ESTABLISHMENT OF A FEDERAL RESERVED WATER RIGHT FOR A NEW MEXICO WILD AND SCENIC RIVER

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The lower four miles of the Red River in New Mexico as well as 48 miles of the Rio Grande downstream from the Colorado state line were designated as one of the "instant" components of the National Wild and Scenic River system by the Wild and Scenic Rivers Act of 1968. The major purpose of the act is to preserve these rivers in their free-flowing condition. The Bureau of Land Management (BLM), as the managing agency of the wild and scenic river, was a participant in a general water rights adjudication of the Red River stream system.

The Red River stream system adjudication was filed by the state of New Mexico in November 1972. The BLM sought a federal reserved water right and asserted a claim to the necessary instream flows to protect and maintain the particular scenic, recreational, fish, and wildlife values unique to this river. The matter of whether the United States had a right to a minimum instream flow was referred

to trial in 1978.

Instream flows are not considered a beneficial use of water under state law, and the other parties strongly resisted a federal reserved right for that purpose. In planning the case, a major problem we faced was how to quantify and prove the instream flow requirements of the river. The BLM conducted studies from 1979 to 1980 to quantify the instream flow needs of the lower Red River. Negotiations with the involved parties began in 1980 to settle and terminate the matter without the necessity of further lengthy and costly litigation.

DESCRIPTION OF STUDY AREA

The Red River is located in Taos County in north-central New Mexico about 20 miles north of Taos (figure 1). The Red River originates in the rugged Sangre de Cristo Mountain Range. The Rio Grande is entrenched in a gorge that begins about six miles north of the Colorado state line and gradually deepens to a maximum depth of 860 feet. The lower portion of the Red River is also entrenched in a similar gorge.

The Red River component of the wild river is unique from other wild rivers in that it is downstream from all developments and effects of man within its drainage basin. Developments along the Red River, in downstream order, include the town of Red River and a ski area, a molybdenum

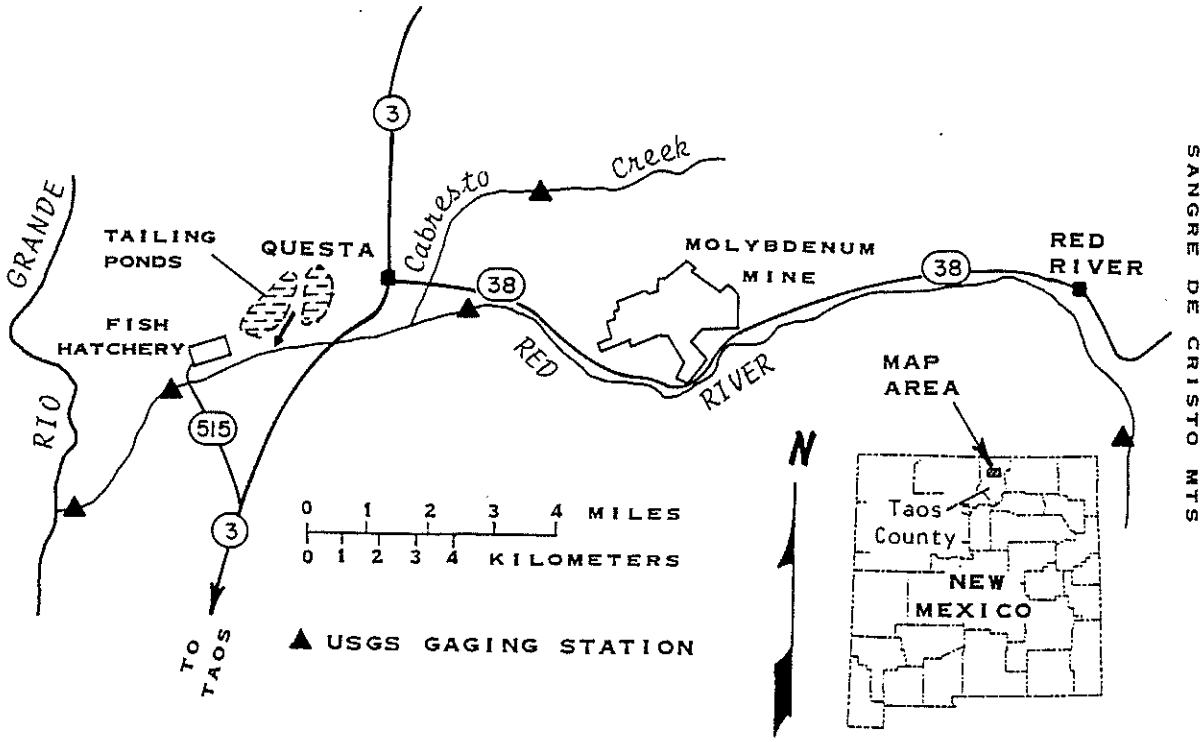

Figure 1. Vicinity map and major features within the Red River Stream System.

mine and mill, the town of Questa, scattered rural homes and recreation facilities, molybdenum mill tailings ponds, and a state fish hatchery at the upper end of the wild river segment. The majority of the basin is undeveloped national forest land.

The major uses of water in the basin are for irrigation, mining, municipal water supply, and fish culture purposes. All water rights have a priority date prior to October, 1968 (New Mexico State Engineer Office 1974). No diversions occur below the fish hatchery, and the wild river portion is downstream from all return flows.

The lower Red River and the Rio Grande are renowned for their high-quality rainbow and brown trout fisheries, and represent one of the top trout fishing areas in the state. Recreational activities in the wild river portion of the Red River consist primarily of fishing followed by camping, picnicking, hiking, sightseeing, and nature study. These are, therefore, the major instream water uses of the lower Red River.

Water quality of the Red River is generally suitable for most uses, although some short-term degradation of water quality does occur due to both natural and artificial causes (Garn 1985). The toxic elements zinc, cyanide, copper, and cadmium approach or exceed water quality criteria. This is due to leaching of natural ore bodies and discharge from the

mill tailings ponds. Water quality is an important factor because it is related to the scenic, recreational, and fish and wildlife values of the river.

METHODS

An interdisciplinary team approach including hydrologists, fisheries biologists, and landscape architects, was used in the quantification process. We determined that fish and wildlife, scenery, and recreation are the major purposes for which instream flows would be quantified. Instream flows for waste transport and maintenance of water quality were also determined because of the upstream waste discharges and the relationship of water quality to these values.

A state-of-the art methodology was required for quantification in this case. The instream flow incremental methodology (IFIM), developed by the Cooperative Instream Flow Group of the Fish and Wildlife Service, was selected (Bovee 1982). The incremental methodology predicts the amount of potential fish habitat available for each life stage of a species as a function of stream flow. It is based on the premise that the suitability of a species' habitat can be described by measuring selected physical variables in the stream, such as water depth, velocity, and substrate or cover type. A more detailed discussion of the methodologies used in this study is given by Garn (1986).

As a part of the IFIM, the physical habitat simulation computer program (PHABSIM) was used for data analysis (Milhous et al. 1981). This program consists of several sub-programs: IFG2 or IFG4, FISHFIL, and HABTAT. IFG2 or IFG4 are two different hydraulic simulation programs (only one is used) that predict the depth, velocity and flow in the reach. IFG4 was used for the Red River because of its complexity and large roughness components. FISHFIL contains the habitat preference criteria for the particular species and life stages of fish. The criteria curves relate fish occurrence to the physical habitat variables. Brown trout and rainbow trout are the management species of interest in the Red River. The HABTAT program combines hydraulic data with the biological criteria to predict potential available habitat (Weighted Usable Area, WUA) in the given reach for the life stages of the target species at various flows.

Sound is an important aesthetic value associated with running water. Quantification of instream flows to maintain the sounds of falling, splashing, trickling water were attempted with the use of a sound level meter. Sound measuring points were established within each of the study reaches and sound levels were measured, in decibels, for a wide variety of flows encountered during the study.

Instream flow requirements for the preservation and protection of water quality were determined based on the

maintenance of safe levels of toxic elements in water. Flow requirements for waste transport and dilution of upstream discharges were determined by using mass balance equations to maintain concentrations at acceptable instream values based on water quality criteria for trout.

RESULTS AND DISCUSSION

Application of the Fish and Wildlife Service's incremental methodology results in a computer printout of potential available habitat area versus streamflow for each target species, life stage and study reach. Runs were made for three fish species: rainbow trout, brown trout, and white sucker. Such a curve for adult trout is given in figure 2.

To analyze these curves, it was necessary to determine the times at which the various life stages of the fish occur in the stream. By comparing the habitat area vs. flow curves for each life stage of a species with the time of year that each life stage occurs, monthly instream flows to maintain a desired level of habitat was determined (table 1). Instream flows were selected from the curves near the point where habitat area decreases sharply with decreasing flows. The monthly flow requirements for the various life stages of the management species were then compared and a single monthly flow requirement for fish habitat that best satisfies all life stages of all species was selected. This

process also considered the adverse effects of non-game species such as the white sucker.

Instream flow requirements for aesthetics were close to those determined for fish habitat. Instream flows needed for waste transport and water quality maintenance were also found to be in the general range of those for the other purposes. Sound measurements showed a promising relationship to streamflow that further helped to quantify instream flow needs for aesthetic purposes (figure 3).

The final instream flow recommendation was made from an evaluation of the individual instream flow requirements in table 1 for fish and wildlife, aesthetics, and water quality. This recommendation is the water requirement to maintain all of these uses at an acceptable level. This instream flow recommendation was also compared to the monthly available flow to meet the test of reasonableness. Daily flow duration curves for each month were used to make this comparison. Lastly, the flow recommendation is checked to see that it does not adversely affect watershed conditions and food and other relations in the stream that have not been accounted for. The final instream flow recommendation was adjusted to best accommodate all of these variables.

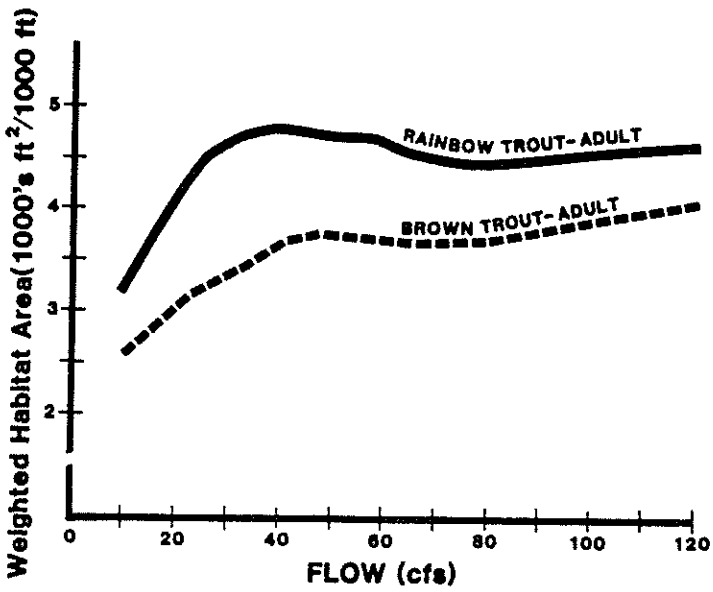

Figure 2. Weighted Available Habitat Area (from two Study Reaches) for Adult Brown and Rainbow Trout Versus Flow in the Lower Red River.

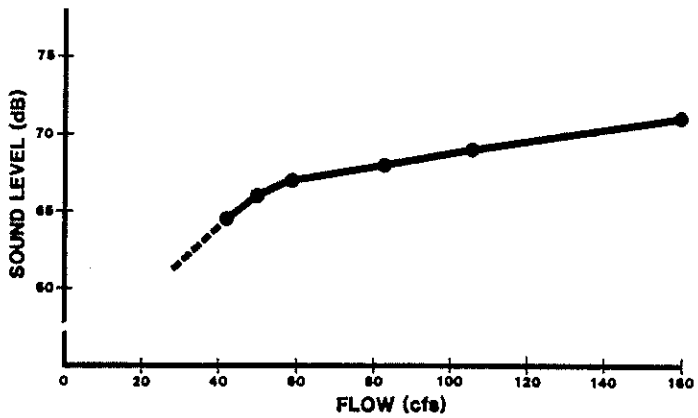

Figure 3. Sound Level Versus Flow in the Lower Red River.

Table 1. Comparison of Individual Instream Flow Requirements with Available Streamflow and the Final Federal Reserved Water Right.

Characteristic	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
TYPE OF USE												
Brown Trout												
Adult	40	40	40	40	40	40	40	40	40	40	40	40
Spawning										45	45	
Incubation	35	35										35
Fry			40									
Juvenile				45	45	45	45	45	45	45	45	45
Aesthetics	50	50	50	50	50	50	50	50	50	50	50	50
Water Quality	38	38	38	38	38	38	38	38	38	38	38	38
AVAILABLE FLOW												
Q50*	34	35	35	42	110	115	63	54	43	41	39	34
Q80*	30	31	32	35	55	63	42	41	34	34	33	28
Q90*	27	29	30	32	45	48	37	36	30	30	30	26
RESERVED RIGHT	30	30	30	35	45	45	40	40	35	35	30	30

*Percentile flows from flow-duration curves for each month.

This methodology held up well under cross-examination during depositions. The IFIM and other supporting methods used in this study to quantify the reserved water right provided a strong position for entering into negotiations. On February 23, 1984, the parties involved in this case entered a precedental stipulation recognizing a federal reserved right to instream flows for the Red River component of the Wild and Scenic River System. The quantity of the reserved right was that arrived at through the IFIM. The average monthly instream flows agreed to in the stipulation ranged from 30 to 45 cfs (table 1, bottom). On March 2, 1984, the court approved the stipulation.

This case is believed to be the first of its kind to be settled in the nation, and sets a precedent for other wild and scenic rivers. It also set a precedent in negotiation and cooperation among the federal, state, and private parties in order to settle the federal reserved water right issue quickly and at least cost. The constructive negotiation by the parties resulted in a stipulation in four short years, compared to many other water rights cases involving federal reserved rights that have not been settled yet after 15 to 20 years.

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