

LOST MAN CREEK DAM REMOVAL
1990 Progress Report
Redwood National Park
by Carolyn Meyer

Redwood National Park (RNP) removed an old concrete dam on lower Lost Man Creek (Figure 1) during the summer, 1989. To evaluate the effects of that removal on aquatic habitat, the park contracted with Trinity Fisheries Consulting (TFC) to conduct an inventory of fish habitat types on lower Lost Man Creek before and after dam removal. RNP's fish and wildlife staff evaluated changes in spawning gravel quality. Park geologists evaluated changes in stream dynamics; their results are documented in a separate 1990 progress report. The objectives of this project were as follows:

- I. To quantify aquatic habitat on lower Lost Man Creek in order to characterize winter and summer aquatic ecosystems by defining diversity, identifying habitat type distribution, surface area, volume, and cover for aquatic vertebrate and invertebrate species.
- II. To establish a baseline measure of salmonid populations per habitat type and shelter rating to compare changes to the aquatic ecosystem that may result from dam removal.
- III. To quantify sediment size distribution and assess gravel quality.
- IV. To determine the effect of dam removal on salmonid spawning migration.
- V. To document the relationship between physical habitat and biological components within the aquatic habitat types in terms of salmonid population, standing crop, carrying capacity, and preference per habitat type by volume, surface area, shelter, and unit/type sequence.

These objectives were established in the environmental assessment for the upper dam removal on Lost Man Creek (RNP 1988).

I. HABITAT INVENTORIES

Identification of important components of stream habitat is essential to evaluating environmental changes such as removing a dam. Bisson et al. (1981) developed a habitat classification system as a tool to achieve this objective. In 1988, RNP contracted with TFC to identify and quantify habitat types, using Bisson et al.'s method, on lower Lost Man Creek.

A. Methods:

TFC was contracted to conduct habitat inventories on the stream reach from RNP's picnic area to the confluence with

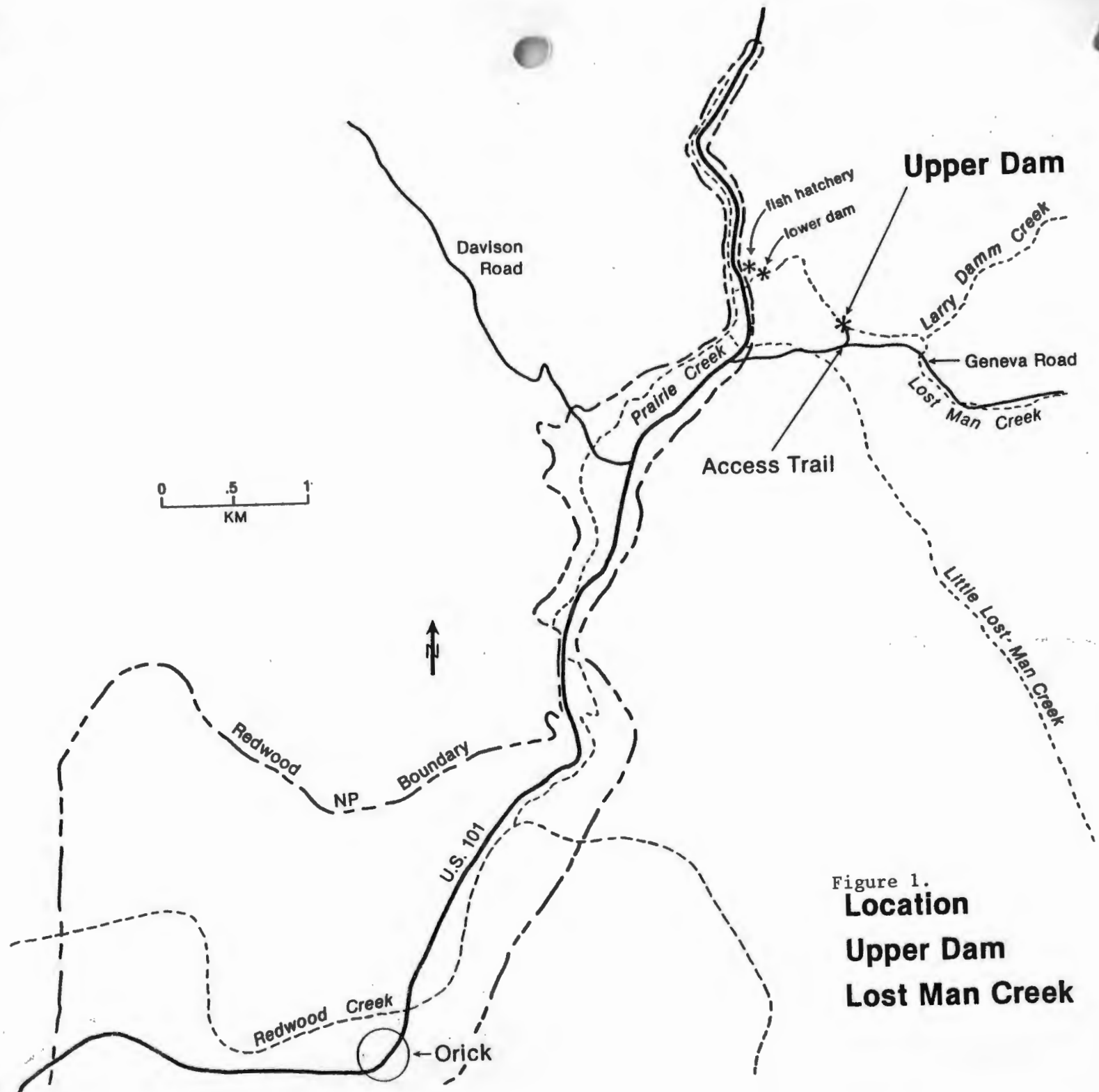


Figure 1.
Location
Upper Dam
Lost Man Creek

Prairie Creek during the summer and winter before and after dam removal. Surface area, volume, substrate type, and average weighted shelter rating of each habitat type were to be quantified. Details on methods used are provided in TFC (1988, 1990).

B. Results:

Habitat type distribution, surface area, volume, substrate type, and shelter ratings by station were reported in TFC (1988) under 1988 summer (8/31-9/1) and winter (6/15-6/16) baseflow conditions. Summer flows were 1.95 cfs and winter flows were 25.6 cfs. Winter habitat was evaluated in mid-June because flows at that time were more typical of winter baseflows than the earlier abnormally low flows. The inventory was repeated during summer flows in 1990 (9/17-18) at < 3 cfs (TFC 1990).

A comparison of the distribution of habitat types by surface area between the summer 1988 survey (pre-dam removal) and the summer 1990 survey (post-dam removal) indicated that below the dam site, pool area decreased from 51.5% to 36.7% of stream area. Correspondingly, riffle area increased from 19.8% to 31.9% (Figure 2). Pool volume decreased from 76.0% to 57.4% (Figure 3).

The habitat inventory will be repeated during winter baseflows in 1991. This information will be compared to the winter 1988 data. After evaluating these inventories and the geomorphological results, the effects of the dam will be interpreted and summarized in a final report.

II. SALMONID HABITAT UTILIZATION

To understand the effect of habitat changes on salmonid populations, salmonid utilization of each habitat type needs to be determined. RNP contracted with TFC to conduct this evaluation.

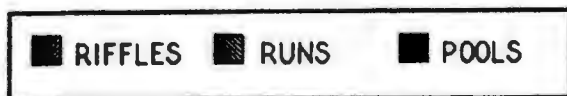
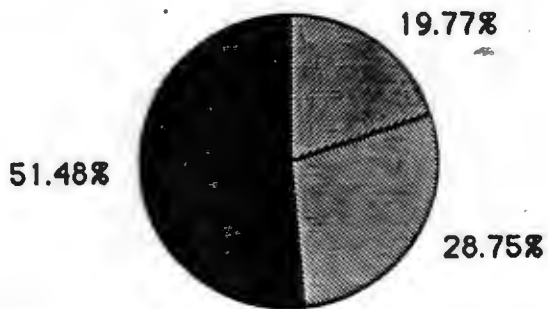
A. Methods

In 1988, TFC conducted electrofishing and direct observation surveys on Lost Man Creek from the picnic area to the mouth. Under summer baseflow conditions, they counted number, species, and age class of fish observed in each habitat type. A correction factor based on an electrofishing-derived population estimate was applied to direct observation counts. Methods used were detailed in TFC (1988).

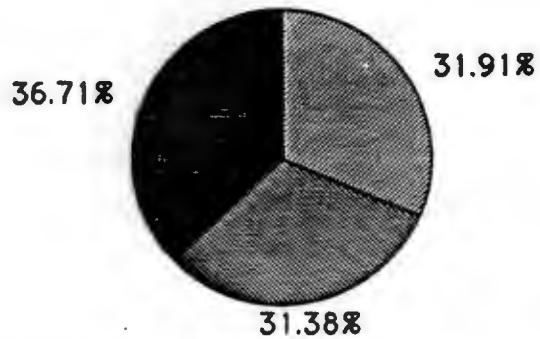
B. Results

Results were summarized and presented graphically in TFC (1988). Species observed were coho salmon (age 0+) and steelhead trout (age 0+, 1+, 2+). Both species were found in

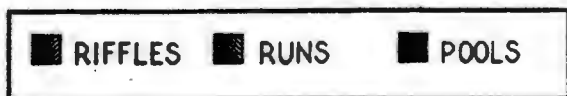
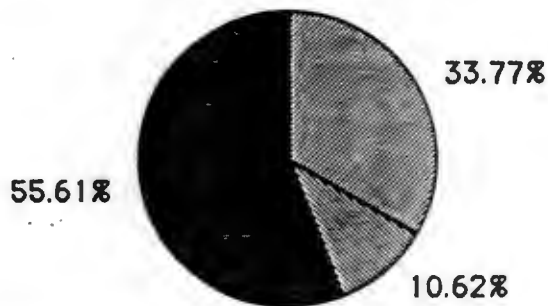
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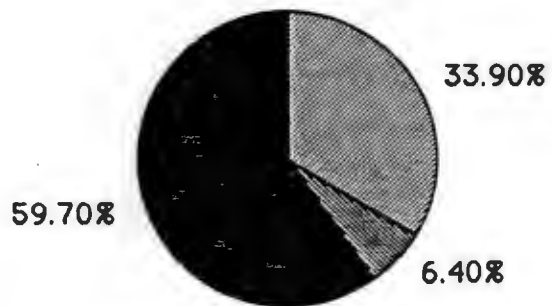
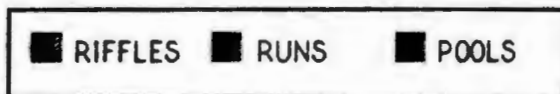
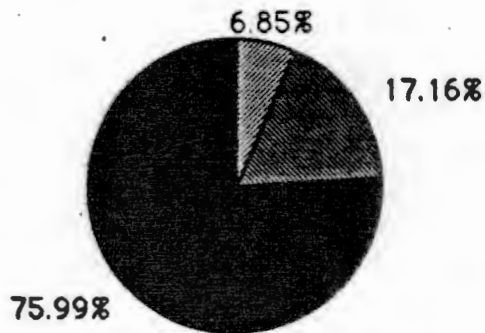
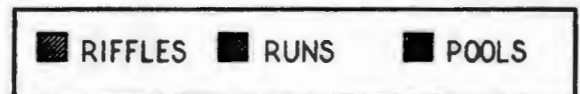
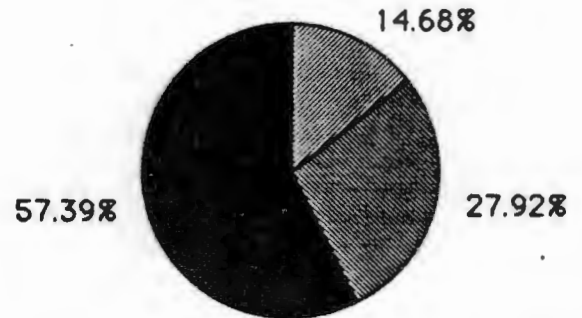


Figure 2.. Comparison of surface area distribution of fish habitat for lower Lost Man Creek between 1988 and 1990. (From TFC (1990))

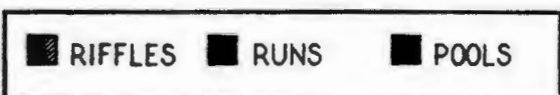
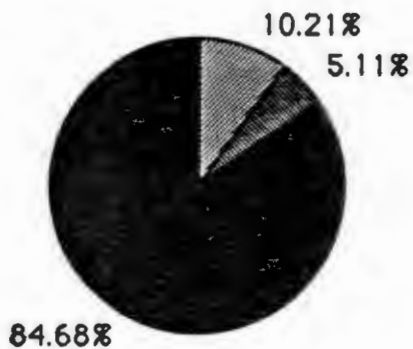
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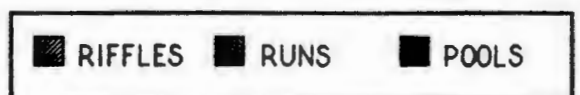
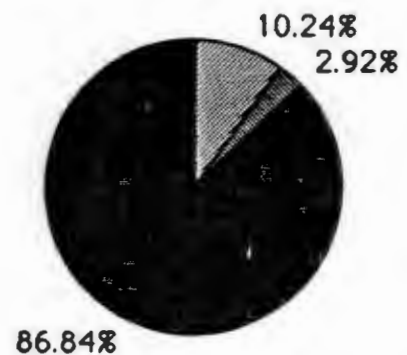


Figure 3. Comparison of volume distribution of fish habitat for lower Lost Man Creek between 1988 and 1990.

runs and pools, particularly lateral scour pools associated with boulders. These results will be evaluated in relation to physical habitat changes in the final report.

III. GRAVEL QUALITY

Removal of the upper dam can release sediment downstream, which may alter the gravel quality in potential downstream spawning sites. Many precautions were taken during dam removal to reduce downstream sedimentation. This monitoring was conducted to evaluate whether such efforts were successful.

A. Methods

During summer 1989, prior to dam removal, 6 freeze-core samples (Platts et al. 1983) were randomly collected from a few potential spawning riffles below the dam site. Samples were stratified by depth into four subsamples. The gravel was sieved, and weight and percent of each size class was determined. Percent fines < 1.0 mm, geometric mean, and fredle index (Platts et al. 1983) were determined for each sample and subsample. In 1990, after dam removal, 6 freeze-core samples were randomly collected again from the same riffles. Procedures used in 1989 to analyze the samples were repeated. These methods were documented in detail in the gravel quality section of RNP's report to Caltrans (RNP 1989).

B. Results

The results still need to be summarized and tabulated. This summary and interpretation of the results will be completed by September 30, 1991. The geologists have conducted a pebble count to evaluate gravel quality, also. Freeze-core results will be compared to pebble count results in the final report.

IV. SPAWNING SURVEYS

Lost Man Creek supports runs of chinook and coho salmon and steelhead trout. Cutthroat trout and lamprey are present, also. When the upper dam was in place, mainly the lower 0.8 miles below the dam were available for salmonid spawning and rearing. After the dam was removed, an additional 1.8 miles became more accessible. An upstream large, impassable log jam prevents migration beyond this point. Spawning surveys provide information on whether spawners are using the stream reach above the dam site after the dam was removed.

A. Methods

For a number of years in the 1980's, spawning surveys were conducted on lower Lost Man Creek from the mouth to the picnic area or to the next set of upstream bridges. During

each survey, number of redds, live fish and carcasses were counted. These surveys were repeated in 1990 and 1991 after the dam was removed.

B. Results

Pre-dam removal surveys revealed significantly more carcasses and redds below the upper dam than above the dam, indicating that many salmonids (especially chinook salmon) were unable to jump over the dam. As stated in the environmental assessment for the dam project, the dam's configuration was a partial barrier to fish passage. Salmon need both a plunge pool and standing wave at the base of a structure that are large enough for fish to gain momentum to jump over the structure. During low flows, these requirements were not met.

Results from spawning surveys before and after dam removal still need to be summarized, tabulated, and interpreted to determine whether spawning activity has increased above the dam site.

V. FINAL REPORT

A final report documenting the results from the above biological studies and other geological studies will be prepared. After reviewing all the study results, a discussion of the impacts due to dam removal will be provided.

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