CASE STUDY REPORT #47
HETCH HETCHY
TUOLUMNE RIVER

I. Project Description

The Raker Act of 1913 (38 Stat. 242) granted to the city of San Francisco right-of-way to certain lands in Yosemite National Park and Stanislaus National Forest. The approval included the construction, operation, and maintenance of facilities necessary to convey the waters of the Tuolumne River for domestic water supply and electrical power to be used in San Francisco. The primary unit of the project is O'Shaughnessy Dam and Hetch Hetchy Reservoir commonly called the Hetch Hetchy project (Figure 1).

O'Shaughnessy Dam was constructed in 1923 in Yosemite National Park in the lower end of Hetch Hetchy Valley on the Tuolumne River. The reservoir has a maximum storage capacity of 360,000 acre-feet and covers 1,960 acres.

II. Pre-Project Condition

> "The Tuolumne River originates at the base of a glacier on the west slope of 13,000 feet high Mount Lyell in Yosemite National Park. The Tuolumne flows westward from its origin for a distance of 158 miles to join the San Joaquin River near the City of Modesto, draining an area of about 2,000 square miles." (U.S. Fish and Wildlife Service, 1975)

Flows in the Tuolumne River at Hetch Hetchy Valley prior to the construction of O'Shaughnessy Dam in 1923 reacted primarily

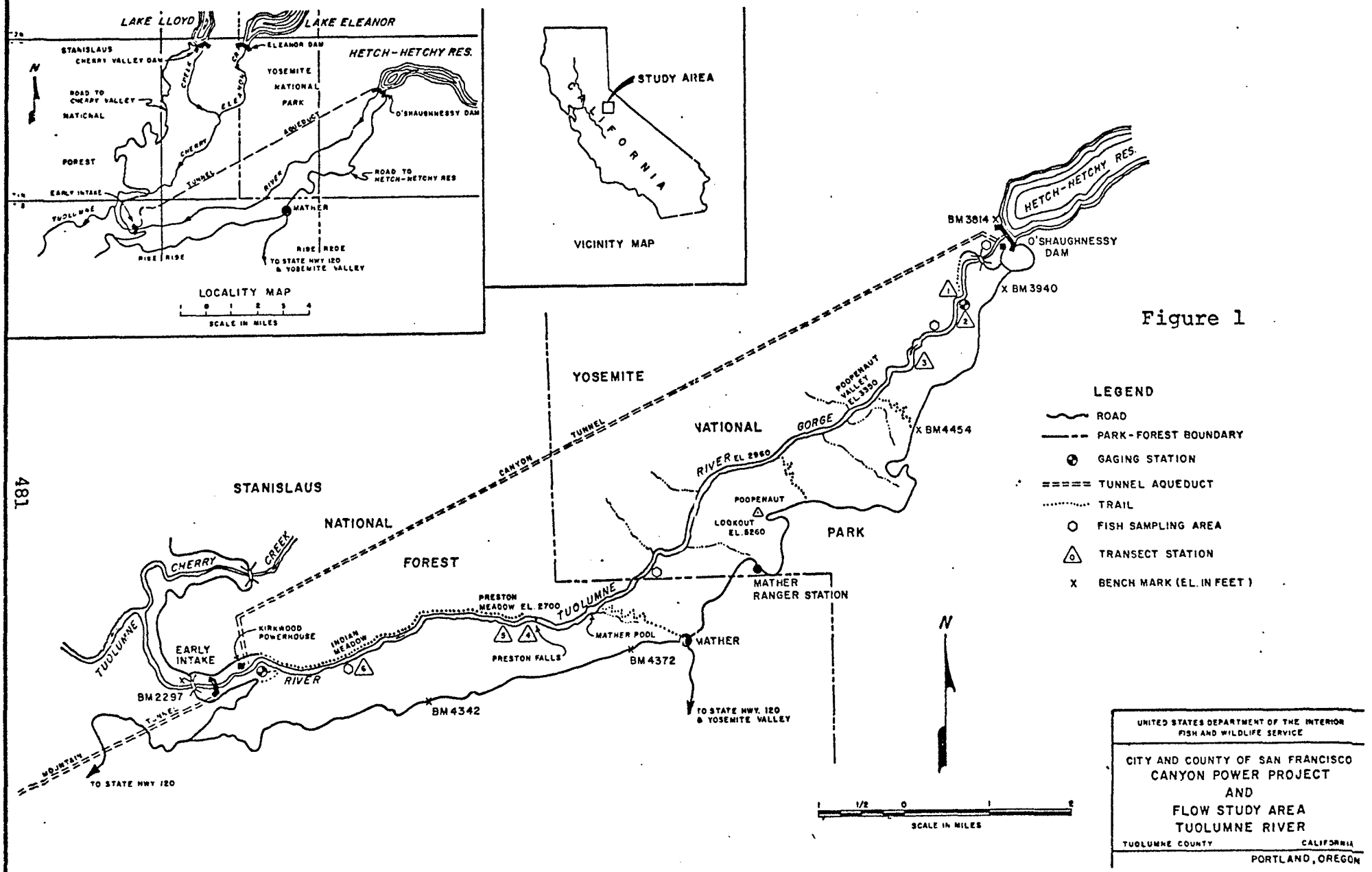

Figure 1

Source: U. S. Fish and Wildlife Service, 1975.

to the annual spring runoff at snowmelt. Pre-project instream flow conditions (Figure 2) indicate a peak flow of 4,635 cfs in June and the flow generally remained above 250 cfs for eight months of the year and above 100 cfs for the low flow months.

The Tuolumne River supported a significant trout fishery in the upper, coldwater reaches of the river. Rainbow, brown, brook and golden trout ranged as far downstream as the present location of Don Pedro Reservoir. Largemouth and smallmouth bass, bluegill, white catfish, and other warmwater fish were common in the lower foothill and valley reaches of the river.

Before impoundment of the lower reach, the Tuolumne River supported steelhead and annual runs of chinook salmon (king salmon) ranging to 100,000 fish. The Tuolumne River still supports a small chinook salmon run. Information quantifying the size of fish populations was not discovered.

III. Project Development

The Raker Act (38 Stat. 242) approved by the President of the United States on December 19, 1913, granted to the City and County of San Francisco right-of-way to certain lands in Yosemite National Park and Stanislaus National Forest.

Initial project plans approved pursuant to the Raker Act called for the diversion of river flow at O'Shaughnessy Dam and conveyance by tunnel on the south side of the Tuolumne to a powerhouse at Early Intake (Canyon Power Project) (see Figure 1). Further studies change the location of the tunnel to the north side of the river and, accordingly, in 1958, San Francisco filed

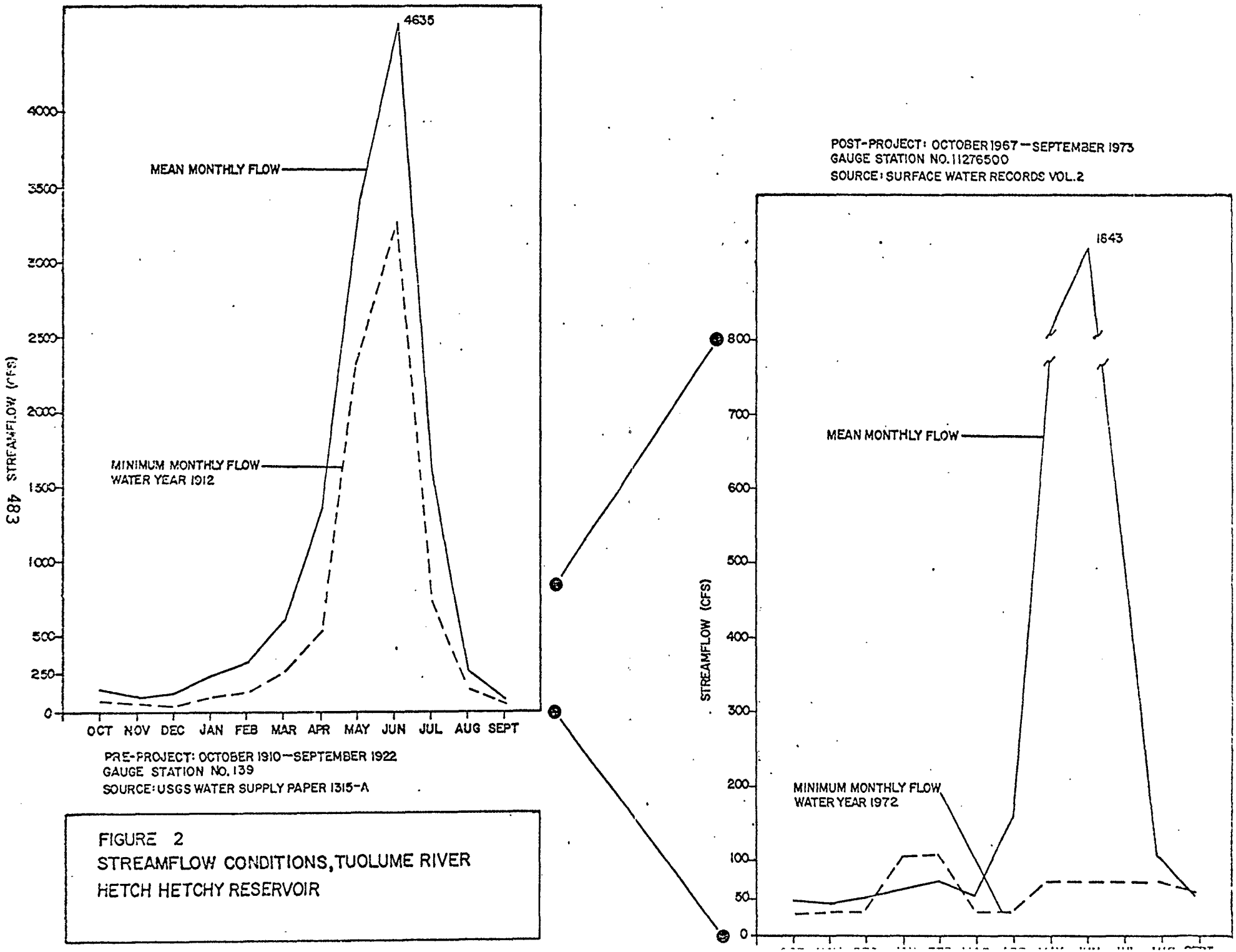

FIGURE 2
STREAMFLOW CONDITIONS, TUOLUME RIVER
HETCH HETCHY RESERVOIR

an application with the Department of Interior for a change in the location of tunnel right-of-way from the south side to the north side of the river. Because diversion at O'Shaughnessy Dam would substantially alter the flow regime in the Tuolumne River between the dam and Early Intake, and in view of the fact that the environmental consequences of the alteration had not been adequately considered when the right-of-way across federal lands was initially granted, the Secretary of the Interior stipulated in his approval of the change in location of the tunnel right-of-way that water would be released from Hetch Hetchy Reservoir into the Tuolumne River in accordance with the following schedule:

May 1 through September 15 - minimum of 75 cubic feet/second

September 16 through April 30 - minimum of 35 cubic feet/second

"The Secretary of Interior further stipulated that the National Park Service, the U. S. Forest Service, and the U. S. Fish and Wildlife Service would jointly conduct, with voluntary participation by the applicant and the California Department of Fish and Game, a 2 year study of the Tuolumne River between O'Shaughnessy Dam and Early Intake to determine the adequacy of the prescribed flows for fish life, recreational use and esthetic considerations." (U.S. Fish and Wildlife Service, 1975)

"Under the terms of the authorization granted by the Secretary of the Interior, the designated flows may be changed on the basis of recommendations developed from the 2 year interagency study. The recommended flows become a

part of the conditions under which the San Francisco Public Utilities Commission must operate the Canyon Power Project, unless an objection is filed within 30 days of notification by the Secretary of any revised flows. In the event of objection, the commission is entitled to a hearing before a special hearing officer who will develop a finding of fact for the Secretary's consideration before a final determination is made." (U.S. Fish and Wildlife Service, 1975)

The Canyon Power Project was completed in 1967 and the inter-agency field study was implemented the following year. The U. S. Fish and Wildlife Service and the California Department of Fish and Game jointly conducted the field portion of the fishery study. The U. S. Forest Service and the National Park Service carried out that part of the study pertaining to recreation and esthetics. In accordance with Section 9(r) of the Raker Act, the City of San Francisco reimbursed the study agencies for a substantial part of the expenses incurred.

IV. Post-Project

The natural flow regime of the Tuolumne River was drastically altered following the construction of O'Shaughnessy Dam and Hetch Hetchly Reservoir. Further alteration resulted from the installation of Canyon Tunnel which can divert in excess of 850 cfs from the reservoir (see Figure 1).

Instream flows below O'Shaughnessy Dam are generally less than pre-project flow. A comparison of the pre- and post-project

hydrographs (Figure 2) indicates that the post-project minimum flows are much less than the historic pre-project instream flows.

The Tuolumne River once supported annual king salmon runs of 100,000 fish. Modern runs have declined because of the adverse effects of gravel extraction, dams, and other water diversions in the lower reaches of the river. The 1974 spawning run of king salmon was estimated at less than 1,000 fish. The California Department of Fish and Game has indicated that "increased diversion may result in the complete elimination of salmon from the Tuolumne River" (California Department of Fish and Game, 1974).

> "The natural values of the Tuolumne River between Hetch Hetchy Reservoir and Don Pedro Reservoir are of sufficient magnitude that the segment was designated in 1970, pursuant to Section 5(d) of the Wild and Scenic Rivers Act (Public Law 90-542), as a potential addition to the National Wild and Scenic Rivers System. In 1975, the Act (Section 5a) was amended (Public Law 93-621) to add the Tuolumne from its headwaters to Don Pedro Reservoir to the active study list. The study is to be completed and submitted to the President and to Congress by October 2, 1979." (U.S. Fish and Wildlife Service, 1975)

The results of the fishery, recreational and esthetic study initiated as part of the Amendment of Right-of-Way for the Canyon Power Project in 1968 has not received the approval of the Secretary of Interior. It is currently in the draft review

process among the study agencies and is not available for summarization in this case study.

V. Conclusions

Initial project plans approved pursuant to the Raker Act called for the eventual diversion of river flow at O'Shaughnessy Dam and conveyance by tunnel on the south side of the Tuolumne River to a powerhouse at Early Intake (see Figure 1). Engineering studies of the original tunnel alignment have indicated the superiority of a tunnel alignment on the north side of the river. The subsequent request by the City of San Francisco to change the alignment required the approval by the Secretary of the Interior. A stipulation of the approval required a minimum water release from Hetch Hetchy Reservoir. A 2-year study was also required to evaluate the adequacy of the prescribed flows for fish life, recreational use and esthetic considerations.

Instream flows below O'Shaughnessy Dam are generally less than pre-project flows. The operation of Hetch Hetchy has maintained instream flows well above the minimum release requirement of 35 cfs from September 16 through April 30 and 75 cfs May 1 through September 15. However, these flows were developed as interim releases until a flow release schedule could be studied.

In August and September 1968 and July 1970, stream transect measurements were made at five representative riffle areas to determine the amount of habitat available to trout and other aquatic organisms at flows approximately 35, 50, 75, 100, 125,

150, 175 and 200 cfs. The riffle areas selected for transect study ranged in length from about 150 to 300 feet and, at a flow of 75 cfs, averaged nearly 70 feet in width. Wetted riffle area and usable riffle area were determined for each of the experimental flows.

The results of the post-project tunnel relocation study have not been finalized. The recommendations for instream flow release are still being formulated by the U. S. Fish and Wildlife Service and the California Department of Fish and Game.

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