

CASE STUDY REPORT #15
COYOTE DAM (LAKE MENDOCINO)
RUSSIAN RIVER

I. Project Description

The Russian River Basin drains in a southwestward direction for 108 miles to the sea at Jenner which is located 57 miles north of San Francisco (see Figure 1). Coyote Dam impounds Lake Mendocino on the East Fork of the Russian River near Ukiah. It was completed in 1958 by the U.S. Army Corps of Engineers and has a maximum storage capacity of 122,500 acre-feet covering 1,960 acres. The dam is operated by the Army Corps of Engineers for flood control and water conservation which includes agriculture and municipal uses. Successful operation of the water conservation feature of this reservoir depends on the availability of water imported from the Upper Eel River (see Case Studies 13 and 14).

Eel River water impounded by Lake Pillsbury (Scott Dam) and Van Arsdale Reservoir (Cape Horn Dam) is diverted through a tunnel to the Pacific Gas and Electric Potter Valley Powerhouse on the East Fork Russian River and then to Lake Mendocino (see Figure 1). This interbasin transfer of water began in 1908 and has provided the Russian River Basin with additional irrigation water since that time. The constant availability of the Eel River water supply is accomplished by the storage of 86,800 acre-feet of water in Pacific Gas and Electric's Lake Pillsbury located on the head waters of the main stem of

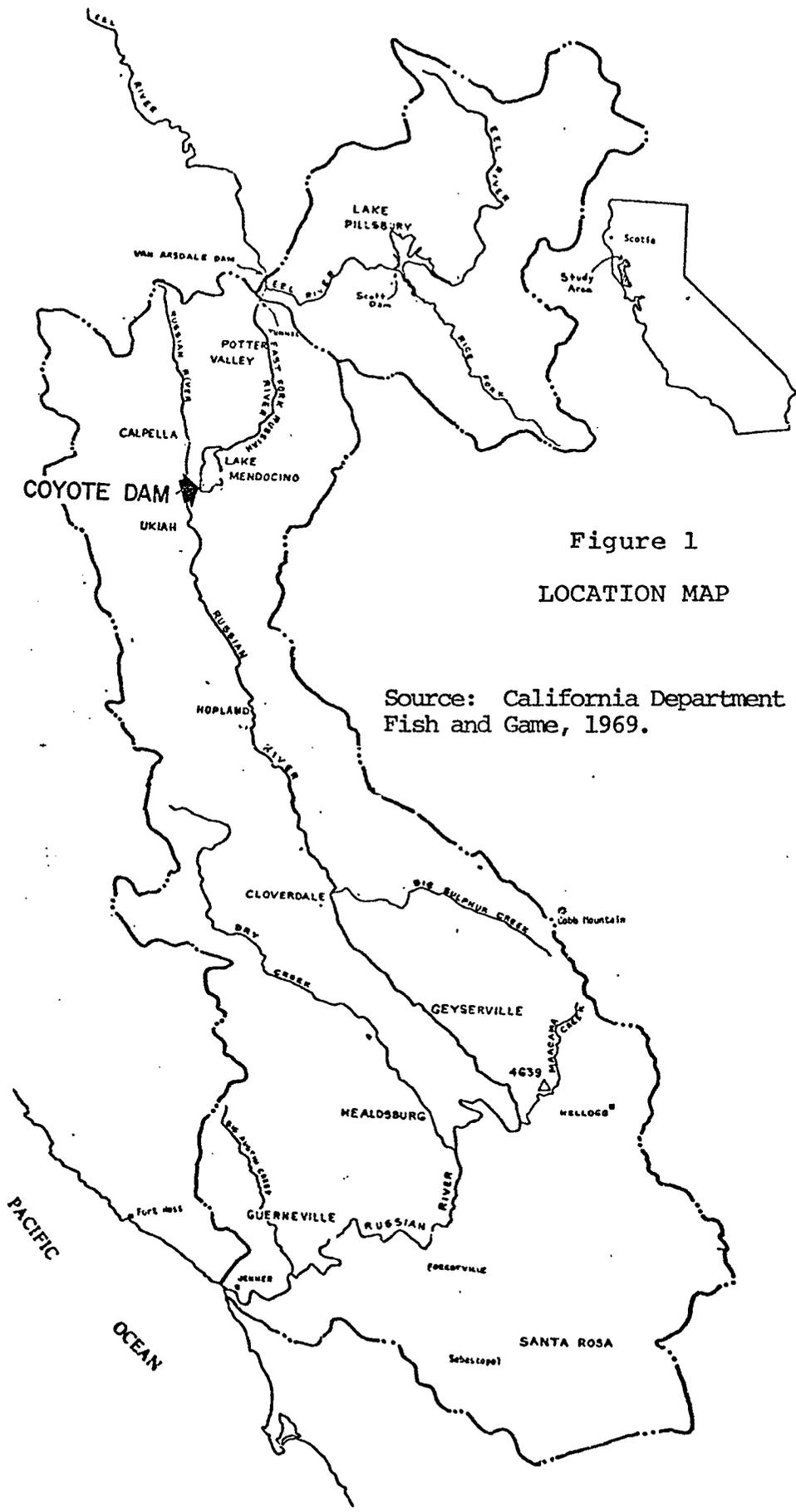


Figure 1
LOCATION MAP

Source: California Department of Fish and Game, 1969.

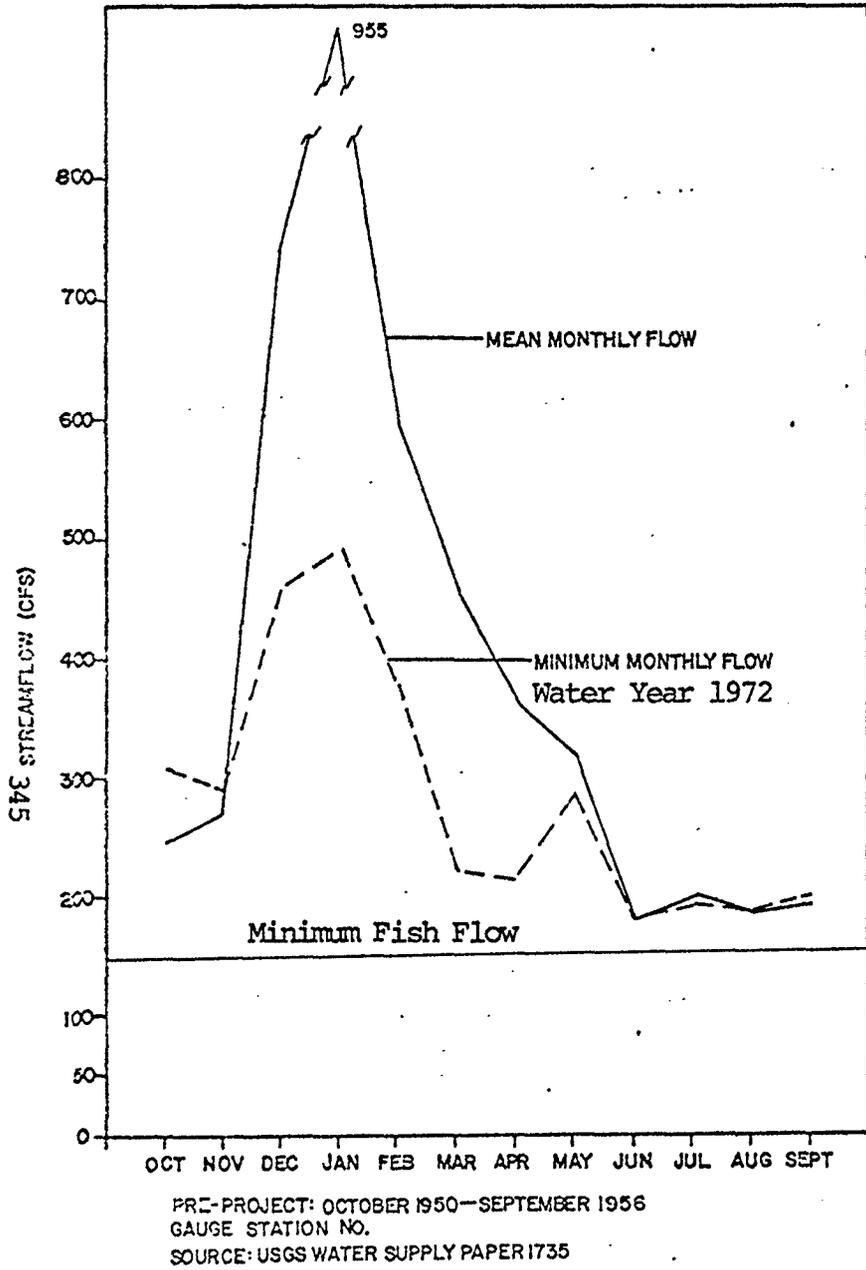
the Eel River (see Case Study #14). Since storage began in Lake Pillsbury in 1922 the transbasin diversion of water became more dependable except for occasional shutdowns of the Potter Valley Powerhouse. The lowest level in Lake Pillsbury recorded was 10 acre-feet during the 1931 water year, an exceptionally dry year.

Water diverted from the Eel River has annually averaged 228 cfs or 68 percent of the total possible inflow to Lake Mendocino during a 27 year period (1942 water year to 1968 water year). Natural runoff in the lake's drainage area averaged 105 cfs annually, which accounts for the remaining 32 percent of the possible annual inflow (Department of Fish and Game, 1972).

II. Pre-Project Condition

Historically there have been times of no flow on the East Fork of the Russian River (USGS, 1959). Runoff in the Russian River Basin is seasonal with nearly 80% of the rainfall occurring from November to March in normal years. Climatic extremes range from short, rainy winters to long, hot dry summers.

Water imported from the Eel River since 1908 has supplied most of the summer flow in the East Fork of the Russian and practically all the late summer and fall flow shown in the pre-project hydrograph (Figure 2). The average diversion from the Eel River for a 63 year period (1910-73) has been 202 cfs (USGS, 1973). The winter flow shown in Figure 2 is more representative of natural stream flows.



POST-PROJECT: OCTOBER 1960—SEPTEMBER 1973
 GAUGE STATION NO. 11462000
 SOURCE: USGS SURFACE WATER RECORDS VOL. 2

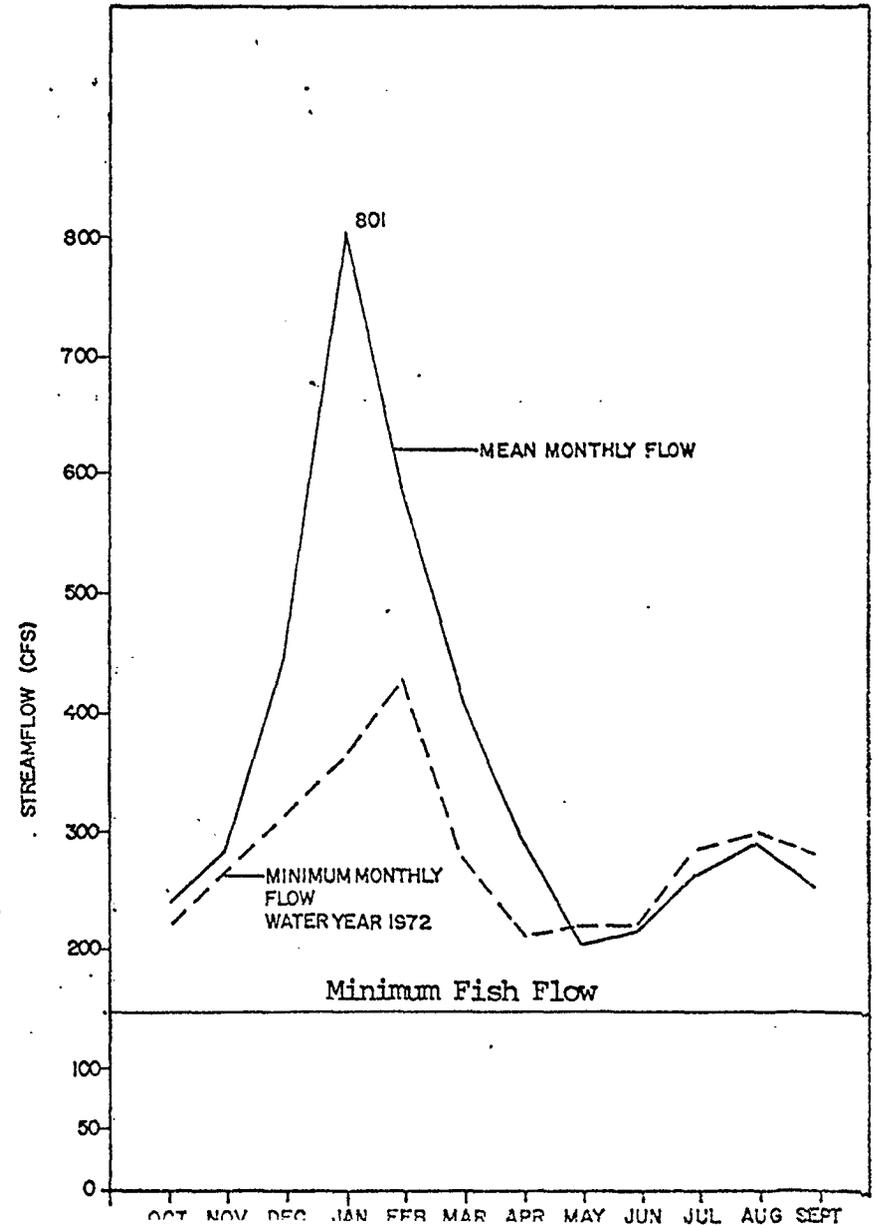


FIGURE 2
 STREAMFLOW CONDITIONS, EAST FORK OF THE
 RUSSIAN RIVER
 COYOTE DAM

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The pre-project fisheries in the Russian River were best known for steelhead trout which used the upper portions of the river for spawning and nursery grounds. The Russian River is well known for this sport fishery as well as king salmon and shad.

In 1943 the Department of Fish and Game estimated a total catch of 221,500 trout from the river, primarily steelhead. This estimate includes both small juvenile fish taken during the early summer and mature adults (returning to spawn) during the winter. A December 1954 survey conducted on the Russian River by the Department of Fish and Game indicated 15,300 angler days resulted in a catch of 8,370 steelhead (.55 steelhead per angler day). Silver salmon and king salmon spawning runs were present on the lower reaches of the Russian River.

Along the East Fork of the Russian River all but the lower 0.8 mile has been blocked by Coyote Dam. The Department of Fish and Game estimated that 32 miles of good spawning and some nursery areas for steelhead, silver salmon, and king salmon occurred above the Coyote Dam site. The height of the proposed dam made fishway construction infeasible.

No pre-project estimates of the number of salmon and steelhead using the 32 miles of spawning area were found in the data reviewed. However, in spring of 1959, the first steelhead spawning season after the dam was completed, the California Department of Fish and Game estimated at least 2,000 steelhead were present below the dam site (Department of Fish and Game memorandum).

All during the pre-project conditions the numbers of downstream migrant steelhead and salmon produced on the East Fork had been supplemented by fish transferred through the unscreened transbasin diversion at Cape Horn Dam. The actual number of fish diverted into the East Fork prior to the construction of Coyote Dam is unknown.

III. Project Development

The State Department of Finance* filed applications in 1949 for a permit to appropriate water from the East Fork Russian. Applications 12919 and 12920 were each to appropriate 550 cfs by direct diversion and 200,000 acre-feet per annum (afa) by storage. In 1955 the applications to the extent of 122,500 afa and 335 cfs were transferred to the Sonoma County Flood Control and Water Conservation District (presently Sonoma Water District).

These transferred applications (Nos. 12919A, 12920A) were initially protested by the Department of Fish and Game in April, 1957, and again in February, 1959. The essential basis of these protests was that the amount of water proposed for diversion was greater than the known minimum flow of the stream during dry years. Such periodic dewatering of the river would severely impair and possibly destroy the existing fishery resources.

Probably in response to the above situation, the Sonoma County Flood Control and Water Conservation District and the Russian River Flood Control and Water Conservation District applied in 1959 for appropriative water rights in the amount of 93,700 acre-feet per annum by storage and 345 cubic feet per second by direct diversion from the Eel River. These applications were subsequently held in abeyance by the State Water Resources Control Board pending the Federal Power Commission's decision on the relicensing of the Potter Valley project.

In August of 1959 an agreement was negotiated between the Department of Fish and Game and the Sonoma County Water District for maintaining minimum flows of suitable quality water along the East Fork Russian River and "the Russian River from Coyote Dam to the mouth of the Russian River for protection and enhancement of fish, wildlife and recreation" (interpretation of the agreement by the State Water Rights Board, Order 74-30).

At the outlet of Coyote Dam a continuous flow of 25 cfs must be maintained except during a time of emergency and then only after informing the Department of Fish and Game.

Approximately one mile downstream from the dam below the confluence of the East Fork and main Russian River there must be sufficient releases to maintain a flow of 150 cfs, or the Sonoma Water District shall release the existing natural flow of the East Fork reaching the dam as augmented by the

existing flow of diverted Eel River water, whichever is less. This means that the minimum flow at the confluence will not be made up from storage in Lake Mendocino.

The Department of Fish and Game determined, by means of a survey on the river that this flow release schedule would be sufficient to allow passage of spawning salmon and steelhead over shallow riffles. The data reviewed did not discuss the technique used to determine the minimum stream flows required on the Russian River.

Farther downstream at the Wohler Intake below Dry Creek a flow of 125 cfs is to be maintained along this lower reach of the river (Zone 5) to the Pacific Ocean (as stated in the 1959 Department of Fish and Game agreement).

It was determined by the Department of Fish and Game that this flow would provide the necessary surface flows for passage of anadromous fish and sufficient quantities of water for recreational facilities along the lower sections of the river. No data was found indicating whether or not this flow would provide streamflow at the sand bar on the river mouth.

In 1961, the Department of Fish and Game-Sonoma County Water District agreement was included in the terms of the state's water rights permit as the result of a formal hearing of the State Water Rights Board (Decision 1030). The quantity of water to be appropriated on the East Fork of the Russian River under the issued permits was 212 cfs by direct diversion

and 122,000 by storage in Lake Mendocino. Also included in the terms of the permit were the diversions of Eel River water at the tailrace of the Potter Valley Powerhouse by Potter Valley Irrigation District. The irrigation district can divert 50 cfs from May 1 to October 15 and 5 cfs from October 16 to April 30 as provided by a 1936 contract with Pacific Gas and Electric Company.

Maintenance of the required flows on the Russian River above Wohler Intake could be affected by the future operation of the Warm Springs Dam on Dry Creek. In September of 1973 a Department of Fish and Game memorandum expressed concern over strict interpretation of the 1961 permit terms in relation to the Warm Springs Project supplying the required 125 cfs instead of the Coyote Dam Project. This could cause dewatering of the Russian River above Dry Creek. The Department of Fish and Game requested that terms of the water rights permit be amended to provide protection for the Russian River above Dry Creek.

In 1974 the State Water Rights Board issued order 74-30 to revise and clarify parts of Decision D1030. The order did not change the terms of the water rights permit as requested by the Department of Fish and Game due to the fact that the Board had power under Condition A of the 1959 Department of Fish and Game agreement to prevent dewatering of the river

above Dry Creek. Condition A of the agreement between the Department of Fish and Game and Sonoma Water District gives the Board continuing authority "to modify releases for minimum flows of water therein provided to prevent waste of or inequitable use or method of use or method of diversion of water".

The primary purpose of the State Water Rights Board Order 74-30 was to divide the water rights of Sonoma County Water District and Mendocino County Flood Control and Water Conservation Improvement District under the permit issued by Decision 1030. This permit was revoked and new and separate permits were issued (Permit nos. 12947A and 12947B respectively). This action was prompted because of Sonoma County Water District's (Sonoma) lack of compliance with one of the terms of D1030. Sonoma had neglected to file a description and location of the diversion points on the river and a statement of the quantities of water to be diverted as required by D1030.

Dividing the permits allowed the State Water Rights Board to deal more effectively with Sonoma. This is an example of the reserve power held by the Water Rights Board in the permit situation. After the state water rights license is issued to the permittee the board is limited in some aspects (Lundlof, pers. comm.).

IV. Post-Project

Since construction of Coyote Dam the upper section of the main Russian River maintains a surface flow throughout the

entire summer. The improved flow regime and California Department of Fish and Game fish planting operations below Coyote Dam have slightly improved the annual salmon spawning runs.

The Russian River supports a large anadromous fisheries resource. An estimated 57,000 steelhead and 5,500 salmon use this drainage each year for spawning and nursery grounds. Both silver and king salmon have been stocked in the drainage by the Department of Fish and Game. Five hundred thousand king salmon were released along with 75,000 silver salmon in 1969 (Department of Fish and Game, 1969). Two and a quarter million king salmon fingerlings were released between 1956 and 1961. In 1961 the spawning run was estimated at about 1,000 fish. King salmon have been observed upstream as far as the the East Fork (California Department of Fish and Game Memorandum). Since 1961 the early king salmon migrations in August and September encountered inadequate spawning conditions due to temperature and flow factors and presently the spawning run does not exist (Baracco, pers. comm.).

The 10 mile reach of the East Fork Russian River above Lake Mendocino has been planted with catchable-sized rainbow trout from 1965 to 1969 at the rate of 30,000 per year. The California Department of Fish and Game estimated 5,320 angler days were expended for rainbow trout in this section of stream in 1970 (Department of Fish and Game, 1969). During the dry part of the year this fishery depends on imported Eel River water. Shutdowns of the Potter Valley transbasin

diversion occasionally caused dewatering in the East Fork which stranded many fish and severely damaged fishery habitat (Anderson, 1972).

Steelhead spawning runs utilizing the Upper Russian River had an unnatural source of juvenile steelhead from the Eel River above the transbasin diversion at Cape Horn Dam. From April, 1961, through March, 1962, an estimated 24,766 steelhead were diverted through the Potter Valley Powerhouse (Department of Fish and Game, 1975). Presently downstream migrant steelhead that survive the diversion through the Potter Valley Powerhouse (the survival rate is only about 10 percent [Baracco, pers. comm.]) are subjected to unfavorable salmonid habitat of Lake Mendocino. This has isolated the Upper Eel River source of juvenile steelhead from the ocean. To prevent diversion of fish to the Russian River basin, the Department of Fish and Game requested Pacific Gas & Electric to construct a fish screen at the Cape Horn Diversion. The screen was completed in May of 1972; however, frequent breakdowns have kept it out of service for long periods of time. Currently the Department of Fish and Game has installed and is testing a new louvered design screen which may correct the problem (Emig, pers. comm.).

Turbidity has been a major problem in the Russian River drainage. Turbid silt-laden waters originating in the upper Eel River are stored and released to the Russian River over long periods of time from Lake Pillsbury and Lake Mendocino

(USGS, 1971). Frequent mud slides are known to occur at Lake Pillsbury. Regulation of the turbidity of the outflow from either Lake Mendocino or Lake Pillsbury is made increasingly difficult by the lack of multi-level outflow structures on these reservoirs.

Turbidity has been shown to have adverse effects on anadromous fish production and angling success as well as general recreation. To reduce turbid flows during the steel-head season, a special flow release schedule has been followed at Coyote Dam. The purpose of the schedule is to reduce outflow from Lake Mendocino during days of expected high angler use. The procedure consists of releasing a large volume of water for two to three days drawing the reservoir down 10,000 to 20,000 acre-feet then releasing minimum flows until the water supply pool is full.

The regulated releases have provided clear water and improved fishing conditions for intervals up to two weeks, depending on rainfall and runoff.

The widely fluctuating releases may have an adverse effect upon anadromous fisheries spawning success (Anderson, 1972). The extremely variable flow releases could cause alternate dewatering or scouring of salmonid spawning redds, and for this reason, the procedure has been discontinued (Baracco, pers. comm.).

The post-project fisheries of the Russian River have been adversely affected by the continuous deterioration of fish habitat occurring primarily along the lower reaches of the river below Coyote Dam. Spawning grounds were lost as the result of the removal of gravel for aggregate, stream channelization or excessive siltation from logging and road construction. Anadromous fish nursery habitat and trout habitat has been lost because of an increasing number of water diversions and summer dams and the increase in water temperature associated with dams. In some cases, pollution from municipal and industrial wastes is present (Vestal and Lassen, 1969).

V. Conclusion

The operation of Coyote Dam increased the summer instream flow to meet downstream irrigation and municipal water supply needs in Sonoma and Mendocino County. Instream flows reserved for fish and wildlife were included in the water allocation. Coyote Dam instream flow releases to the Russian River were designed to provide an increased year-round flow regime compared to pre-project conditions along the entire length of the Russian River, except for dry years when the natural inflow to the dam is released. The performance of Coyote Dam in maintaining the required flow at the three gauging points along the river has been good except for the present drought water year, 1976. This water year has been less than the anticipated minimum

of the 1924 water year, and it has been possible to maintain flows at the confluence due to limited amounts of water imported from the Eel River basin (Roxon, pers. comm.).

The exact technique used by the Department of Fish and Game in determining instream flow needs was not discovered; however, it was found that consideration was given to providing passage flows for salmon and steelhead and supplying streamflows for the summer recreational facilities on the lower section of the river near Guerneville.

Although the mean monthly flows shown in the post-project hydrograph are above the minimum instream flow release and display an increased summer streamflow regime, the effectiveness of the instream flow release in preserving fishery resources is difficult to analyze. This is primarily due to unforeseen habitat deterioration that has more recently occurred on the main stem of the Russian River and its tributaries which has been caused by pollution, gravel mining operations, logging and the turbid outflow from Lake Mendocino, the effects of which are hard to isolate from any beneficial or adverse results of streamflow alteration upon the fishery resource.

Present and future flow regimes of the Russian River depend heavily upon the operation of the Pacific Gas and Electric's entire Potter Valley complex. The continued diversion of Eel River water is required to accommodate the existing and future urban and agricultural development in the Russian River basin.

Five alternative operational plans for the present operating procedures of the Potter Valley power complex in conjunction with the Russian River are currently being studied by an interagency study group (for further description see Cape Horn Case Study Report #13). Some of the proposed plans include an enlargement of Lake Mendocino's storage capacity to help augment the Russian River flows and reduce some of the dependency on imported Eel River water.

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