary position. Wading extremely hazardous.
Stenzel – Yes. Difficulty in climbing banks. Unable to see underwater obstacles. Floating debris—logs, timber.
Sullivan – If you wade it you'd be in trouble if you were not experienced and strong. Visibility for the bottom is very poor.
Walls – Yes, the flow level was too high for unfamiliar levels and access was poor.

Flow 4 – Base Flow + Cedar Cliff and Thorpe Release:

Gabel – Higher water forces a person to fish at specific points. Walking the river bank becomes more difficult.
Johns – Anyone trying to wade would need to be very careful.
Knight – Wading—probably fishing from boat except very stable platform.
Stenzel – Yes. Floating debris. Difficulty in maintaining footing. Difficulty in exiting the river.
Sullivan – Water too high to wade safely and you see the bottom well enough.
Walls – Yes, water depth and velocity.

Question 8: Did you observe any outstanding angling features or opportunities at this flow? If so, please describe them below:

Flow 1 - Base Flow:

Brett – no.

Gabel – Water flow was clear. Fishing lures worked well and all likely spots could be detected from a distance. Landing fish was fun because you could detect strikes easily.

Howell – no.

Johns – no.

Johnson – Nice riffles, overhanging trees, runs.

Knight – Could definitely “see the river” – all the little channels, rocks, etc – most enjoyable fishing it like a small stream.

Parrott – no.

Stenzel – no.

Sullivan – no.

Walls – no.

Flow 2 - Base Flow + Thorpe Release:

Gabel - Spinner was easier to keep off bottom. Seemed to have better action.

Howell – Fish seemed to be more active.

Johns – No.

Johnson – Clear water, deeper holes, still didn’t catch any fish.

Knight – Not really – prefer the lower flow

Parrott – No.

Stenzel – No.

Sullivan – It would be a great tail water fishery if flow could be obtained all year.

Walls – No.

Flow 3 - Base Flow + Cedar Cliff Release:

Gabel – no

Johns – no

Knight – no

Stenzel – no

Sullivan – no

Walls – no outstanding features

Flow 4 – Base Flow + Cedar Cliff and Thorpe Release:

Gabel – Fish seemed to be moving and feeding somewhat.

Johns – no

Knight – no

Stenzel – no

Sullivan – no

Walls -- no

Question 9: Additional Comments.

Flow 1 – Base Flow:

Brett – I don’t usually fish this river if the flow is higher.

Gabel – Thank you for considering anglers in this study.

Howell – no.

Johns – Access is difficult. Not many of them and the 4-lane highway is right next to the river – this is the biggest safety factor.

Johnson – Nice river, I’m sure there are better fishermen.

Knight – no.

Parrott – no.

Stenzel – no.

Sullivan – Need to have public ramps for putting in float boats.

Walls – I am interested to see other flows.

Flow 2 – Base Flow + Thorpe Release:

Gabel – This flow increase was of minimum impact to fishing. Had I not known the water level was increased, I probably would not have noticed at all.

Howell – No.

Johns – Visibility excellent; clear water.

Johnson – No.

Knight – No.

Parrott – No.

Stenzel – Mud along banks caused some difficulty in entering and leaving river.

Sullivan – No.

Walls – Not much change from base except that water was more clear.

Flow 3 – Base + Cedar Cliff Release:

Gabel – I would fish at this flow but would not consider it if the water was much higher.

Johns – Lots of leaves to catch. The flow was too high for this novice. Not able to wade except along bank so couldn't get out to areas that looked good. Maybe OK for experienced anglers but I wouldn't know.

Knight – no

Stenzel – Many leaves, twigs, debris affect what lures could be used.

Sullivan – For this river to be safe and a good tail water fishing, flow should be 150 cfs or 200 cfs max. If it was possible to maintain a min. flow of not less than 150 cfs it could be a great economic boost for Jackson and Swain counties.

Walls – This flow should only be used for and marketed to more advanced fishers and water users.

Flow 4 – Base + Cedar Cliff and Thorpe Release:

Gabel – Overall you can fish this flow from the bank. However, you can only fish at the slower reaches to have a fair chance at success. Riffles and rocky areas become too swift.

Johns – no

Knight – Very high water

Stenzel – Warnings should be posted at this flow rate and higher.

Sullivan – I think it could be great fishing if min. flow could be around 150 cfs. It could be a great economic boost for this area. More money is spent on sportfishing than any other outdoor activity.

Walls – Level was unsafe for a good angling experience.

Reach 5 - Written Comments – Comparative Survey

Question 6: Please add anything you'd like to tell us about fishing on the Tuckasegee.

- Gabel - I would fish on all flows. However, once you reached Flow #3 on Wednesday morning, boat floating and fishing became difficult.
- Johns – Public access is needed—some developed sites (1 or 2) and known legal access for others that remain “natural”. All flows could be fished with success with the right skills. For the average angler, a flow between base and 200 cfs would probably be optimum—say base + 60-100 cfs.
- Knight – The water level determined how you were going to fish. Base –200 could wade most areas. 450+ wading very limited if not down right hazardous. At high flows didn't expect fish to hit because no fishable structure to river flows. At 100-150 above base would be excellent.
- Stenzel – Enjoy the good access—a bank clean up (trash) is needed from time to time.
- Sullivan – I would like to see a min. flow of 150 cfs. The river has a wild population of fish that need to be considered. The waters above the dams are fine; but we have control led the aquatic life below and that is not right.
- Walls – The 2nd flow was excellent but could've been ideal with a bit more water. This river is fun and accessible, but does not offer the same biodiversity as others in the region.

Appendix E
Acknowledgement and Assumption of Risk
And
Release of Liability
Tuckasegee River Angling Flow Study
October 16 - 20, 2001

Acknowledgement and Assumption of Risk
And
Release of Liability
Tuckasegee River Angling Study
October 16, 17, 18, 19, 20, 2001

As an experienced fisherman with knowledge of the hazards involved in fishing rivers with moving water, whitewater and many other hazards, I understand and accept that this Angling Study on the various sections of the Tuckasegee River will expose me to numerous known and unknown risks which could result in personal injury, illness, death or damage to myself or my property. In addition to the usual hazards of fishing under these conditions, some of the specific known factors creating risk on this river include:

- Falling in swift water with consequent swims in turbulent water.
- Foot entrapment while wading in the riverbed.
- Walking on uneven ground on shore and in the riverbed.
- Water releases for fishing that will vary significantly in magnitude.

My participation in this trip is voluntary and I participate in spite of these named and other unnamed risks. I accept and assume all responsibility for and risk of personal injury, illness, death or damage to myself and my property arising from this trip.

In consideration that Duke Power has provided various water flows for this angling study, I voluntarily release and forever discharge Duke Energy, Inc., their officers, agents, and employees from any and all liability or claims for any injury, illness, or death, or damage to myself or property arising out of my participation in this angling study.

I fully recognize that if injury, illness, death or damage occurs to me while participating in this study that I will have no right to make a claim or file a lawsuit against Duke Energy or its officers, agents or employees, even if any of them negligently cause my injury, illness, death, or damage.

I also grant Duke Energy the right to use any photographs or videos taken of me during this trip for documentation and purposes related to studies for the hydropower relicensing of the Thorpe and Tuckasegee power plants.

Signature	Printed Name	Date
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Appendix F
Definition of Angling Terms
Tuckasegee River Angling Flow Study
October 16 - 20, 2001

Tuckasegee River Flow Evaluation Study Definition of Terms

The following defines several terms frequently used in the Flow Evaluation Surveys. These definitions are provided to ensure a common use/understanding of terms by all participants.

Unacceptable – A condition that you do not consider acceptable for your activity. You would not choose to recreate on the river under these conditions if given the opportunity in the future.

Poor – The activity is doable, but the quality of the experience is poor. Given the opportunity to recreate on the river under these conditions in the future, 75% of the time you would choose not to come.

Neutral – The experience is acceptable. Given the opportunity to recreate on the river under these conditions in the future, you would choose to come 50% of the time.

Good – The experience is notable and something you would go out of your way for. Given the opportunity to recreate on the river under these conditions in the future, 75 % of the time you would choose to come.

Excellent – An outstanding experience of very high quality. Something you would definitely make a special effort to do if given the opportunity in the future.

Ability to walk shoreline/bank – Refers to the ability and ease with which you can move up and downstream walking along the water's edge for the purpose of fishing.

Quality fishing spots – Refers to areas of the river that offer quality angling opportunities due to the physical characteristics of the stream, such as a deep pool that is easily accessible or a run that is just downstream from a shallow riffle or rapid.

Ability to walk in stream channel – Refers to the ability to wade in the river for the purpose of fishing. This includes the velocity of the water (the speed of the water and your ability to properly present your lure or fly) and the depth of the water.

Ability to cast – Refers to the ability to physically cast (either with a fly rod or spin gear) a line from the shore or while wading into the water for the purpose of fishing.

Aesthetic quality – Pleasing visual and sound characteristics of the river.

Challenge – Refers to how stimulating, interesting, and tricky the fishing situations were for you. How much of your angling bag of tricks did you need to use?

Appendix G
Study Schedule for Reaches 1 – 5

Tuckasegee Angling Flow Study
October 16-20, 2001

**Angling Flow Study Schedule
Tuckasegee River
October 16-20, 2001**

October 16-17, 2001 – Reach 5 – Barker’s Creek to Camp Creek

October 16:

8:00AM – 8:30AM	Orientation to study at The Outpost/High Country Outfitters
9:00AM – 11:00AM	Fish base flow
11:30AM – 12:30PM	Lunch and fill out evaluations
1:00PM – 3:00PM	Fish 200 cfs
3:30PM	Fill out evaluations

Water at:	200 cfs
Barker’s Creek	11:20AM to 3:20PM
Camp Creek	1:30PM to 5:00PM

Need to fish base flow from upstream to downstream. Can fish 200 cfs any place in the reach.

October 17:

9:00AM – 11:00AM	Fish 450 cfs
11:30 AM – 12:30PM	Lunch and fill out evaluations
1:00 PM – 3:00PM	Fish 650 cfs
3:30PM	Fill out evaluations

Water at:	450 cfs	650 cfs
Barker’s Creek	7:20AM – 11:45AM	11:45AM – 4:00PM
Camp Creek	8:45AM – 1:20PM	1:20PM – 5:30PM

Need to fish 450 cfs flow from upstream to downstream. Can fish 650 cfs any place in the reach.

October 18, 2001 – Reaches 1 and 2; E and W Forks from Powerhouses to Confluence of the two forks

October 18:

2:00PM	Orientation at Ken’s Grocery and Shell Station
2:30PM – 4:00PM	Fish base flow
4:30PM – 6:00PM	Fish 60 cfs
6:30PM	Fill out evaluations

October 19 – 20, 2001 – Reaches 3 (Confluence of East and West Forks to Cullowhee Dam backwater and 4 (below Cullowhee Dam to Webster Bridge).

October 19:

Reach 3

7:30AM	Orientation for reach 3 at Ken's Grocery and Shell Station
8:00AM – 10:00AM	Fish base flow
10:30 – 12:30	Lunch and fill out evaluations
1:00 – 3:00	Fish 200 cfs
3:30	Fill out evaluations

Reach 4

11:00 AM	Orientation and lunch for reach 4 at Ken's Grocery and Shell Station
12:00PM – 2:00PM	Fish base flow
2:30PM – 3:30PM	Fill out evaluations
4:00PM – 6:00PM	Fish 200 cfs
6:30PM	Fill out evaluations

Need to fish from upstream to downstream at base flow and 200 cfs.

Water at:	200 cfs
Forks	10:00AM – 3:00PM
Cullowhee Dam	2:00PM – 7:00PM
Webster	5:00PM – 10:00PM

October 20:

Reach 3

8:30AM – 10:30AM	Fish 450 cfs
11:00AM – 12:30PM	Fill out evaluations and lunch
1:00PM – 3:00PM	Fish 650 cfs
3:30PM	Fill out evaluations

Reach 4

10:00AM – 12:00PM	Fish 450 cfs
12:30PM – 2:30PM	Fill out evaluations and lunch
3:00PM – 5:00PM	Fish 650 cfs
5:30	Fill out evaluations

Need to fish from upstream to downstream at both flows.

Water at:	450 cfs	650 cfs
Forks	4:00AM – 10:00AM	10:00AM – 2:00PM
Cullowhee Dam	7:50AM – 1:20PM	1:20PM – 5:20PM
Webster	10:20AM – 3:40PM	3:40PM – 7:40PM