

ANNUAL PERFORMANCE REPORT

FEDERAL AID IN SPORT FISH RESTORATION ACT

State: California

Grant Agreement: F-51-R-13

Grant Title: Inland and Anadromous Sport Fish Management and Research

Project No. 22: North Central District Salmon and Steelhead Management

Job No. 1: Juvenile Salmon and Steelhead Stock Assessment

Period Covered: July 1, 1999 through June 30, 2000

- I. Summary: During the Fiscal Year (FY) 99-00, nine stations representing five streams were electrofished by the Department of Fish and Game using the three-pass depletion/regression method to determine juvenile salmonid standing crop. These nine stations have been surveyed annually since 1986 to determine trends in standing crop density.

Both coho salmon and steelhead trout densities remained depressed, if not, in decline. The results of sampling revealed coho salmon presence in four of the five annually monitored streams: Caspar Creek, Little River, Hollow Tree Creek, and Pudding Creek. Coho salmon have not been observed in Ryan Creek since 1993. A comparison of coho salmon standing crop densities in the five annually monitored stations showed current densities were lower than those of previous years. Steelhead were collected at all stations. Steelhead trout populations were variable but were generally below the average density revealed since 1986.

Since 1986, all electrofishing has been conducted during September and October. By conducting the surveys in late summer/early fall, when water temperature has begun to decline the probability of injury to fish is lessened. Also, the populations at this time will have already experienced summer natural mortality and therefore our numbers may reflect a more real situation than if the surveys were conducted in June, July, or August.

- II. Background: The salmon and steelhead populations in the five counties making up the North Central Sport Fishing District in California once supported large, vigorous sport and commercial fisheries. Already vestiges of what they once were, these populations and the fisheries they supported continue to decline. Attempts to restore salmon and steelhead populations have been conducted in the form of stream habitat improvement, rearing programs, upslope restoration, and the implementation of stricter angling regulations. However, to manage these resources more effectively we need to know more fully where salmon and steelhead production is occurring, what limiting factors are affecting the populations, and what the trend in recruitment is. We also need to know population trends over time. This information enables us to focus management efforts in areas which will yield the greatest benefits.

- III. Objective: To determine trends in abundance of juvenile coho salmon and steelhead trout populations in North Central District streams.
- IV. Procedures: Selected streams were surveyed to determine juvenile coho salmon and steelhead trout distribution and abundance. Included in the FY 99-00 survey season were five streams surveyed annually since 1986. Additional streams were added to the survey to increase our database as time and personnel become available. Three pass electrofishing within 30 meter transects was the method employed for the surveys.
- V. Findings:

Coho: Five streams are monitored annually and this year four, Caspar Creek, Little River, Hollow Tree Creek, and Pudding Creek contained coho salmon. Among the five streams, eight stations are monitored and only four of the eight stations contained coho. Juvenile coho have not been observed in Ryan Creek since 1993.

Coho salmon densities were generally low for both, stations in coastal streams, and stations in tributaries to the Eel River. In the smaller coastal streams, coho salmon densities at stations in the annually monitored streams ranged from 0 to 0.18 fish/m² and averaged only 0.05 fish/m². In both main stem Eel River tributaries and South Fork Eel River tributaries, coho salmon densities in the annually monitored streams ranged from 0 to 0.17 fish/m² and also averaged only 0.05 fish/m².

Coho salmon density trends based on a three year life history pattern, revealed a continued decline at all stations (Figure 1a,b). Caspar Creek stations, upper and lower, were 6% and 17%, of the year class mean, respectively. Coho salmon density at the lower station on Little River was 9% of the year class mean and no coho were collected at the upper station. Absence of coho salmon at the upper station on Little River was most likely due to an instream barrier located approximately 75 meters downstream.

Coho salmon trends based on juvenile density are equally depressed in the tributaries to the Eel River compared to the coastal streams. Most disturbing, is the absence of coho salmon in Ryan Creek since 1993. It is very likely all three year classes have been extirpated and this absence is backed by data collected during adult salmon spawning stock surveys conducted throughout the Outlet Creek system. Juvenile coho salmon have not been observed in Outlet Creek, which Ryan Creek is tributary to, since 1993. The trend in Hollow Tree Creek, similar to the coastal streams, reflects decline. In 1999, the density of coho salmon was 39% of the year class mean at the upper station, and 7% of the year class mean at the middle station. Only once, in 1994, during the past 15 years have coho salmon been collected at the lower station on Hollow Tree Creek.

Overall, juvenile coho salmon density was depressed when compared to data collected since 1986. Despite restoration efforts, coho salmon populations remain depressed among the streams monitored through this project. Five separate

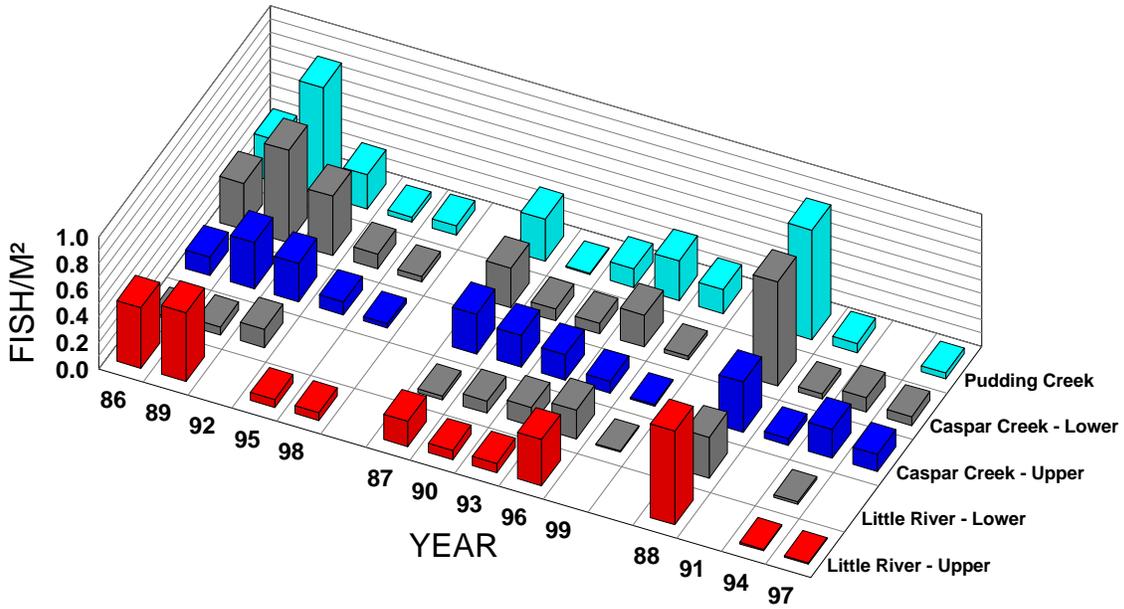


Figure 1a. Juvenile coho salmon trends based on three year life history pattern, coastal Mendocino County, 1986 to 1999.

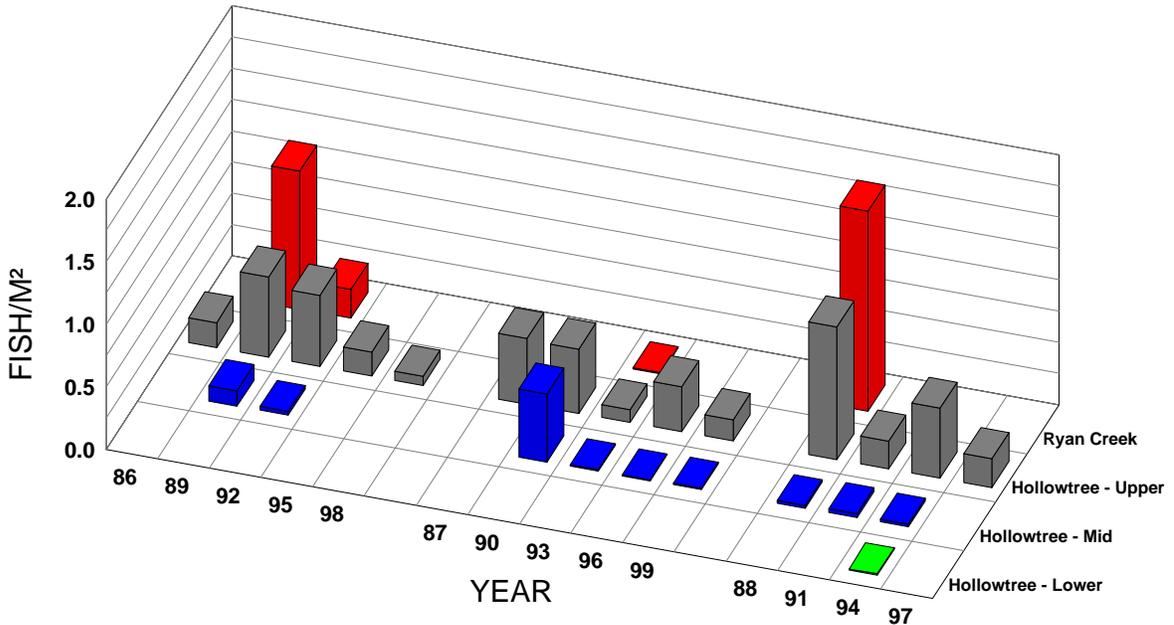


Figure 1b. Juvenile coho salmon trends based on three year life history pattern, Eel River tributaries, 1986 to 1999.

watersheds are monitored through this project and each is managed differently; Little River ownership is half private and half California State Parks, Caspar Creek is owned by California and managed by the Department of Forestry as an experimental watershed, Pudding Creek is primarily owned by the Campbell Timber Group, Ryan Creek is privately owned, and Hollow Tree Creek is split by private ownership and Mendocino Redwoods Company.

Steelhead: As steelhead trout do not adhere to the same predictable life cycle as coho salmon, year to year comparisons provide a general estimate of trends. In 1999, juvenile steelhead trout densities were lower at every station than the average for the previous 13 years (Figure 2 a,b). In 1999, densities as a percentage of the 13 year average ranged from 6 to 48 for coastal Mendocino stream stations, and from 27 to 87 for Eel River tributaries. Although relatively stable since 1991 or 1992, steelhead trout densities for the Little River and Pudding Creek stations were much higher in the later half of the 1980's.

Although this project reflects 14 years of data collection and inferences to trends of salmonid populations are made, it should be kept in mind that we do not know the long term fluctuations in these small coastal populations. The declines eluded to may be a very consistent trend in the overall cycle. But it may also be a very dire sign of problems associated with man's affective acceleration on limiting factors.

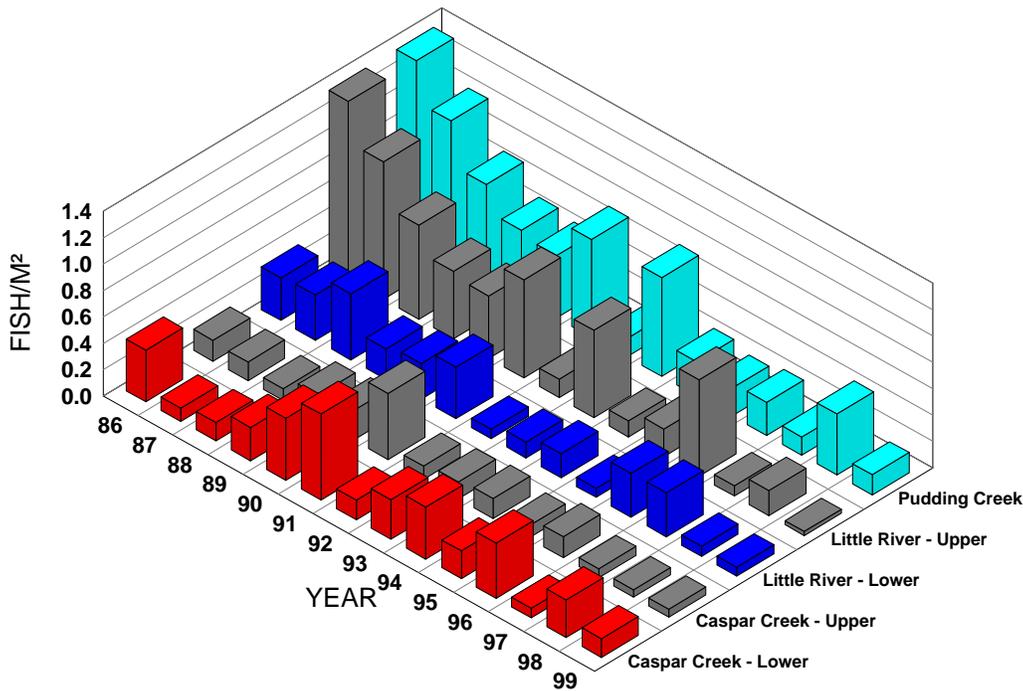


Figure 2a. Juvenile steelhead trends in density, coastal Mendocino County, 1986 to 1999.

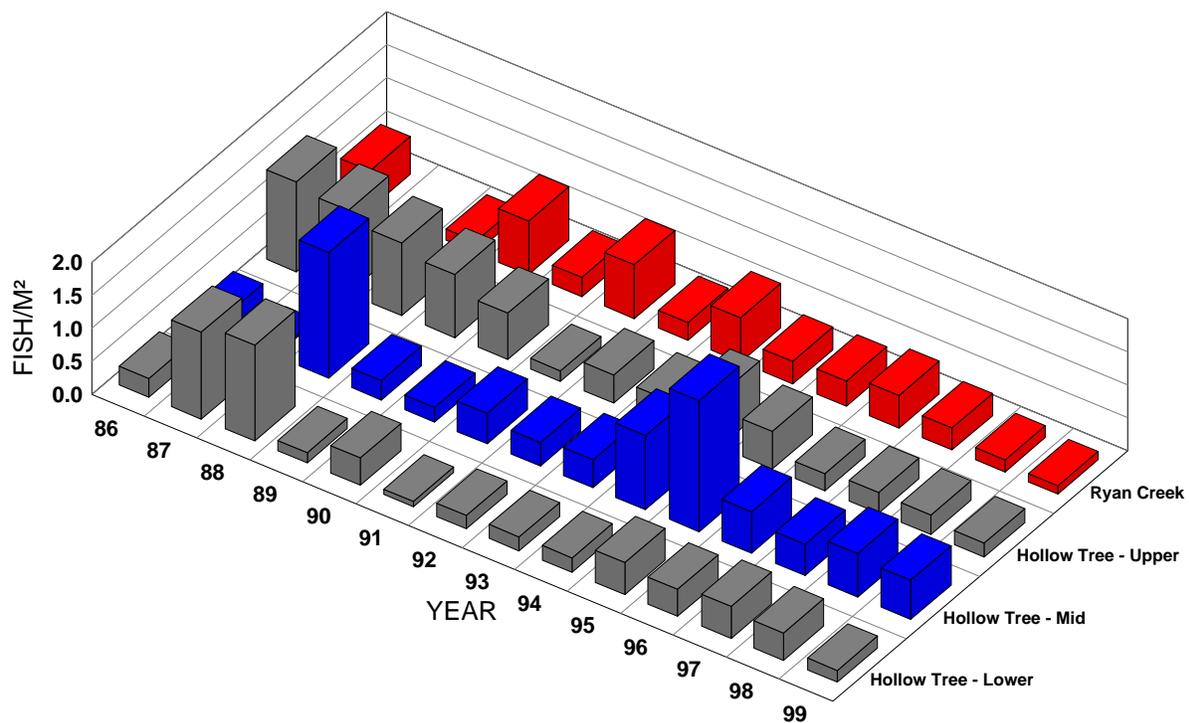


Figure 2b. Juvenile steelhead trends in density, Eel River tributaries, 1986 to 1999.

Juvenile steelhead length varied considerably between stations (Figure 3). Ryan Creek steelhead length distribution was the most platykurtic, with the Little River steelhead reflecting a similar distribution. All other stations reflected a more leptokurtic distribution. The most interesting length frequencies were revealed at Hollow Tree Creek where the population size was gradually greater with distance from the headwaters.

The pattern of small to larger fish from the headwaters to the mouth on Hollow Tree Creek was not reflected in densities of juvenile steelhead, or combining coho and steelhead for an overall juvenile salmonid density. If, in combining salmonid species, the trend from upper to lower station was high to low, respectively, a case could be made for size being density dependent. However, this was not the case and therefore other habitat factors, for instance water temperature, hence metabolism, may be one reason for smaller fish at the upper stations. There are several other conditions, acting either singly, or in combination with other conditions, that could result in the progression of sizes revealed on Hollow Tree Creek. Past studies on returning adult steelhead and subsequent scale analyses suggests that size at the time of smolting is a critical factor in population maintenance and escapement.

Overall, the low coho salmon and steelhead trout standing crop densities found during recent years may indicate we will continue to see lower numbers of adults returning to spawn in the future. Recruitment, for one reason or another, appears to be slowly failing.

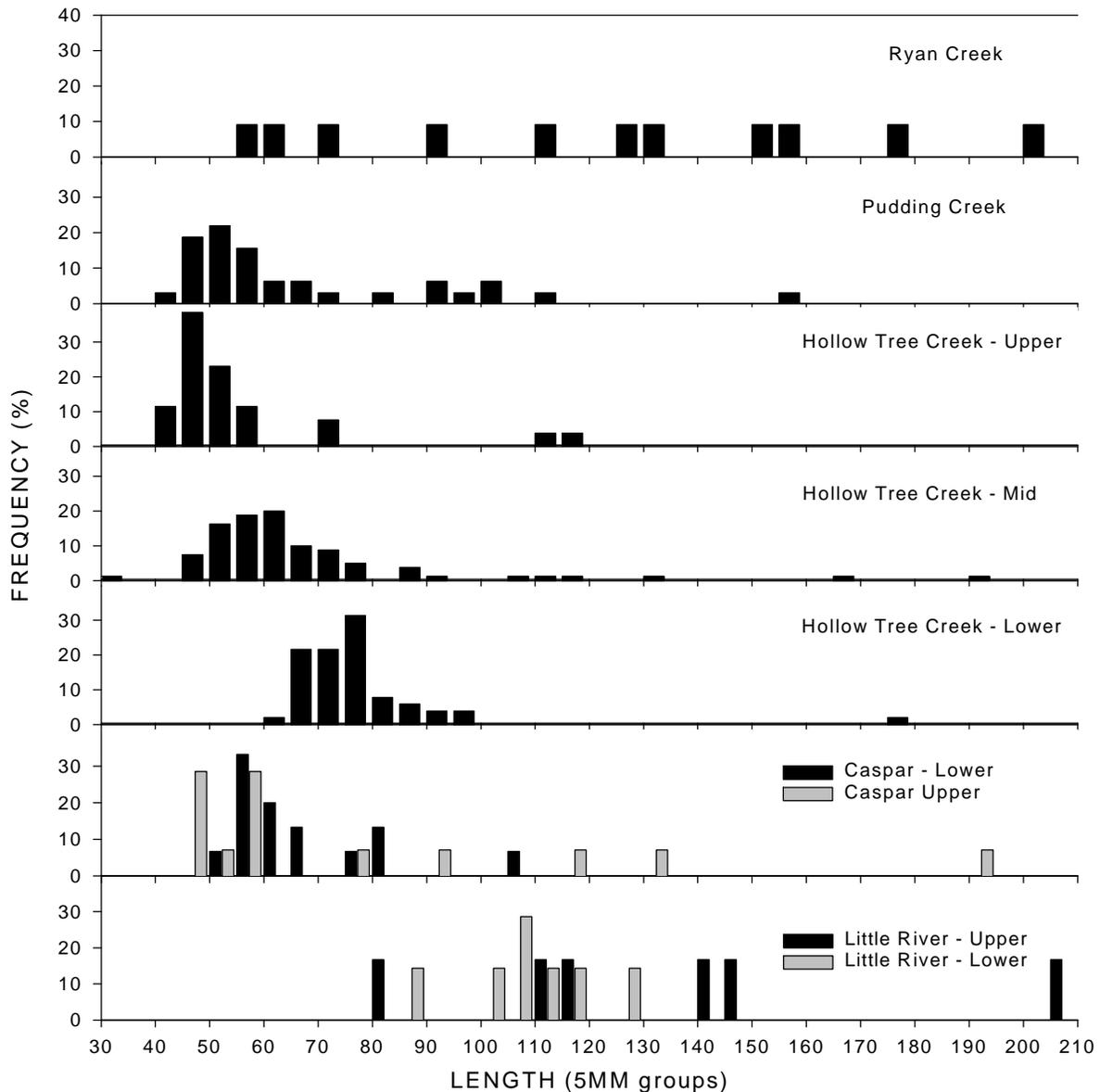


Figure 3. Juvenile steelhead length frequency, Mendocino County, 1999.

Recommendations: Electrofishing provides crucial information for estimating trends in standing crop of coho salmon and steelhead trout. Annual collection of this data illuminates trends which are essential in focusing management and restoration efforts. With the recent increase in restoration activities, it is very important to continue this monitoring as one tool to determine the effectiveness of our efforts.

These surveys were conducted on State Forest, State Park, corporate timber, and private land. All of these land owners must be made aware of the aforementioned trends and what further steps could be taken to restore these watersheds and that stewardship of the land they are responsible for is of the utmost importance.

VII. Estimated FY 99-00 Job Cost: \$34,287.00

VIII. Preparer: Scott Harris, _____, Associate Fishery Biologist