A Paddler's Vision of
Twelve Mile River

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AMERICAN WHITEWATER

Outline

About American Whitewater

American Whitewater's mission is to conserve and restore America's whitewater resources and to enhance opportunities to enjoy them safely. It is a national non-profit river organization. It represents roughly 6500 dues paying members, a portion of which live in and recreate in South Carolina, as well as approximately 80,000 affiliated paddlers. The majority of members are non-commercial whitewater paddlers.

American Whitewater's activities fall into five main areas.

EDUCATION: Through publication of its magazine, American Whitewater, and by other means, AW provides information and education about whitewater rivers, boating safety, technique, and equipment.

CONSERVATION: AW maintains a complete national inventory of whitewater rivers, monitors threats to those rivers, publishes information on river conservation, provides technical advice to local groups, works with government agencies, and --when necessary -- takes legal action to prevent river abuse.

EVENTS: AW organizes sporting events, contests and festivals to raise funds for river conservation, including the Ocoee Whitewater Rodeo in Tennessee and the annual Gauley River Festival in West Virginia, the largest gathering of whitewater boaters in the nation.

SAFETY: AW promotes paddling safety, publishes reports on whitewater accidents, and maintains both a uniform national ranking system for whitewater rivers (the International Scale of Whitewater Difficulty) as well as an internationally recognized whitewater safety code.

RIVER ACCESS: To assure public access to whitewater rivers AW arranges for river access through private lands by negotiation or purchase, seeks to protect the right of public passage on

all rivers and streams navigable by kayak or canoe, and resists unjustified restrictions on government-managed whitewater rivers.

Source: American Whitewater (www.americanwhitewater.org/who/)

Summary

Twelve Mile River is located in Pickens County, South Carolina. Although named "Twelve Mile Creek" on USGS topographic maps, it is identified as "Twelve Mile River" at many road crossings. Senior community members have always known it as Twelve Mile River, and many feel that the creek designation has been unfairly given and has been propagated to diminish support for its cleanup.

Twelve Mile River is considered a navigable river by the state of South Carolina. It has played an important role in the development and history of Pickens County. It was being considered for inclusion under the South Carolina Scenic Rivers Act until PCBs were discovered.

Background

The building of impoundments on Twelve Mile River dates back to the late 1800s. Norris Mills built two dams, Woodside I and Woodside II, to support their mill operations. The town of Cateechee grew on the river left bank of Woodside I. A third hydroelectric dam was built further upstream in 1926. Between 1955 and 1963, the Army Corps of Engineers constructed Lake Hartwell, inundating the lower reaches of the river. The mills in Cateechee were later abandoned. Today, the two lower dams produce hydroelectric power. The upper dam was purchased by the Easley-Central Water District in 1962 and is currently used as the intake point for the Easley-Central Water Plant.

Sangamo Weston, Inc. manufactured capacitors in Pickens from 1955 to 1978. PCBs were used in the manufacturing process. During this time period, an estimated 400,000 pounds of PCBs were discharged into Town Creek. From Town Creek, the PCBs flowed into Twelve Mile River and then into Lake Hartwell.

Widespread PCB contamination was found in 1976, leading to a health advisory being issued against eating fish caught in parts of Lake Hartwell and in Twelve Mile River. After investigation, the site was placed on the National Priorities List in 1990. The site is being managed as two units. Operable Unit 1 (OU1) addresses the land-based source sites. Operable Unit 2 (OU2) addresses the downstream sites of Town Creek, Twelve Mile River, and Lake Hartwell.

The EPA issued its Record of Decision (ROD) in 1994. The ROD summarizes the site and its history, information found during the investigation, risks, possible cleanup alternatives, and the selected cleanup remedy. "Alternative 2A–Institutional Controls" was selected as the cleanup solution. This solution focused on four areas: 1) continuance of the existing fish advisory, 2)

Picture of Eric Paysen taken by Will Reeves, 2 July 2003
Twelve Mile River near Lay Bridge
Water level unknown, but 4.2 inches of rain had fallen in the previous 48 hours
Source: American Whitewater (www.americanwhitewater.org/photos/?photoid=4691)

public education program, 3) fish and sediment monitoring, and 4) regulation of Twelve Mile River impoundments. It was projected that this solution would meet cleanup goals by 2005. The following is an excerpt from the Record of Decision (1).

> Regulation of Twelvemile Creek Impoundments - A routine schedule would be developed for flushing of sediment accumulated behind the 3 small impoundments located on Twelvemile Creek. Periodic flushing (most recently in September 1993) of a large load of sediment over a short period of time has been documented to have an adverse impact on the water quality and aquatic biota of the upper portion of the Twelvemile Creek Arm. These adverse impacts are attributed to elevated levels of suspended sediment and not PCBs. A routine flushing schedule would minimize impacts to the ecosystem while enhancing burial of more contaminated sediments with cleaner sediments from the Twelvemile Creek drainage.

Although there is no mention of dam removal in the Record of Decision, this topic could fall under the category of regulation of impoundments. As of 2003, routine flushing of the sediment behind the dams has not been accomplished. Periodic flushing has continued, resulting in large fish kills in the Twelve Mile River arm of Lake Hartwell. It is unclear whether or not the cleanup goals will be met by 2005. In 2003, the EPA approached a mining operation about removing the sediment from behind the dams. The sand would be used to make concrete.

This action is in direct conflict with the Record of Decision. There is some speculation that this action may make possible the removal of the dams, which would then allow the most effective "routine flushing" of the sediment. Although a public hearing (2) has been held with respect to the mining permit, the reasons behind this action have not been publicly announced.

Sources:
(1) EPA Superfund Record of Decision: Sangamo Weston, Inc./Twelve-Mile Creek/Lake Hartwell PCB Contamination. EPA ID: SCD003354412. OU2. Pickens, SC. 06/28/1994. Section 5.1.2.1.
(2) Public hearing held on Thursday, October 16, 2003 at 6:00 PM at Central Elementary School in Central, SC.

Purpose

A whitewater boater looking at the Twelve Mile River gorge thinks of what might could be. It is impossible to tell precisely what rapids would exist beneath the reservoirs of the three dams until they are removed. Nor does the creation of this vision cover the scope of the complexities of dam removal.

This document describes what a whitewater paddler envisions could be when looking at the Twelve Mile River gorge. It is not intended to be a complete vision for the gorge. It does not take into account the perspectives of other potential users, such as fly fisherman, hikers, etc.... However, it is not expected that this vision conflicts with the interests of those users.

Accessibility

Twelve Mile River is considered navigable from its beginning at the confluence of the North Fork Twelve Mile River and the Middle Fork Twelve Mile River. Its first access point is 0.2 mile downstream of this location at Red Hill Road (SSR 174). The river meanders unabated for 14.6 miles under 8 additional road access points before reaching Robinson Bridge Road (SSR 51). This is the last access point before the Easley-Central Water Dam. This section of river ranges in gradient from 6 fpm (feet per mile) to 14 fpm and in difficulty from swift moving flatwater to class I whitewater.

Below this dam, the river passes under SC 137 before coming to two larger dams

Table 1: Access Points

Mile	Road
0.2	Red Hill Road (SSR 174)
1.1	Reece Mill Road (SSR 23)
1.9	Shade Grove Road (SSR 32)
3.1	SC 183
5.0	Allgood Bridge Road (SSR 273)
6.6	Belle Shoals Road (SSR 267)
9.1	Riggins Bridge Road
10.8	Stewart Gin Road (SSR 158)
11.8	Liberty Highway (SSR 137)
14.6	Robinson Highway (SSR 51)
15.7	NO ACCESS—Easley-Central Water Dam
16.0	Norris Highway (SC 137)
16.5	NO ACCESS—Woodside I
17.2	Woodside II--access below dam
17.6	Lay Bridge Road (SSR 277)
17.7	NO ACCESS—Lake Hartwell begins
19.5	Maw Bridge Road (SSR 337)

known as Woodside I and Woodside II. These two dams block nearly two miles of river.

Below the second dam, Lay Bridge Road parallels the river briefly before crossing it. Roughly 0.4 mile of class III-IV whitewater runs from below the Woodside II dam to the beginning of Lake Hartwell. From here, the paddler may carry back upstream to Lay Bridge Road or continue an additional 1.8 miles across Lake Hartwell to the next access point, Maw Bridge Road.

USGS Quadrangles

Twelve Mile River flows through the following USGS 1:24000 quadrangles: Pickens, Liberty, and Six Mile.

Elevation Change and Gradient

The approximate gradient by river mile was estimated from USGS topographic maps (1) and is shown in Table 2. Figure 1 graphically shows these elevation changes, along with access points and the three dams. The dams are shown as vertical lines, marking the elevation of the water level at the top of the dam and the elevation of bedrock at the base of the dam. Dam and reservoir elevations are based on information given in the EPA Record of Decision (2). The gradient approaches 70 feet per mile for the two mile stretch between mile 15.5 and 17.5.

Table 2: Approximate Gradient by River Mile

Mile	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Feet	7	7	7	6	8	8	8	11	6	6	6	6	13	11	10	25	47	55	0	0

Sources:

(1) The following USGS topographic maps were used:
Pickens (SC). 1:2400. 1983.
Liberty (SC). 1:24000. 1983.
Six Mile (SC). 1:24000. 1977.

(2) EPA Superfund Record of Decision: Sangamo Weston, Inc./Twelve-Mile Creek/Lake Hartwell PCB Contamination. EPA ID: SCD003354412. OU2. Pickens, SC. 06/28/1994. Section 5.1.2.1.

Climate

The climatic conditions are obviously well known by people in the local area. These conditions make whitewater paddling possible year round, although a wetsuit or drysuit may be required parts of the year. Table 3 shows average maximum temperature, minimum temperature, and precipitation by month for the Twelve Mile River area.

Table 3: Average Climatic Conditions for the Twelve Mile River Area

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Max Temp (°F)	51	55	63	72	79	86	89	87	82	73	64	54
Min Temp (°F)	28	31	38	47	55	63	67	67	60	48	39	32
Precip (in)	5.2	4.9	6.0	4.2	4.3	4.2	4.6	4.4	3.6	4.1	4.1	4.7

Source: WorldClimate (www.worldclimate.com)
Average conditions are based on data from 1961 to 1990 taken from Clemson, SC, the nearest available source.

The Dams

From the Record of Decision (1)

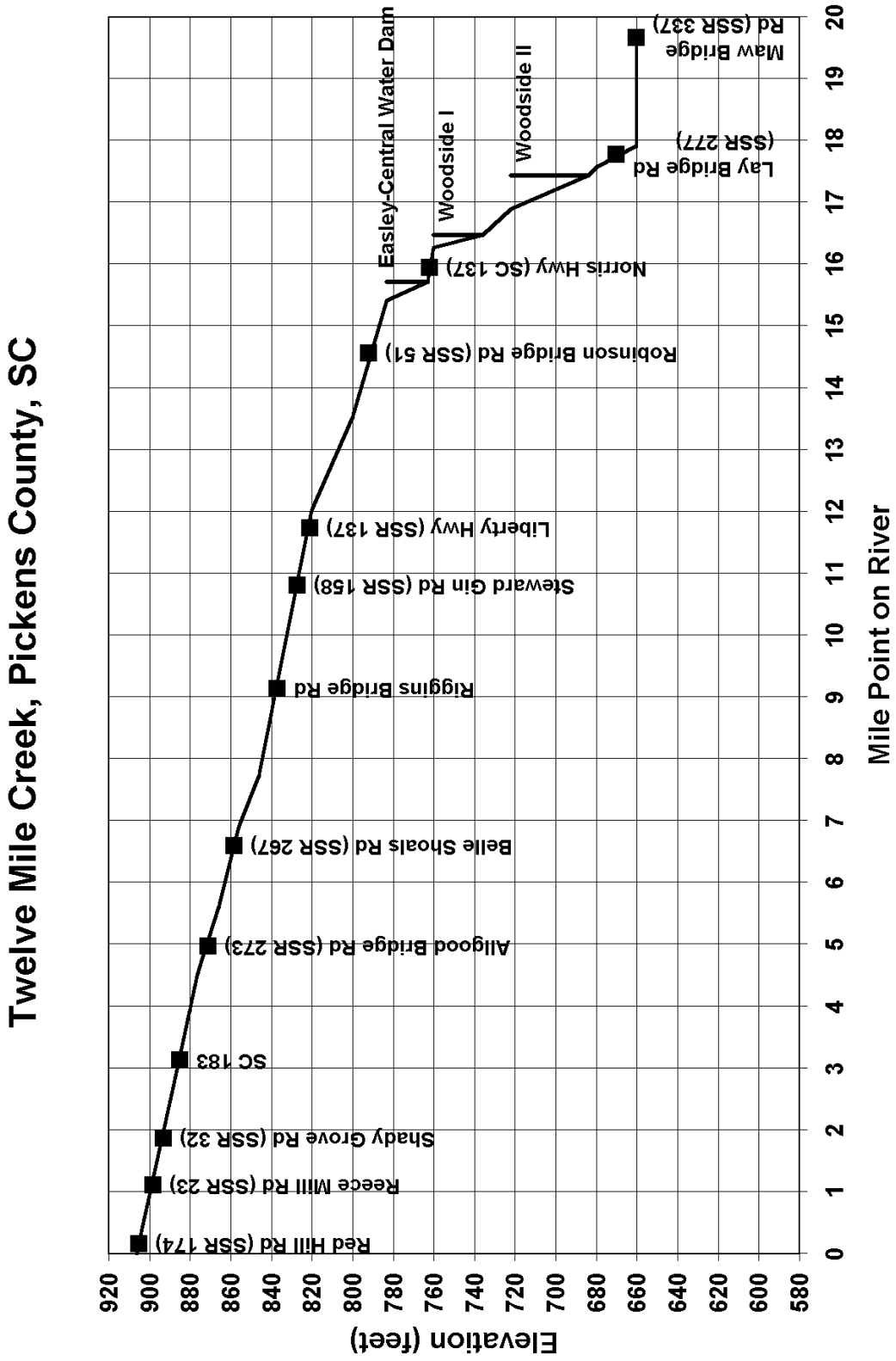
> The third, or uppermost, impoundment was built in 1926 and is the smallest of the three impoundments, with an upper pool elevation of 783 ft MSL and a lower pool elevation of 763 ft MSL (difference of 20 ft). This upper impoundment was formerly used for generation of hydroelectric power. The impoundment was purchased by the Easley-Central Water District in 1962 and is currently used as the intake point for the Easley-Central Water Plant. Sediments are flushed from behind the upper impoundment quarterly. Approximately 6 ft of sediments are flushed from behind the impoundment during each flushing event.
>
> The three impoundments on the lower section of Twelvemile Creek are all of masonry construction. The lowermost impoundment (Woodside II) is the largest of the three, with an upper pool elevation of 722 ft MSL and a lower pool elevation of 684 ft MSL (difference of 38 ft). This impoundment was built in 1905. The middle impoundment (Woodside I) is located in the community of Cateechee and was rebuilt in 1937 after it failed in 1934. The middle impoundment has an upper pool elevation of 760 ft MSL and a lower pool elevation of 736 ft MSL (difference of 24 ft). Both the lower and middle impoundments were constructed by Norris Mills and are currently owned and operated by Consolidated Hydro of Greenville, South Carolina. These two impoundments were renovated in 1983-1985 and currently produce a combined 2.5 million kWh/yr. In 1984, up to 20 ft of sediments were flushed from the pools behind the lower and middle impoundments. In September 1993, an estimated 43,000 cubic yards of sediment were flushed from behind the lowermost impoundment. Currently, sediments are flushed from these pools approximately biannually.

The following information was obtained from the National Inventory of Dams (2).

Easley-Central Water Dam: This dam is not listed in the National Inventory of Dams.

Woodside Mills Dam #1: The NID (National Inventory of Dams) ID is SC02450 and its record number is 47541.0. Other identifying numbers include a state ID of D4028. The reservoir covers and area of approximately 5.0 acres. The storage of the dam is between 50 and 80 acre-feet. The dam is regulated by the South Carolina Department of Health and Environmental Concerns (SCDHEC). The drainage area above the dam is 141.85 square miles.

Figure 1


Twelve Mile Creek, Pickens County, SC
Elevation (feet)
Mile Point on River
920
900
880
860
840
820
800
780
760
740
720
700
680
660
640
620
600
580
0
1
2
3
4
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16
17
18
19
20
Red Hill Rd (SSR 174)
Reece Mill Rd (SSR 23)
Shady Grove Rd (SSR 32)
SC 183
Allgood Bridge Rd (SSR 273)
Belle Shoals Rd (SSR 267)
Riggins Bridge Rd
Steward Gin Rd (SSR 158)
Liberty Hwy (SSR 137)
Robinson Bridge Rd (SSR 51)
Norris Hwy (SC 137)
Easley-Central Water Dam
Woodside I
Woodside II
Lay Bridge Rd (SSR 277)
Maw Bridge Rd (SSR 337)

Picture of Kevin Miller taken by Will Reeves, 2 July 2003
Twelve Mile River near Lay Bridge
Water level unknown, but 4.2 inches of rain had fallen in the previous 48 hours
Source: American Whitewater (www.americanwhitewater.org/photos/?photoid=4733)

Woodside Mills Dam #2: The NID ID is SC02451 and its record number is 47544.0. Other identifying numbers include a state ID of D4022. The drainage area above the dam is 144.31 square miles. Like Woodside Mills Dam #1, the reservoir covers an area of approximately 5.0 acres and the storage of the dam is between 50 and 80 acre-feet. This dam is also regulated by SCDHEC.

Sources:
(1) EPA Superfund Record of Decision: Sangamo Weston, Inc./Twelve-Mile Creek/Lake Hartwell PCB Contamination. EPA ID: SCD003354412. OU2. Pickens, SC. 06/28/1994. Section 5.1.2.1.
(2) National Inventory of Dams (crunch.tec.army.mil/nid/webpages/nid.cfm)

River Gauge

A USGS river gauge exists on river left of the downstream side of Liberty Hwy (SSR 137). The USGS gauge number is 02186000. The drainage area at the gauge is 106 square miles. The gauge was monitored for stage and flow from August 1, 1954 to September 30, 2001. The gauge is still monitored for peak stream flow. Historical flow data is available from USGS. Historical flow and stage data is available from the South Carolina Department of Natural Resources

Picture of Wade Harrison taken by Mark Hammock, 8 May 2003
Twelve Mile River near Lay Bridge
Water level unknown, but 4.2 inches of rain fell in the previous 3 days
Source: American Whitewater (www.americanwhitewater.org/photos/?photoid=5243)

(DNR). A rain gauge is also at the site. It does not appear to be associated directly with the USGS gauge at the site and USGS does not have any data associated with it. Information from the rain gauge is available at the DNR web site using the USGS station ID. Rain gauge data is available beginning April 13, 2001. This rain gauge is currently active.

The USGS web site is:
http://nwis.waterdata.usgs.gov/sc/nwis/discharge?site_no=02186000

The DNR web site is:
http://www.dnr.state.sc.us/pls/hydro/river.dataform?stnid=02186000

DNR previously funded this river gauge. During the last several years, many gauges around the state have lost funding due to budget cuts. This gauge is an example. The cost of operating this gauge for both stage and flow as a continuous stream flow gauge is $12,200 per year. The gauge can be operated for stage only for $5800 per year. In either case, the USGS can fund 40% of the expense for gauge operation.

Stream flow is more useful to paddlers as the information can be more readily used to compare flow to other rivers. However, stage alone is adequate for evaluating a river's water level and the potential for a run. Table 4 shows the approximate relationship between stage and flow based on historical data. This may be useful in the future if funding can be found to continuously monitor the gauge for stage.

Table 4: Relationship Between Stage and Flow for the Twelve Mile River Gauge

Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)	Stage (ft)	Flow (cfs)
		2.0	108	3.0	381	4.0	734	5.0	1120	6.0*	1550
		2.1	126	3.1	415	4.1	770	5.1	1140	6.1*	1600
		2.2	152	3.2	450	4.2	806	5.2	1190	6.2*	1640
		2.3	176	3.3	486	4.3	842	5.3	1230	6.3*	1680
1.4	31	2.4	201	3.4	522	4.4	886	5.4	1280	6.4*	1730
1.5	37	2.5	227	3.5	558	4.5	920	5.5	1340	6.5*	1780
1.6	46	2.6	255	3.6	576	4.6	960	5.6	1380	6.6*	1820
1.7	57	2.7	285	3.7	626	4.7	980	5.7	1420		
1.8	77	2.8	315	3.8	662	4.8	1020	5.8	1460		
1.9	89	2.9	347	3.9	702	4.9	1080	5.9	1500		

*The river is considered at flood stage about 6.0 feet.
Source: South Carolina Department of Natural Resources
(www.dnr.state.sc.us/pls/hydro/river.dataform?stnid=02186000)

Finally, historical data from this river gauge gives an indication of when and how often Twelve Mile River flows with enough water to be suitable for whitewater. Experience has shown that rivers of this size have sufficient water for boating when flows exceed 150 cfs, although it may be possible to scrape downstream at flows as low as 125 cfs. Flows above 200 cfs will likely be a healthy run and the river will become increasingly challenging at flows higher than that. As Table 4 shows, flows above 1550 cfs are considered flood stage. Table 5 shows the number of days per month and year that various flows can be expected. This table is based on the average daily flow for all recorded data between January 1, 1955 and December 31, 2000.

Table 5: Number of Days per Month for Various Flow Conditions

Month	>125 cfs	>150 cfs	>200 cfs	>300 cfs	>400 cfs	>500 cfs	>1550 cfs
January	24.4	19.7	12.6	5.7	3.3	2.2	0.2
February	25.4	22.6	15.0	7.5	4.0	2.6	0.4
March	27.8	25.2	19.8	8.2	4.2	3.1	0.6
April	28.1	25.2	17.4	7.6	4.2	2.7	0.3
May	23.8	20.3	10.9	3.1	1.3	1.0	0.0
June	19.3	13.2	4.7	1.5	0.7	0.3	0.1
July	12.9	8.1	3.7	1.4	0.5	0.4	0.1
August	11.4	7.7	4.6	2.5	1.6	1.1	0.1
September	9.5	4.9	1.8	0.8	0.5	0.3	0.0
October	10.8	6.2	3.3	1.6	1.1	0.8	0.2
November	9.9	7.0	4.1	2.1	1.1	0.9	0.0
December	16.8	11.3	6.6	3.1	1.9	1.1	0.2
ANNUAL	220	171	105	45	24	17	2

Source: USGS (nwis.waterdata.usgs.gov/sc/nwis/discharge?site_no=02186000)

A Sister River—The Tellico River

The length, size, flow characteristics, and proximity to population centers makes Twelve Mile River extremely similar to the Tellico River near Tellico Plains, Tennessee. The Tellico River is a very popular whitewater run, which is frequently run during winter and spring and after heavy rains.

The Atlanta whitewater community frequently travels over three hours to paddle the Tellico River. Even though Twelve Mile River is about the same distance from Atlanta as the Tellico River, it is about 35 minutes closer as Interstate 85 can be taken most of the way. A continuously monitored river gauge, accessible from the internet, would greatly aid in drawing this group of paddlers to the area.

Paddlers coming to the Tellico River have proven to provide a significant economic benefit to the local community. This was clearly demonstrated when the USGS gauge for this river was discontinued for lack of a funding partner. Not only did the paddling community complain about the loss of this resource, but the local community quickly realized the economic loss due the decrease in visitors. The community had not expected this economic loss when announcements were made that monitoring of this gauge would be ceased. The volume of paddlers present, though significant to the economy, did not disrupt the community in other ways. Therefore, the significance of these visitors was not fully appreciated. This gauge is now funded for stage monitoring only.

Jason Foley running Baby Falls at 200cfs on the Tellico River.
Twelve Mile River may have similar ledges once the dams are removed.
Source: American Whitewater (www.americanwhitewater.org/photos/?photoid=1466)

Economic Benefits

Twelve Mile River could draw an economic benefit similar to that of the Tellico River to the Pickens County community. The volume of paddlers present is not expected to be disruptive to community members who have no interest in using the river. The limited amount of roadside parking may be an issue in areas and should be addressed.

Several groups of boaters visit the Tellico River each weekend day that it is runnable, regardless of season. Past estimates have indicated the economic benefit to be in excess of $50 per person per trip (1). This is primarily based on gas and food purchases, although benefits extend to other areas such as campgrounds and service stations (with the unfortunate breakdown).

(1) Use and Economic Importance of the Wild and Scenic Chattooga River. November 10, 2003. Department of Parks, Recreation and Tourism Management, North Carolina State University, Raleigh, NC.

A Paddler's Vision

A paddler's vision for Twelve Mile River includes benefits for all boaters from the class I recreational boater to highly skilled boaters seeking the thrill of class IV and class V rapids.

The recreational boater would enjoy the 14.5 mile stretch of swift flatwater and class I rapids above the Liberty Highway (SSR 137). The slightly more skilled whitewater paddler may enjoy the stretch between Liberty Highway and Norris Highway (SC 137), which likely would be class II-III.

The most popular whitewater run would be the three mile stretch from Robinson Bridge Road (SSR 51) to Lay Bridge Road. Many boaters would run this section two or three times in a day. The six mile run from the Liberty Highway to Lay Bridge Road would be popular to many boaters as well. This run would attract those that want a longer river day without running the same section twice, want a warm up stretch of river before the more challenging rapids begin, or would like to check the river level before putting on the river. (The USGS gauge is located at this location.)

All three dams, the Easley-Central Water Dam, the Woodside Mills Dam #1, and the Woodside Mills Dam #2, should be removed. Once the sediment behind the Easley-Central Water Dam is removed, a series of well place boulders could create a class III rapid with roughly a five foot vertical drop. This would create enough of a reservoir for the Easley-Central Water District #1 to continue to operate with minimal disturbance. This method has been successfully utilized by Atlanta Water Works on the Chattahoochee River.

River access along Twelve Mile River should be improved to allow boaters of all skill levels to access the full range of the navigable river. Improved access and parking should be investigated at Red Hill Road, SC 183 (or Walhalla Road which briefly parallels the river downstream of SC 183), Allgood Bridge Road. Improved access and parking should be made at Liberty Highway and at Robinson Bridge Road (or at Norris Highway if the Easley-Central Water Dam is not removed or if accommodations cannot be made to float over or portage around it). Parking should be expanded along Lay Bridge Road.

The USGS gauge should be funded to continuously monitor at least stage and preferably stage and flow. This will provide current river level information to potential boaters on the internet.

A gate course could be created along the 0.5 mile stretch that parallels Lay Bridge Road. Although water flow is not expected to be consistent enough to hold major events such as slalom races or rodeos at Lay Bridge Hole, a gates course would encourage visitors at lower flows.

These actions could lead to making this vision of the Twelve Mile River gorge come true.