**FIELD NOTE**
**August 3, 2020**
**Adult Salmonid Sonar Monitoring Program**
**South Fork Eel River, Tributary to Eel River**

## EXECUTIVE SUMMARY

This season's Sonar deployment on the South Fork Eel River began 21 November 2019 and ended 30 May 2020. The preliminary estimate for Chinook Salmon was 2,093 adult spawners during the months of November and December. The preliminary estimate of 2,182 fish during the months of January and February represents a mixture of Coho Salmon and steelhead. The preliminary upstream estimate of 1,317 fish for the months of March and April represents steelhead, with an estimated 171 steelhead kelts returning to the ocean after spawning. The combined count of 5,538 fish for the 2019-20 season is well below the estimate of 9,194 for 2018-19. Funding for the 2020-21 season has not been secured, so the future of this monitoring effort is uncertain.

## INTRODUCTION

California Trout has been using a Sonar system to estimate abundance of spawning steelhead, Chinook Salmon, and Coho Salmon on the South Fork Eel River with support from the California Department of Fish and Wildlife (CDFW) Steelhead Report and Restoration Card Program. The Sonar system (DIDSON) located 10 miles above the South Fork Eel River confluence with the Eel River records video of fish as they migrate upstream to their spawning grounds. A second DIDSON Sonar station operated by CDFW, is located nearby on the mainstem Eel River above its confluence with the South Fork Eel River. With both stations in their second year of operation, salmonid escapement data is now available for a large portion of the Eel River.

This Field Note is our third and final in-season update for 2019-20 to our program partners and interested parties. The 2018-19 season of data collection is summarized in a Field Report, which includes extensive background information on the deployment site and methods. This document does not contain final data; thus, these preliminary estimates of fish passage in this document should *not* be cited. The CDFW has provided information for the 2018-19 and 2019-20 sonar operations on the mainstem Eel River station in separate reports.

## SONAR FIELD SET-UP AND SAMPLING EFFORT

The new deployment site for 2019-20 near Meyer's Flat now features on-site power, but loses coverage of the lower 10 miles of South Fork Eel River and the major tributaries Bull Creek and Canoe Creek. The Sonar equipment was first deployed November 21, 2019 before the Eel River's first significant flow increase for the rainy season. Video data has now been reviewed through 1 May 2020, with a few days pending completion.

As per established protocols, the first 10-20 minutes of each hour was reviewed to reduce review time and the 40cm minimum fish length was determined visually. Hourly expanded counts from 10-minute samples are calculated as the net movement (upstream movements – downstream movements) multiplied by an expansion factor. Simple adjustments to daily raw counts have been made for missing hours and days. More advanced interpolation methods will be applied for the final estimates.

To expedite species assignment of the Sonar images, the Chinook Salmon run was assumed to have ended by 31 December 2019, and that the fish detected in 2020 are either Coho Salmon and/or steelhead. This assumption is based on initial review of Pacific States Marine Fisheries Commission

(PSMFC) and CDFW 2019-20 spawner survey data. The same end-date for the Chinook Salmon migration period was used for 2018-19 analysis of both South Fork Eel River and mainstem Eel River Sonar data. Individual species estimates for steelhead and Coho salmon are not available at this time.

When not accounted for, steelhead migrating back downstream after completion of spawning (kelts) can mistakenly be subtracted from the steelhead spawning population estimate. January 1 was used to characterize the start of the downstream steelhead migration season; after this date, we assign all downstream movements as either unspawned milling fish, or as kelts. When downstream passage rates exceed 20% of all movements for a day, we characterize the day as having some steelhead migrating downstream after spawning. On these days identified as having post-spawn steelhead present, the net movement calculation is changed to:

$$net\ movement = upstream\ movements - (20\%\ baseline\ milling\ rate * upstream\ movements).$$

**PRELIMINARY FISH MIGRATION ESTIMATES**

In 2019, the onset of the rainy season for the Eel River was delayed until late November for the second in a row. Very few salmon were detected on the sonar prior to the first significant rain event on 27 November 2019. This rain brought a modest flow increase on the South Fork Eel River to ~200 cfs, which triggered an influx of Chinook salmon that presumably had been holding in the lower river (Figure 1).

The 2019-20 preliminary passage estimates for all species are significantly lower than in 2018-19. We estimated 2,093 Chinook Salmon passed the Sonar during November and December 2019 compared to 3,831 Chinook Salmon seen in November and December 2018. The first flow increase allowing for migration was accompanied by the highest observed passage rates (Figure 1). This large initial pulse of fish is consistent with observations from sonar operations on other coastal systems in the region (Redwood Creek, Mad River, mainstem Eel River).

The months of January, February and March had somewhat steady upstream passage rates around 30 fish/day; but upstream passage dropped to around 10 fish/day in April (Figure 2). At the same time, more images were assigned as steelhead kelts while movements transitioned to mostly downstream during April (Figure 2). The pattern of declining counts through April was also evident in 2018-19, but was more pronounced in 2019-20 (Figure 3).

The smaller abundance estimates for 2019-20 are due in part to placement of the sonar camera 10 miles upstream of the previous year. To facilitate comparison between years, rough estimates for Canoe Creek and Bull Creek could be produced from CDFW/PSMFC redd survey observations; and the basin-wide sonar estimate could then be adjusted to account for spawners in Bull Creek and Canoe Creek.

While we have some survey information to inform spawner estimates in these two tributaries, CDFW/PSMFC spawner surveys do not cover reaches of the lower mainstem South Fork Eel River. Furthermore, the South Fork Eel River Chinook salmon population includes any spawners below the South Fork Eel River confluence with the mainstem Eel River. These mainstem reaches are also not covered by CDFW/PSMFC spawner surveys and are more likely to be used for spawning during low-water years. Although there are anecdotal reports of spawning activity in these reaches during 2019-20, the general lack of information here makes assessing this portion of the spawning populations difficult. There are likely more fish spawning in these lower reaches during low water years, when tributary access is limited. The offspring of fish spawning near or below the South Fork Eel River confluence likely have lower adult return rates, as these juveniles are restricted to rearing in the short length of heavily degraded lower Eel River and estuary.

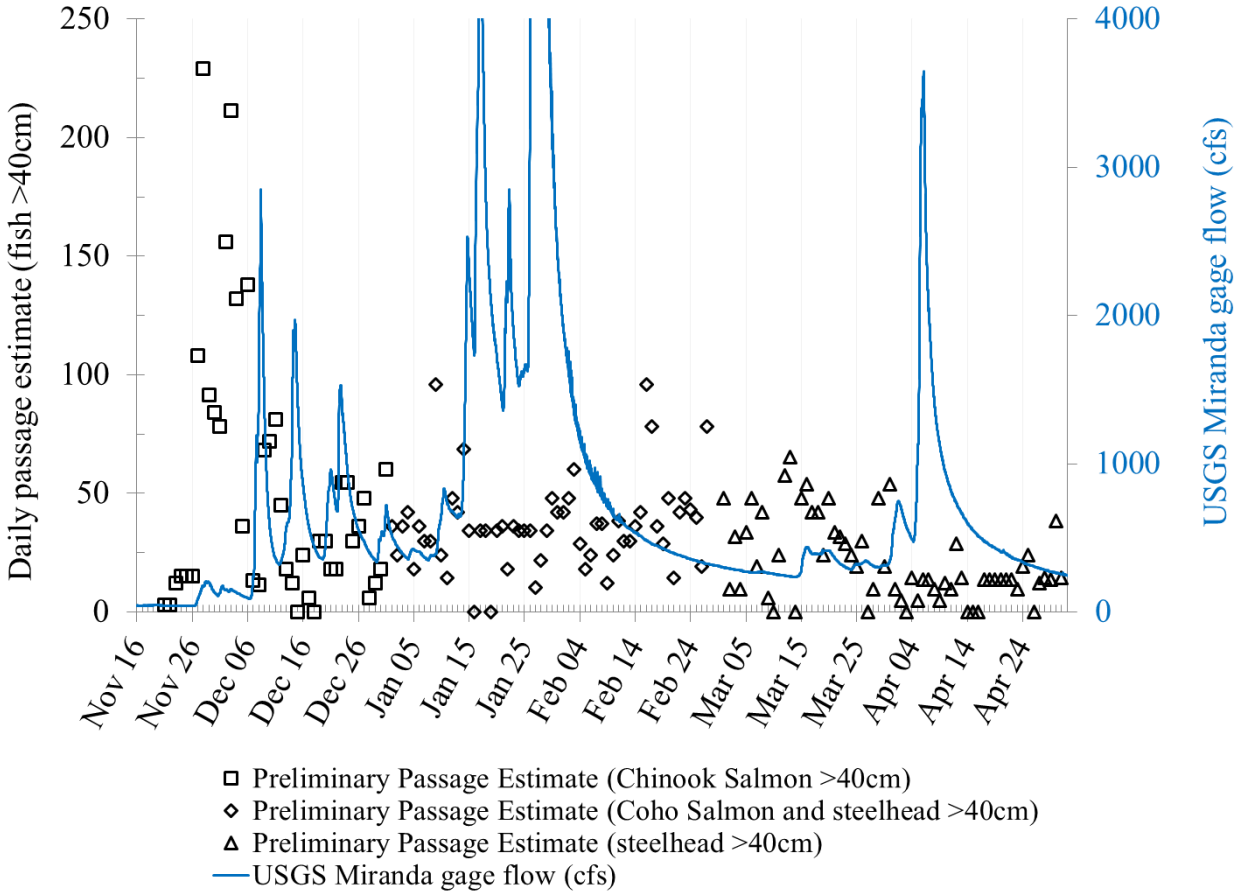


*Figure 1. Hydrograph of South Fork Eel River near Miranda (USGS gage #11476500) with preliminary passage estimates of fish over 40cm total length entering the South Fork Eel River in 2019-2020. During November-December 2019, an estimated 2,093 Chinook Salmon migrated upstream past the camera. The upstream estimate of 2,182 fish during the months of January and February 2020 represents a mixture of Coho Salmon and steelhead. The upstream estimate of 1,317 fish for the months of March and April represents steelhead.*

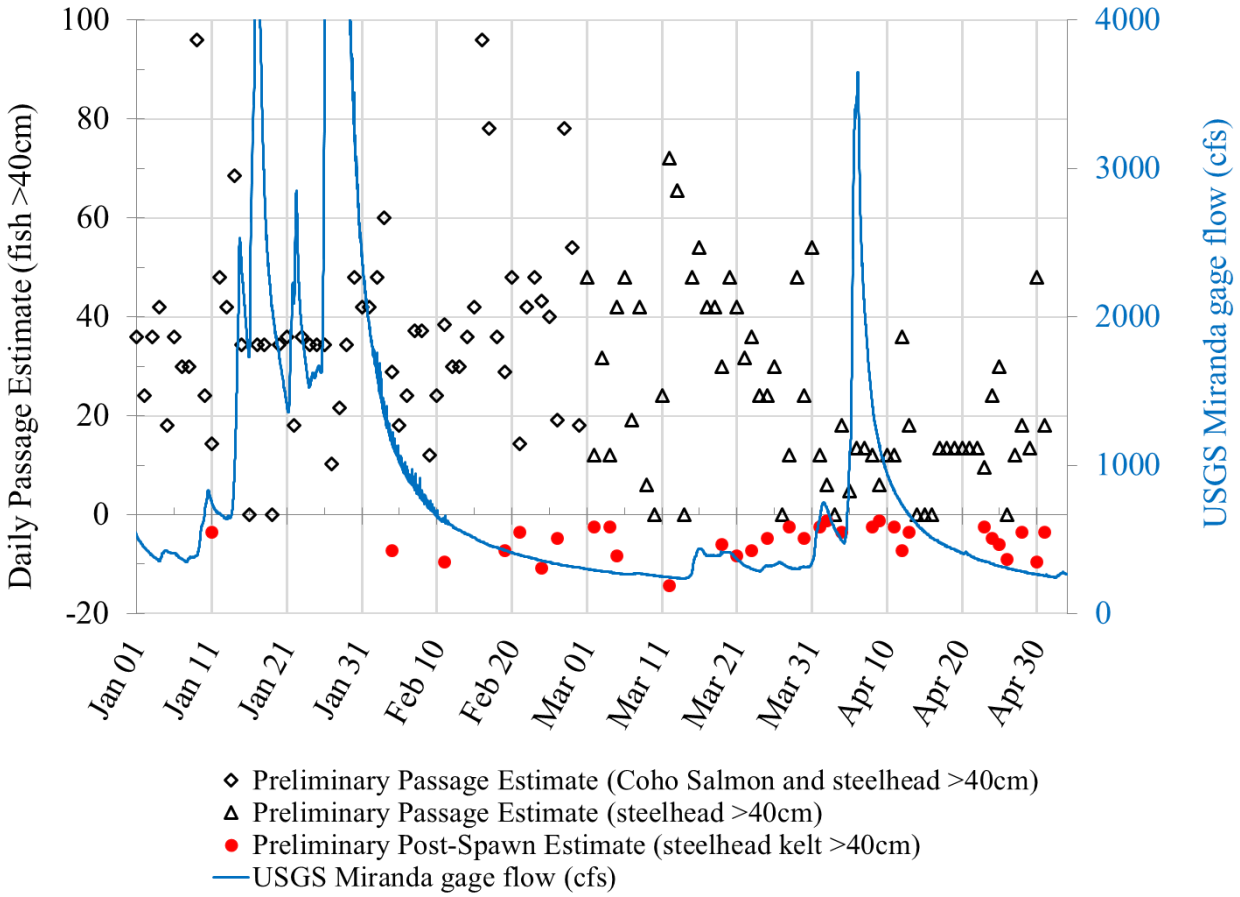


*Figure 2. Hydrograph of South Fork Eel River near Miranda (USGS gage #11476500) with preliminary passage estimates of fish over 40cm total length entering the South Fork Eel River to spawn in 2020, as well as preliminary estimates of post-spawn steelhead (kelts) migrating back downstream to the ocean. The preliminary estimate of 171 steelhead kelts assumes a milling rate of 20% at the deployment site.*

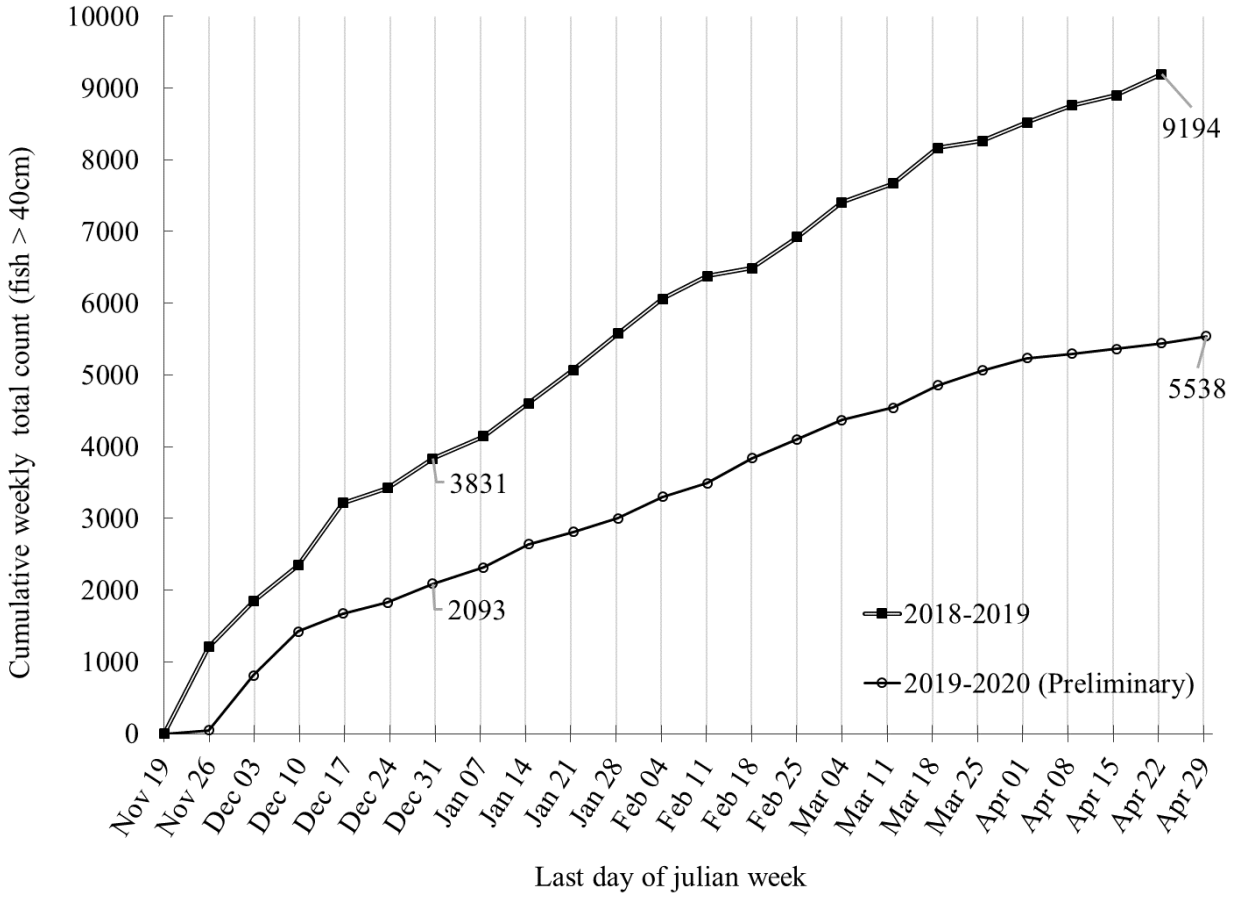


*Figure 3. Weekly comparison of South Fork Eel River sonar cumulative total counts of fish >40cm length for the 2018-19 and 2019-20 migration seasons. Counts shown on the last day of each Julian week represent net passage of all fish up to that date. The year-end totals represent estimated Chinook Salmon run sizes; and the season-end totals represent a mixture of Chinook Salmon, Coho Salmon, and steelhead.*

**Report Prepared by:**

Matthew Metheny, California Trout
August 3, 2020

**Field Crew**
Matthew Metheny, California Trout
Kori Roberts, California Trout