USFWS Service 1975 · Dennis Lee

Associate Director - Environment and Research

[Acting]
Chief, Division of Ecological Services

SEP 9 1975

Redwood Creek, California

This responds to your August 3 memo requesting that ES prepare a summary of existing information relating to the past and present fishery resources of Redwood Creek, California. Members of my staff have conducted an extensive review of the literature and have supplemented this material with information from personnel in Geological Survey, National Park Service, Office of Biological Services, California Department of Fish and Game, Cooperative Fishery Unit - Humboldt State University, and the Department of Fisheries, Humboldt State University. In addition, they visited the creek during the week of August 9.

DESCRIPTION OF WATERSHED

Redwood Creek flows in a northwesterly direction through a long narrow drainage basin covering approximately 280 square miles of Humboldt County, entering the Pacific Ocean near Orick, California. The creek is approximately 80 miles long, and has few tributaries. Sand bars often form across the mouth of the creek during summer months, blocking anadromous fish migration until the first heavy fall rains. Seasonally, the area receives approximately 80 inches or precipitation resulting in an annual runoff of about 708,000 acre-feet. Major floods occurred on Redwood Creek in 1955, 1964, and 1965, washing enormous amounts of material into the mainstem, filling pools and widening the channel.

About 90 percent of the watershed is owned by large lumber companies. The remaining 10 percent is owned by the U.S. Forest Service and the National Park Service.

Logging operations began in the Redwood Creek basin in the 1850's, but did not become extensive until after World War II during the building boom of the 1950's. Clear-cutting practices in the basin have exposed highly erodible soils on steep slopes resulting in increased siltation in the creek and its tributaries. There is a debate among various soil scientists as to the source of such sediments: whether they come from cut-over areas or from stream-bank erosion. It is clear, however, that the massive timber harvesting has resulted in higher peak run-off to streams subsequent to storm passage. Since the 1950's, 75 percent of the forested land in the basin (65 percent of its total land area) has

DIVISION OF ECOLOGICAL SERVICES

been logged. Whether the runoff from logged areas contributes sediment directly to the stream, or whether the increased flows cause higher than normal (under pristine conditions) stream bank erosion seems to be an academic question when viewed in the context of the ultimate effect on the fishery resources. Aerial photographs taken in 1947 show 30 slides on Redwood Creek. Aerials taken in 1973 reveal 341 slides. In the last 20 years stream bed elevations have risen 15-feet at the Highway 299 bridge (40-50 miles upstream from the mouth), and 5 to 8-feet at the Tall Trees Grove, about 12 miles from the mouth. Recent measurements over a four year period near the mouth of Redwood Creek at Orick indicate that it transported 8,000 tons per square mile of suspended sediment. According to USGS, this is the greatest measured load per area of any stream of comparable size in the coterminous United States. The high sediment load of the stream is especially evident during October to April at which time intense rain storms and floods occur, moving sediments and logging debris into the stream. In a Stream Damage Survey conducted in 1965 by the CDF&G, 64 miles of the creek were listed as severely damaged with 75-100 percent of the bottom covered by silt. Furthermore, basin streams are subject to low summer flows, a lack of deep pools due to sedimentation, and a broad, poorly shaded stream bed over which the channel meanders, resulting in high water temperatures.

Water quality in Redwood Creek appears to be good. The creek and all tributaries maintain highly saturated dissolved oxygen levels. Water chemistry studies conducted by USGS indicate that the creek has a low level of pollution. This is also evidenced by populations of invertebrates including May flies, caddis flies, stone flies and true flies which normally do not inhabit polluted waters. The water quality therefore does not appear to be an impediment to the fishery resources of the creek.

In 1963, the Corps of Engineers completed a stream channelization and levee construction project on the lower 3.4 miles of Redwood Creek. This action destroyed 50-75% of the estuarine portion of the stream. The loss of the major portion of the estuary resulted in the reduction in the overall productivity of the creek ecosystem.

In 1968, Congress created the Redwood National Park. The park covers an area of approximately 90 square miles, with much of this land adjacent to Redwood Creek. Only 33 percent of the park acreage is composed of virgin and old growth redwoods. The remaining 62 percent of the land was logged either before creation of the park or immediately after.

Prior to creation of the park, the Louisiana Pacific Lumber Co. mined sand and gravel from bars in the creek for use as fill on logging roads. As much as 300,000 cubic yards may have been withdrawn over a 15 year period.

THE FISHERY RESOURCES

Within the drainage are found coho and chinook salmon, resident and sea-run rainbow and cutthroat trout, Pacific lamprey, Humboldt sucker, sculpin, and three-spined stickleback. Some of these fish once provided local Indian innabitants with their primary protein source.

Between 1891 and 1898 the California Department of Fish and Game maintained an egg collecting station on Redwood Creek. Commercial fishing occurred at the creek's mouth during the first quarter of the twentieth century, and supplied the Eureka, California market. No data exist regarding the magnitude of the runs nor the catch.

The Prairie Creek Fish Hatchery, currently operated by Humboldt County, has conducted a program of stocking Lost Man Creek, a tributary to Prairie Creek which is in turn a tributary to Redwood Creek. Since its initial operation in 1928 it has planted millions of salmon and steelhead in both Lost Man and Prairie Creeks. The percentage of these fish that now serve to populate Redwood Creek is unknown.

During the last 15 years various reports have alluded to spawning populations of 2000 coho and 5000 chinook salmon, and 10,000 steelhead trout. California Department of Fish and Game personnel have informed us that these figures were extrapolated from data relating to other streams and applied to Redwood Creek. Actual counts of spawning fish within the mainstem of the creek do not exist.

The sport fishery on Redwood Creek is modest when compared with those which exist on other near-by rivers such as the Smith, Klamath, Trinity and Mad. Estimates of fishing pressure vary from 2000 to 4000 man-days annually for salmon, steelhead trout, and the yield is variously estimated from 650 to 6250 fish annually.

In a stream survey CDF&G conducted in 1956, Redwood Creed was considered to be an excellent spawning stream. Historically, according to CDF&G, Redwood Creek was used extensively by coho and chinook salmon, resident and sea-run rainbow and cutthroat trout for spawning and rearing grounds. In spite of the lack of reliable definitive data, it is safe to assume that current fish runs are far below those which occurred 70-80 years ago.

The majority of salmonid spawning occurs between late summer and early spring although adults may be found in the creek at any time. The sedimentation which occurs during this peak spawning period has resulted in an almost cemented bottom which undoubtedly limits spawning success. In addition, intragravel water provides oxygen for the respiration of

developing eggs and alevins. When sediments are as fine as those found in Redwood Creek, the reduced intragravel dissolved oxygen concentrations can result in delayed egg hatching, additional egg mortality, increased alevin mortality as a result of entombment, and reduced alevin size. High summer water temperatures further limit spawning success.

Although unsupported by data, initial reduction of spawning stock may have occurred due to commercial exploitation, however, it is evident that existing habitat conditions preclude a significant build-up of the anadromous fishery. Due to the Corps' project, estuarine areas that once provided feeding and nursery habitat for migrating fish have been either isolated from the main portion of the stream, or destroyed entirely. The effect that this loss alone would have on the fishery resource is unquantified, but thought to be substantial. Furthermore, since much of the remaining harvestable timber in the basin is on the steepest, most erodable sites, and since other studies indicate the effects of logging may be observed 6-15 years after cessation of operations, Redwood Creek may not have yet reached its highest level of alteration and degradation. In view of existing habitat conditions in Redwood Creek, it is surprising that a sport fishery exists at all.

/s/ Norman R. Chupp

cc:
OBS-Al Dole

ES:NDHolmberg:lfd 9/8/76