

SOME CONSIDERATIONS FOR WATER QUALITY AND ENVIRONMENTAL
PROTECTION IN WILD AND SCENIC RIVER DEVELOPMENT

The Chattooga River - A Case Study

by

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INTRODUCTION

The Wild and Scenic River Act became Public Law 90-542 on October 2, 1968. This Act states in part, "It is hereby declared to be the policy of the United States that certain selected rivers of the Nation which, with their immediate environments, possess outstandingly remarkable scenic, recreational, geologic, fish and wildlife, historic, cultural, or other similar values, shall be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefit and enjoyment of future generations (1)." Several Wild and Scenic rivers were designated in the Act for immediate establishment. Others, and the Chattooga is in this group, were designated as candidates for Wild and Scenic rivers. In order to prove themselves worthy, these designated rivers are subject to many types of evaluations. Among the evaluations, water quality is an essential criteria. In fact, river segments designated "wild" are "those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These are vestiges of primitive America (1)."

The Chattooga Wild and Scenic river study encompassed many areas of concern requiring the expertise of many professional disciplines within and outside of the Forest Service. For example, USGS provided inputs on flow characteristics and other hydrological parameters. Canoe association and the Sierra Club studied the canoeability of river segments. Within the Forest Service, the recreation staff and visitor information service staff gave attention to the outstanding features of the river that would appeal to the potential users. The biologist studied the fishery and upland game resource within the watershed. The list of items and the expertise needed could go on almost without end.

Water quality was a critical item that required thorough study because if the water werenot or could not be brought up to suitable quality for the users' need, then the area simply could not qualify as a Wild and Scenic river.

"The Chattooga River begins (Appendix Map 1) on the crest of the Blue Ridge in mountainous North Carolina, near the eastern flanks of Whiteside Mountain. It flows southward for 10 miles in North Carolina,

then continues for 40 miles as a boundary between the states of South Carolina and Georgia. In this 50 mile rush of water, the river drops from 3360 feet to 891 feet for an average fall of 49.3 feet per mile (3)." There are some 278 square miles in the drainage area.

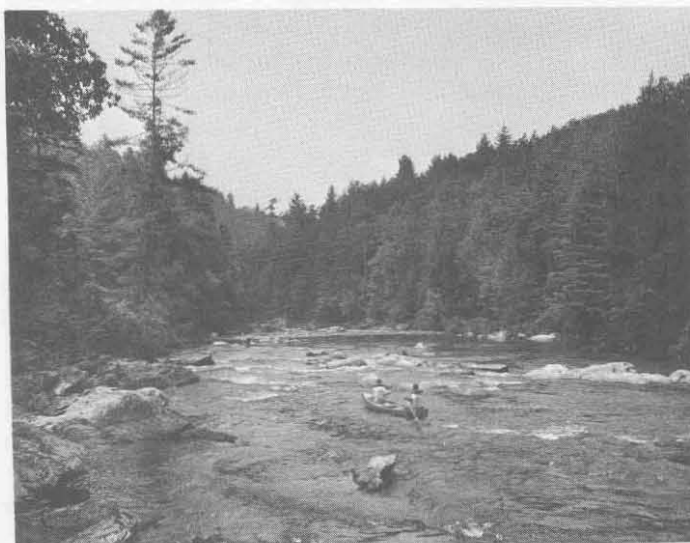


Figure 1 - Canoeists enjoy the view from the river.

Topography, soils, geology, vegetation, and land use are characteristics of an area that affect water quality. The headwater areas in North Carolina are extremely steep. The topography, although still rugged, is somewhat smoother toward the lower end of the watershed.

Soils of the watershed are formed from highly metamorphosed sediments and igneous intrusions - gneisses, granites, and schist. They are generally loamy in texture, variable in depth, and have the ability to receive high intensity rainfall and transmit the water to the streams without extreme flood peaks. All soils are highly leached, therefore the streams are naturally low in dissolved minerals.

About 90 percent of the watershed area is in forest, mostly mixed pine-hardwood type. The other 10 percent is in general type farms including some pasture, row crops, and orchards, the urban area of Clayton, Georgia, and roads.

IMPORTANT WATER QUALITY PARAMETERS

Identifying and quantifying water quality parameters important in evaluating water quality in Wild and Scenic rivers is something that was almost foreign to an agency concerned, in much of the public's eye at

least, with growing and harvesting trees. The Forest Service naturally turned to other Federal and State agencies that were more experienced in this area. The State Water Quality people in North Carolina, South Carolina, and Georgia, contributed their expertise as did the Federal Water Pollution Control Administration and the U. S. Geological Survey.

A Wild or Scenic river should have water of a quality that would (1) protect the users' health, (2) be pleasing to the view, and (3) meet the users' need. With the requirements stated, we looked for parameters that we could quantify in order to evaluate these three requirements.

The parameter commonly used as an index to possible disease-producing pollution is the coliform bacteria group, particularly the fecal coliforms. The coliforms themselves are thought to be harmless, but when the fecal coliforms are present, it is possible that other disease-producing organisms are also present.

The non-fecal coliforms are normal members of the microflora of soils and vegetation. The fecal coliforms are present in the intestines of warm-blooded animals including man. Their presence in large numbers in streams is evidence of recent and possibly dangerous pollution (4).

The esthetic requirement is partially self-explanatory. Highly colored, trashy, foamy, or water with high algae content is naturally undesirable. In order to quantify the esthetic requirements, we needed visual observations and measurements for turbidity and suspended sediments. Nitrate and phosphate measurements indicate if conditions are favorable for algal blooms.

The river users are expected to be canoeists, rafters (Figure 2), fishermen, general recreationists, etc. In addition to the quality characteristics already listed, we needed parameters that would tell us if the stream was a suitable environment to raise edible fish. A number of other physical and chemical properties, plus a stream biology survey by fishery biologists, would help answer this question.



Figure 2 - Rafters struggle to maintain control of craft.

THE WATER QUALITY STUDY PLAN

A first consideration in establishing the study plan was to determine what, if anything, was known about water quality on the stream from previous work. Our research turned up work by the USGS and Georgia State Division of Conservation (2) that gave us an idea of what magnitude some of the natural physical and chemical parameters were.

R. D. Stonebreaker of FWPCA did some bacteriological analysis in 1968 as did Dr. Gordon E. Howard of Clemson University in 1969. Their results indicated that, based on the fecal coliform parameter, the river was unpolluted north of U. S. 76 bridge. Howard's study indicated increasing pollution south of U. S. 76 bridge and suggested further analysis.

After completing the review of previous work, the U. S. Forest Service met with representatives from the three states and designed a water quality monitoring system. The system consisted of 13 monitoring stations (see water quality station location map (Appendix Map 2) on the main river and its tributaries.

The workload for sampling was divided between the Forest Service and the three states. All analyses were made by the water quality laboratories in the three states.

THE STUDY RESULTS

After almost a year of study, the water quality analyses show excellent raw water quality for most parameters tested on the entire river and all its tributaries except the river below Stekoa Creek and Stekoa Creek proper. On-site investigation showed that poor quality on Stekoa Creek and below Stekoa Creek in the main river was due primarily to a municipality emptying raw sewage into the creek. The municipality is presently constructing a modern sewage treatment plant which should alleviate this condition.

The other parameter that shows poor water quality is the high turbidity for short periods following runoff producing storms. Better conservation practices on agricultural land, forest land, and roads, would keep the soil in place rather than in the stream.

TABLE 1 - SELECTED WATER QUALITY RESULTS ON THE CHATTOOGA RIVER FOR STATION #4, RIVER MILE 7.1 (See Appendix for location):

Date	Fecal Coliform (MPN/100 ml)	Turbidity (JTU)	pH	T.D. solids (Mg/l)
5-26-69	4,300	4	6.6	19
6-23-69	930	7	6.3	15
7-28-69	7,500	45	6.3	26
8-25-69	4,300	11	6.3	19
9-29-69	7,500	7	6.5	21

TABLE 2 - SELECTED WATER QUALITY RESULTS ON THE CHATTOOGA RIVER
FOR STATION #2, RIVER MILE 46.1 (see Appendix for location):

Date	Fecal Coliform (MPN/100ml)	Turbidity (JTU)	Water Temp.(°F)	pH	D.O.(mg/l)
5-27-69	<10	7	61	7.0	8.5
6-19-69	10		59	6.7	9.2
7-17-69	<10				
8-25-69	10	0	57	6.9	9.6
10-2-69	20	0	57	6.5	9.5
10-23-69	<10	5	57	6.8	9.8

TABLE 3 - SELECTED WATER QUALITY RESULTS FOR ALL
MAIN RIVER STATIONS FOR AUGUST 1969:

River Mile	Fecal Coliforms	Turbidity	pH	T.D. solids	Water Temp.(°F)
7.1	4,300	11	6.3	19	64
10.0	2,300	46	6.7	26	72
19.0	230	8	6.3	15	64
28.2	170	7	6.6	20	64
40.2	45	5	6.8	14	61
46.1	10	0	6.9		57
51.3	<10		6.9		59

Note the high fecal coliform and high turbidity readings at river mile 10.0 during August. This is due to runoff produced by heavy rains during this period. The suspended matter responsible for the high turbidity readings also provides attachment and transport for the micro-organisms.

Although final decisions on water quality criteria have not been made, it is expected that segments designated for Wild River status will be the same as for primary contact recreation water as outlined in the 1968 Report of the Committee on Water Quality Criteria (4). Scenic sections will most likely have the same criteria as secondary contact recreation water. A complete analysis of all results show that the entire river could qualify (from water quality criteria) as "wild" except for the 0 to 7.1 river mile segment.

PROTECTING THE ENVIRONMENT

Although water quality may be considered excellent at present, there is no assurance that it will remain so. What impact will the expected increase in recreation use have on water quality? It is conceivable that an industry could locate within the watershed or that undesirable land use practices could develop.

The Forest Service will plan to minimize all possible sources of water pollution from the use of the area by recreationists. In this respect, it would be desirable but not socially or economically feasible for all lands to be in Forest Service ownership. An alternative to Federal ownership is state acceptance of non-degradation as part of the water quality criteria and strictly enforcing the water quality laws.

The Forest Service, with the states' assistance, will continue water quality surveillance. Any deterioration in water quality will be traced to the source of pollution and corrected.

CONCLUSION

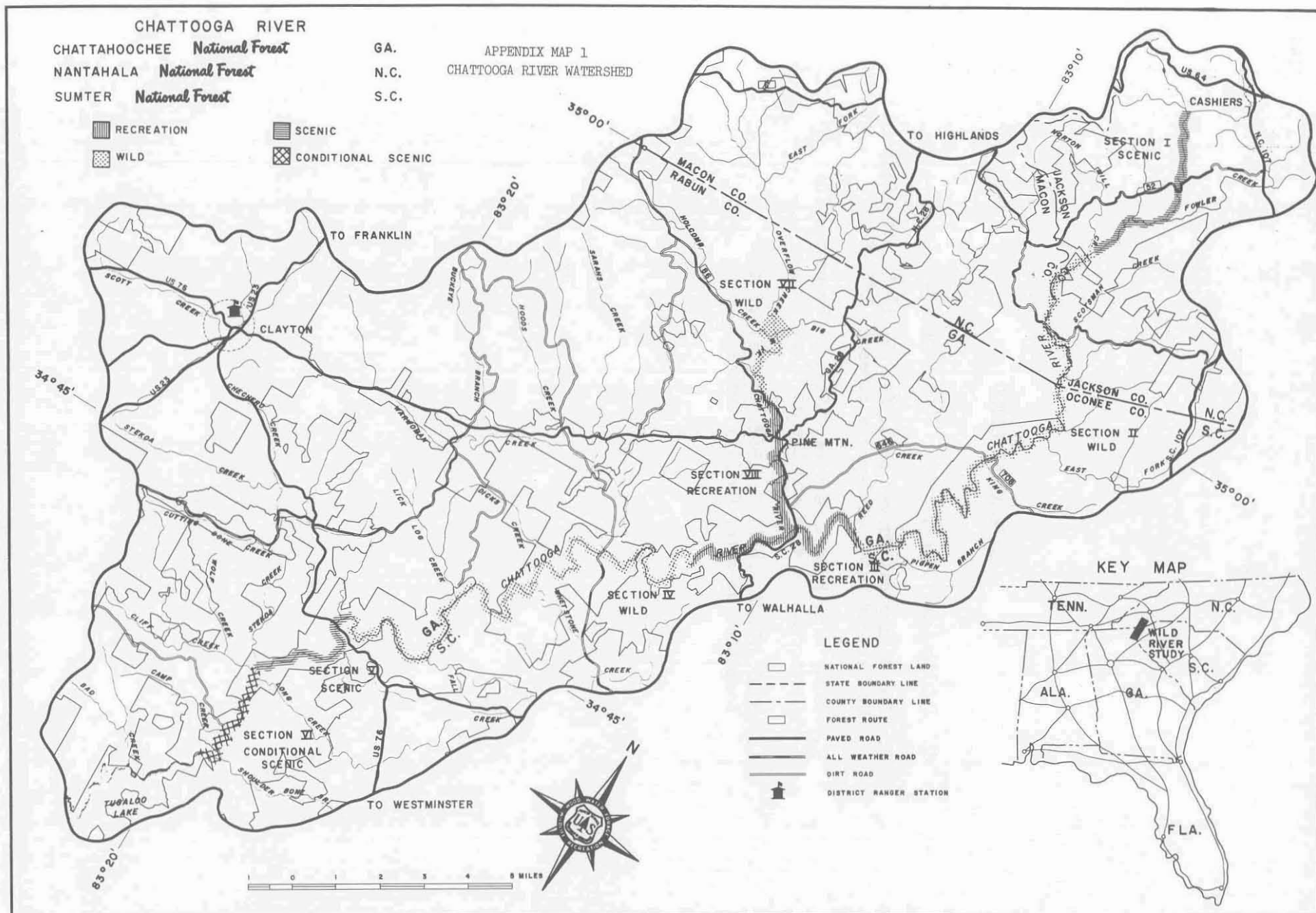
The water quality study illustrates the need for many professional disciplines other than Foresters', in order for the Forest Service to properly discharge its duties under the Multiple Use Act. Maintaining or improving water quality is essential in all Wild and Scenic rivers. The health of the user as well as the quality of the recreation experience is at stake. Since many important water quality parameters are not visually obvious, it was essential for the Forest Service in cooperation with other Federal and State agencies to conduct this intensive water quality study. The results verify what one might expect - that where there is little impact from man, "natural" biological pollution levels are low. Conversely, where man is present in large numbers, one can expect high biological pollution levels. A modern treatment plant, currently being installed, should clear up the obviously polluted stream segment.

Most of the other water quality parameters were good but some improvement could be made in the high turbidity levels following storm producing runoff. Better erosion control practices on agricultural land, timber related activities and roads, would help.

The Forest Service as land manager in the Wild and Scenic river will provide for the optimum use of the area while maintaining good water quality.

LITERATURE CITED

1. Public Law 90-542, 1968. 90th Congress.
2. The Geological Survey Bull. No. 69, 1961. Chemical Quality of Water of Georgia Streams, 1957-58.
3. USDA, U.S. Forest Service, 1969. A Proposal, The Chattooga - A Wild and Scenic River.
4. USDI, FWPCA, April 1, 1968. Report of the Committee on Water Quality Criteria.



APPENDIX MAP 2
WATER QUALITY MONITORING STATIONS-
CHATTOOGA RIVER

- 1 - Grimshawes Bridge
- 2 - Bull Pen Bridge
- 3 - U. S. 76
- 4 - Below Stekoa Creek - Main River
- 5 - Stekoa Creek
- 6 - Warwomen Ford
- 7 - West Fork
- 8 - Below King Creek on Main River
- 9 - Below West Fork on Main River
- 10 - Below Warwomen Creek on Main River
- 11 - Below Whetstone Creek on Main River
- 13 - King Creek below Recreation Area
- 14 - East Fork

