

March, 1969

A. Name of Project and Streams

Marin Municipal Water District; Nicasio Dam and Reservoir; Nicasio Creek, Marin County.

B. Description of Stream and Fishery Resources.

Nicasio Creek is the largest tributary (23 miles) of Lagunitas Creek. The Lagunitas Creek drainage is located in western Marin County and drains approximately 100 square miles of mountainous terrain before entering Tomales Bay.

The vegetative cover in the drainage is principally grassland with oak, bay, and buckeye along the steeper ridges. Riparian vegetation consists of grass, willow, alder, and small stands of redwood.

Composition of the streambed is predominantly gravel (1/2 to 4 inches) with rubble common in the headwater areas. Sand and silt line the bottom of some of the larger pools in the mid and lower sections of the drainage. Gravel, suitable for salmon and steelhead spawning, is equally distributed between Nicasio Creek and Lagunitas Creek. The gradient throughout the drainage is relatively slight, less than 5 feet per 100 feet of stream, except for the extreme headwater areas where it is comparatively steep, more than 10 feet per 100 feet of stream.

Stream flow in the Lagunitas Creek drainage corresponds closely with the rainfall pattern. Most of the rainfall and corresponding high flows occur during the winter months. Surface flow in Nicasio Creek above the reservoir becomes intermittent during summer and fall months. Pre-project stream flows measured at the U.S. Geological Survey flow measurement station on Nicasio Creek 0.9 miles upstream from its confluence with Lagunitas Creek are summarized as follows. The amounts are shown as mean monthly flow in cubic feet per second for the period 1954 through 1960.

Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	July	Aug.	Sept.
1.27	1.78	89.9	111	179	57.4	47.6	6.4	1.2	0.14	0.025	0.036

The stream flow gage was removed after the project was constructed and post project flows have not been made available by the District.

Discharge in Lagunitas Creek above the confluence with Nicasio Creek has been modified by construction of 4 water storage reservoirs by the Marin County Water District. These reservoirs are Lagunitas, Bon Tempe, Alpine, and Kent, with storage capacities of 341, 4300, 9210 and 16500 acre feet respectively.

We believe the Lagunitas Creek drainage supports the largest and most valuable runs of silver salmon and steelhead in Marin County. Although estimates are not available for the size of pre-project runs in the drainage or Nicasio Creek specifically, angler use has been reported to be high. Reliable estimates by Department Fish and Wildlife Protection Officers indicate that angler use during the 1954-55 winter season was 2,200 angler days. The catch was about 18 fish per 100 observed anglers. The winter salmon and steelhead fishery is restricted to the *t* miles of tidewater above Tomales

Bay. The spring fishery for downstream migrants, throughout the drainage, is usually heavy and of short duration. The status of the present runs are described in Section G.

C. Description of the Project

The Nicasio Dam was constructed in 1960 for municipal water use by the Marin Municipal Water District. The project is located 0.9 miles upstream from the mouth of Nicasio Creek and about 13 miles northwest of San Rafael. The dam is earth fill, 115 feet high, and creates a reservoir with capacity of 22,500 acre feet and a surface area of 850 acres. Water stored by the Marin Municipal Water District is not released down the stream channel but diverted from the drainage by pumps.

As a condition of the project development, the District was required to construct and maintain trapping facilities to trap silver salmon and steelhead as they migrated both upstream and downstream from the reservoir. Thus, upstream migrant adults are trapped below the dam, transported above the reservoir, and released in the stream to continue their spawning. Juvenile downstream migrants are trapped above the reservoir and transported to the stream below the dam.

D. Techniques used for making Flow Recommendations

Flow recommendations were based upon visual observations of the stream at known flows and habitat needs for upstream migrants.

E. Flows Recommended

The Department recommended maintenance of minimum flows in Nicasio Creek below Nicasio Dam as follows:

December 1 through March 31,	25 c.f.s. or 6000 a.f.
April 1 through May 31,	5 c.f.s. or <u>600 a.f.</u>
	6,600 a.f.

In addition, the Department recommended that water releases be made from the lower levels of the reservoir to insure low temperatures suitable for fishlife. A summer flow release was not requested. Other recommendations included District construction, operation and maintenance of fish trapping facilities in the stream immediately below the reservoir and in 2 tributary streams immediately above the reservoir.

F. Flows Received from the Project and Reason for any Difference from the Recommended Flows

The District is required to release 800 a.f. of water per month during the period of November 1 through March 31, for the preservation of fish and wildlife. The water is made available the first day of each month during the period and released in increments to be specified by and at the discretion of our Department. However, if the mean runoff during any previous month of this period is 50 percent of the computed mean monthly runoff, the District is permitted to reduce the monthly total release to 600 a.f. If the mean runoff during any previous month of this period is

25 percent of the computed mean monthly runoff, the District and Department are to negotiate the matter. Negotiation of flow releases has never been required. It is our understanding that the Department did not receive the full amount of the recommended flows because of a compromise. The compromise provided that the District would pay for man time to operate the trapping facilities.

Post-project flows have generally been the amount requested and are adequate to provide attraction and migration to the trapping facility. The Department is permitted to manipulate the winter flow releases as needed within the framework of the agreement between the two agencies. Manipulation usually takes the form of releasing attraction flows and/or withholding the flow releases until the streams above the reservoir contain sustained flows suitable for spawning. Although summer flow releases for fishlife are not required of the District, a flow release is made to fulfill downstream water right commitments. The District supplements summer stream flows up to a quantity of 2 c.f.s. as needed and requested by a downstream landowner on Lagunitas Creek. These releases are made in equal amounts from Kent and Nicasio Reservoirs. The District divides the total amount of release between the two reservoirs as a courtesy to our Department.

G. Status of post-project fish populations

We believe that the Nicasio Creek project has resulted in a reduction of the number of salmon and steelhead that historically utilized the stream. A resume of the number of upstream migrant adults trapped at Nicasio Creek during the first 6 years of operation (1960-66) is as follows:

	<u>Silver Salmon</u>	<u>Steelhead</u>
1960-61	0	34
1961-62	1	33
1962-63	44	1
1963-64	151	129
1964-65	620	83
1965-66	464	8

A resume of downstream migrant juveniles trapped in the two tributaries above the reservoir for 6 years is as follows:

	<u>Silver Salmon</u>	<u>Steelhead</u>
1960-61	0	4522
1961-62	0	2185
1962-63	---	Records Lost ---
1963-64	916	1464
1964-65	14,765	156
1965-66	7 tin	836

The following is a resume of silver salmon planted in the Lagunitas Creek drainage as part of our region's stocking program:

	<u>Nicasio Creek and Tributaries</u>				<u>Lagunitas Creek</u>	
	Above the Reservoir		Below the Reservoir			
	<u>Fingerlings</u>	<u>Yearlings</u>	<u>Fingerlings</u>	<u>Yearlings</u>	<u>Fingerlings</u>	<u>Yearlings</u>
1958						63,702
1960					14,144	
1962					20,001	
1963			9,500	40,125		
1964	50,000	4,454				
1966				40,002		
1967				40,014		

H. Evaluation of (1) flows recommended or received and (2) techniques used for making recommendations.

- (1) Winter flows are adequate to provide upstream attraction, migration, and trapping of adult salmon and steelhead. Summer stream flows are low and below the level necessary to provide suitable habitat for healthy nursery populations of silver salmon and steelhead. The magnitude of summer flow release from Kent and Nicasio Reservoirs are dependent upon quantities needed to maintain downstream water rights.
- (2) Techniques used for making recommendations on the Nicasio Creek project were poor according to present standards and methods. Although we find that winter flows received have been adequate, flows based upon subjective judgment could have had an adverse effect upon upstream migration. We believe the Department should have required a minimum flow release during the spring and summer.

I. Discussion of Other Factors that may have affected Post-Project Fish Runs

Other factors that have affected post-project fish runs are:

- (1) Water quality of Lagunitas Creek is generally good; however, at times large fish kills have occurred. Poor agricultural practices in the drainage are the principal problems. At various times, within the past few years, waste from dairy farms has entered the stream in such large concentrations that extensive fish kills have resulted.
- (2) Production of young fish above Nicasio Dam has been poor because of inadequate nursery area. This is reflected in the returns to the downstream trap.

- (3) Marked yearling silver salmon planted in the tributaries above the Nicasio Reservoir have, on occasion, bypassed the downstream trapping facility and entered the reservoir fishery.
- (4) Gravel operations at the mouth of Nicasio Creek have had very little effect upon the aquatic habitat. However, as the drainage is developed and demands for gravel increase, the operation could have an adverse effect upon fishery resources.
- (5) Silver salmon planted in the Lagunitas Creek drainage have been characteristically early spawners and have returned to the drainage during the months of August and September. Stream conditions during this period are poor and the fish have been unable to migrate upstream from the estuary. By late October, many of these "early run" fish have become covered with fungus and have died.
- (6) On occasion, during the adult migration into Lagunitas Creek, the tributaries above the Nicasio Reservoir have not contained sufficient flow for spawning. Consequently, flows to attract fish to the trap were not released and fish destined for Nicasio Creek have strayed into Lagunitas Creek.

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