

Suscol Report 2020

Summary

This is ICARE's seventeenth year of working on Suscol Creek.

The precipitation for the water year was 11.09 inches was well below average, while the long-term average annual precipitation at the Napa State Hospital is approximately 24.6 inches. The observed precipitation is from the rain gauge operated by the partners at Suscol Creek, which is located a few miles from the Napa State Hospital. Only two months during the water year had greater than average rainfall. December had 120% of normal and May had 222% of normal. All other months had below average precipitation and the annual average was only 45% of normal (11.09 inches). This suggests it was not a good year for steelhead. January through March is when steelhead spawn. They normally head upstream during storms. With no large storms during their normal spawning times, they cannot run to the headwaters to spawn. As a result, they spawn in less desirable spots downstream. On the plus side, there were no large storms to scour out those eggs. Also, the above average May rains might have kept the summer low-flow from being even lower.

We conducted our usual June survey of the Suscol Creek watershed.

Chris and Josh Malan were assisted in completing the snorkel count by An-

drew Dewberry, who has five years of experience conducting snorkel surveys. Charley Dewberry was unavailable because of a knee surgery. In our long-term study reach, we observed: 52 age-0 steelhead, 17 age-1+ steelhead, and 9 age-2+ steelhead age. The numbers of all age classes of steelhead were well below average in this reach.

This is also the thirteenth year that we completed a survey of upper Suscol, including the 2 forks. We observed: 425 age-0 (YOY) steelhead, 16 age-1 steelhead, and 0 age-2+ steelhead. The number of age-0 steelhead was above the long-term average, while the age-1 and age-2 steelhead were below average.

The total number of age-0 steelhead in Suscol Creek as a whole was slightly above the seventeen year average. The number of age-1 and age-2 fish were significantly below average.

A life-history analysis follows the year class of fish through their life cycle. For this analysis we use the combined totals of all the observed steelhead in Suscol Creek. For instance, we start with the YOY steelhead in 2008. In 2009, these fish are 1 year old. In 2010, these fish are two years old. We are directly calculating their survival with each successive year. The average number of YOY steelhead observed during the eight years was about 450 fish. The survival of steelhead from YOY to age-1 was be-

tween 45-55 percent in good years. During the current year, survival from YOY to age-1 was 71 percent, which is the highest reported. The number of age-0 steelhead observed last year was the lowest observed during the entire period of working on Suscol Creek. The survival from age-1 to age 2 has averaged about 40 percent and this year's average was below average at 22 percent.

During the snorkel survey, no centrarchids were observed below the pond. The wire mesh cage that was constructed over the opening in the outflow of the pond had successfully eliminated out-migration of centrarchids from the pond during the winter storms.

During the survey we observed that the Himalayan blackberry at restoration site #2 have expanded and should receive attention. They have also expanded in the lowest reach near the bridge.

Introduction

The Suscol Project began in 1999 as a partnership between ICARE and partners within the Suscol Creek basin. The goals were:

- 1) Provide baseline and trend information of the aquatic resources (fish and macro-invertebrates) within the property.

- 2) Document the effects of land management on the aquatic resources on the property.
- 3) Use the biological information to develop the restoration opportunities within the property.

In 2008, with the purchase of the rest of the watershed by the partnership, the three goals were expanded to the whole watershed. In addition, we developed an economically effective monitoring plan to not only trace the watershed trends but to identify key reaches that are improving or degrading within the watershed. This information is used to design the future restoration efforts.

Precipitation

During the current water year, we used the observed precipitation at the partner's gauge in Suscol Creek. (See Table 1; Figure 1). The average annual precipitation for this water year was 11.09", which is significantly less than the long-term average at the Napa State Hospital of about 22.4 inches located a few miles away. The observed precipitation is from the rain

gauge operated by the partners at Suscol Creek, which is located a few miles from the Napa State Hospital.

Only two months during the water year had greater than average rainfall. December had 120% of normal and May had 222% of normal. All other months had below average precipitation and the annual average was only 45% of normal (11.09 inches). This suggests it was not a good year for steelhead. Steelhead normally move to the headwaters during winter storms and spawn in upper Suscol and the forks. There were no major winter storms from January through April. As a result, most steelhead spawned in less desirable spots downstream. On the plus side, there were no large storms to scour out those eggs. Also, the above average May rains might have kept the summer low-flow from being even lower.

Steelhead Population

Long-term Study Reach (Map 1)

We conducted our annual June survey beginning above the state highway. In our normal study reach, we observed: 52 age-0 steelhead, 17 age-1+ steelhead, and 9 age-2+ steelhead age (Table 2). The number of all ages of steelhead was significantly less than the average observed over the

last seventeen years. The number of all ages of steelhead was about one-half of the average we have observed during the seventeen years of survey (see Table 2).

No centrarchids were observed in several pools below the pond overflow pipe. The mesh placed over the outlet pipes to the ponds worked as designed and implemented.

Upper Suscol (Map 1)

This was the thirteenth year that we surveyed upper Suscol Creek (above the boundary fence). There were steelhead all the way to the forks and up the right fork. In upper Suscol Creek, there were 319 age 0 steelhead, 16- age 1, and 0-age 2 steelhead (Table 2). The number of age-0 steelhead was above average, while the number of age-1 steelhead was significantly below average (Table 2). There were no age-2 steelhead observed in upper Suscol Creek. This was only the second survey where no age-2 steelhead were observed in upper Suscol Creek. The left fork was not surveyed as a skunk loitered at the lower end of the fork. In the right fork only age-0 steelhead were observed and they were above the long-term average.

Life-history Analysis

Life-history analysis provides a powerful tool for evaluating the annual populations of steelhead in Suscol Creek. A key part of the analysis is determining the survival of each year class from one year to the next. The population of age-0 steelhead observed in all of Suscol Creek has varied between 165 and 1,303 fish with an average of 455 fish (Table 3, Figure 2). The population estimate of age-0 (YOY) steelhead in Suscol Creek during 2020 was 477 fish. This is above average. There are many factors that affect how many young of the year survive until their first summer. Some of these factors include the number of spawning fish, the number of eggs laid, and the survival of the eggs to hatching. The timing of storms is important because steelhead spawn at the end of major high flows. Floods play a major role in scouring out the eggs buried in the gravel.

The current water year (2019-2020) was not conducive to successful steelhead spawning. The January through April precipitation was below average, restricting adult steelhead coming into and spawning in the headwaters.

Survival of the age-0 to age-1 steelhead averages between 45-55 percent in good years and as low as 10 percent in poor years. The survival rate for age-0 to age-1 steelhead during the current year was 7 percent, which is very low, but not surprising in such a low water year.

Survival of age 1 steelhead to age 2+ steelhead was approximately 60 percent in good years for these large fish, while it was as low as 17 percent in poor years. During the current year, the survival rate of age-1 to age-2 fish was 10 percent, which is also very low, but again not surprising in such a low water year.

The surveys of steelhead trout on Suscol Creek indicate that the population is currently sustainable in all years except for those with severe drought. The distribution and life-history analysis suggests that the reach from just below the middle bridge to above the pond is sustaining fewer than expected fish. During low-flow years, we assumed the decline in fish was due to reduced groundwater inputs and ground-water pumping adjacent to the pond. It is likely that groundwater pumping to fill the pond is at least contributing to the lower than expected stream flows in that reach.

The survey and analysis suggests that the removal of the cattle from upper Suscol Creek has benefited the stream within the basin. Much less fine sediment was observed in the stream channel. There was additional fine sediment observed in upper Suscol due to feral pig activity.

Survival and Precipitation Analysis

Table 4 is a table and graph of the annual precipitation during the water year vs. the number of age-0 steelhead that we observe during the June count. As is evident from the graph, the total amount of precipitation during the year does not greatly affect the number of age-0 fish in the creek the following summer. This was the expected result as the timing of storms is an important factor affecting the survival of steelhead eggs and age-0 fish. The storms in January clean the gravel and make it easy for the female to deposit her eggs in freshly prepared gravel. If no large storms follow after spawning, the survival of the eggs to age-0 will be very good. That was the case in 2008, when more than double the next most abundant year was observed. It is more typical for storms nearly as large or larger to occur after the steelhead have spawned. In these years the number of eggs that survive to age-0 fish is less.

Table 5 presents the annual precipitation vs. the survival of the steelhead in Suscol Creek from age-0 to age-1. Again, the annual precipitation itself is not a good predictor of the survival of the steelhead through this life-stage. We know less about what factor is affecting the survival of these fish. With more years of survey it will be easier to identify the factor or factors causing the pattern. It is interesting that the greatest survival rate occurred in

the year with the greatest precipitation. But no clear pattern has emerged from the rest of the years.

Table 6 presents the annual precipitation vs. the survival of the steelhead in Suscol Creek from age 1 to age 2. In many ways this is the reverse of the previous table. The year with the greatest precipitation had the lowest survival rate. This is curious as these are the largest steelhead in the creek. You would think that they would be better able to cope with high water than age 1 fish, but it appears that it is not the case. For the rest of the years, it appears that annual precipitation is a good predictor of the survival of these age-2 steelhead; the greater the precipitation, the greater the survival.

Restoration Opportunity

We recommend that the cattle continue to be fenced out of the riparian zones and steep slopes in the upper basin, especially the left fork. This would allow cattle grazing in other areas to reduce the fire risk, while protecting the upper basin from excessive soil erosion. Much of the riparian zone and steep slopes on the left fork have minimal understory vegetation as the tree canopy is largely closed by mature trees.

Continue the Himalayan Black Berry (HBB) removal. There are several concentrations of them near the stream crossing in the middle of the basin. Also, the restoration site (#2) where we previously removed HBB and planted willows is in need of maintenance. The HBB is returning in significant abundance.

We also should continue planting willow. In riparian areas where the cattle have been removed, the riparian vegetation is rebounding.

Summary

This year, 2020, was the seventeenth year we have conducted a two-day snorkel survey in Suscol Creek. We have an exceptional set of baseline information for the basin and the life-history analysis is providing a powerful tool for identifying restoration opportunities within the basin.

Precipitation

The 2019-2020 water-year was significantly below average. In an average year about 24 inches of precipitation falls in the basin. During the current water year, only 11.09 inches were recorded.

Snorkel Count

The 2020 annual snorkel count was completed in June. The total number of age-0 steelhead in Suscol Creek was above the long-term average

for the basin, while the number of age-1 and age-2 steelhead were significantly below average.

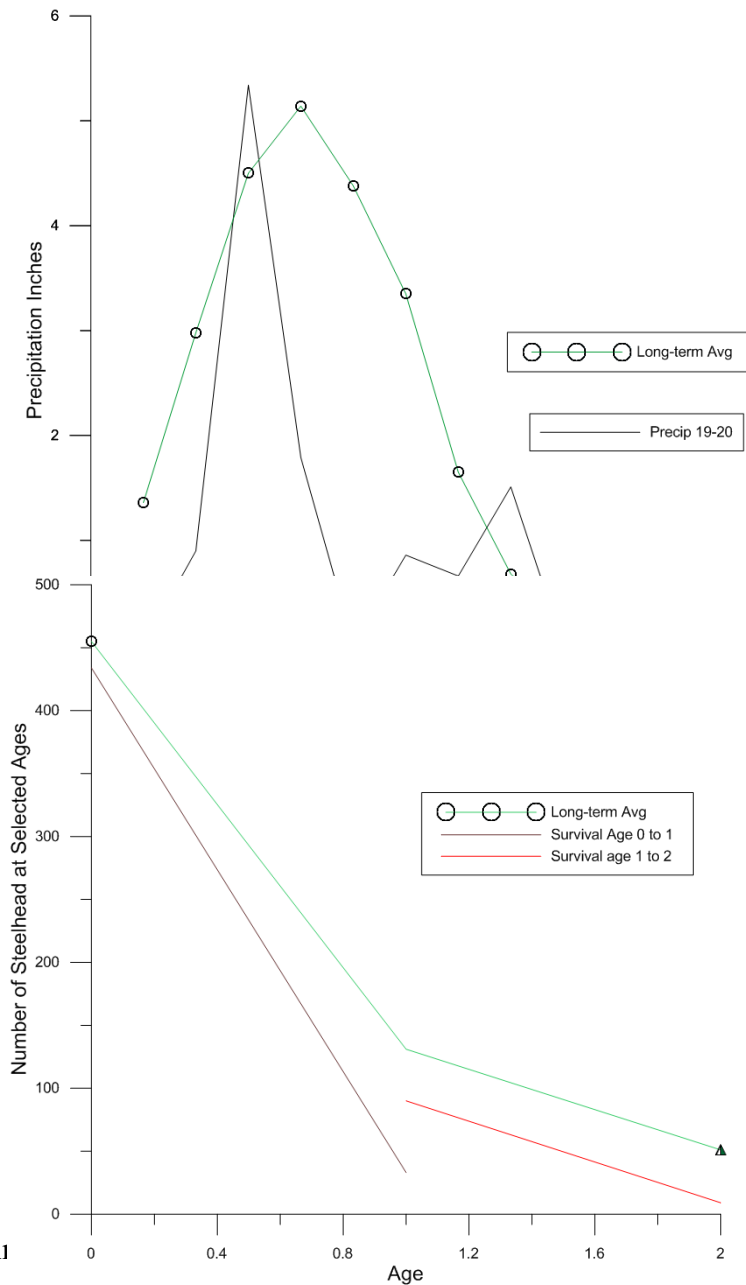


Figure 2. Life-history Analysis (2020)

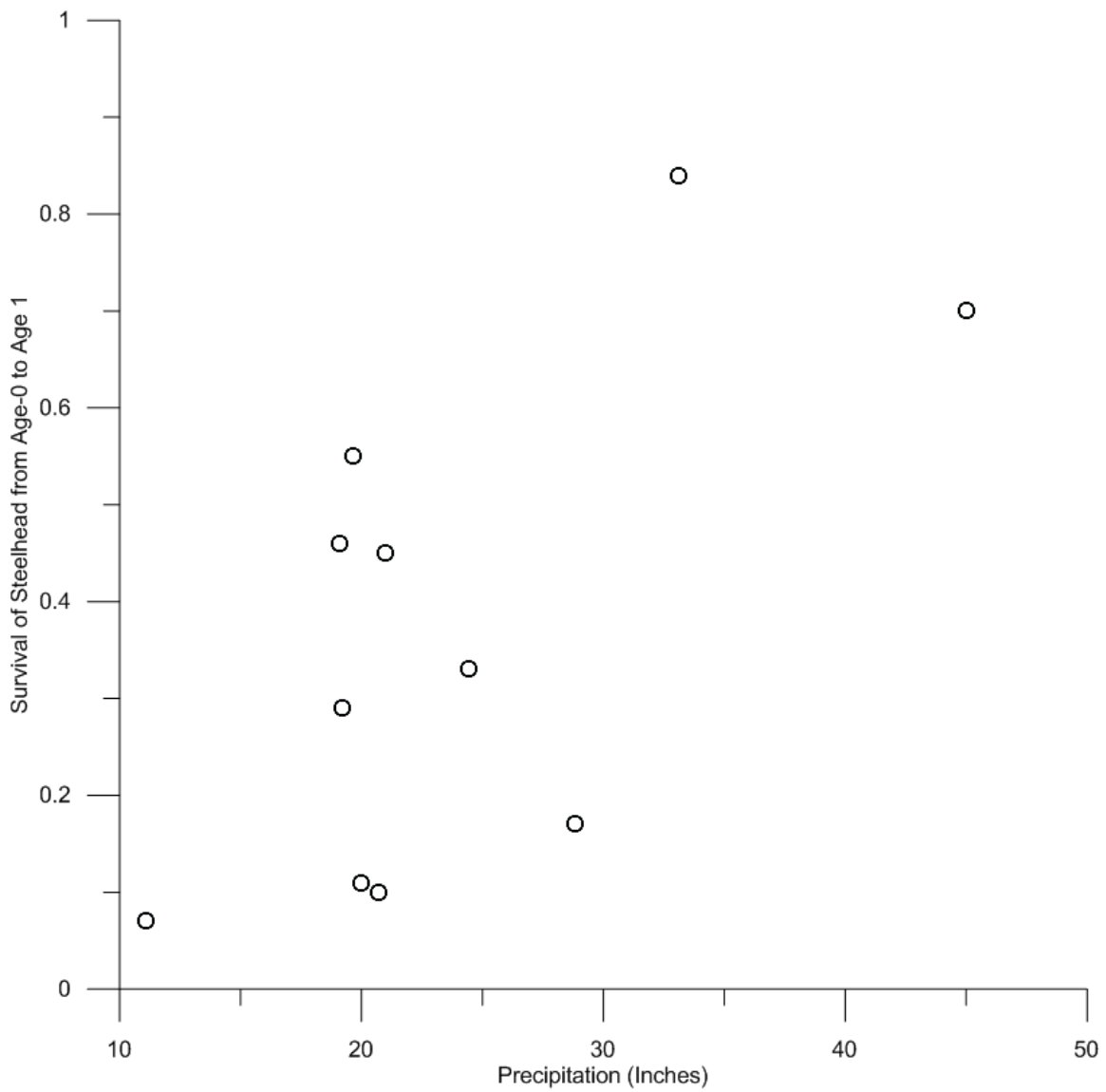


Figure 4. Precipitation vs Survival of Age-0 to Age-1 Steelhead

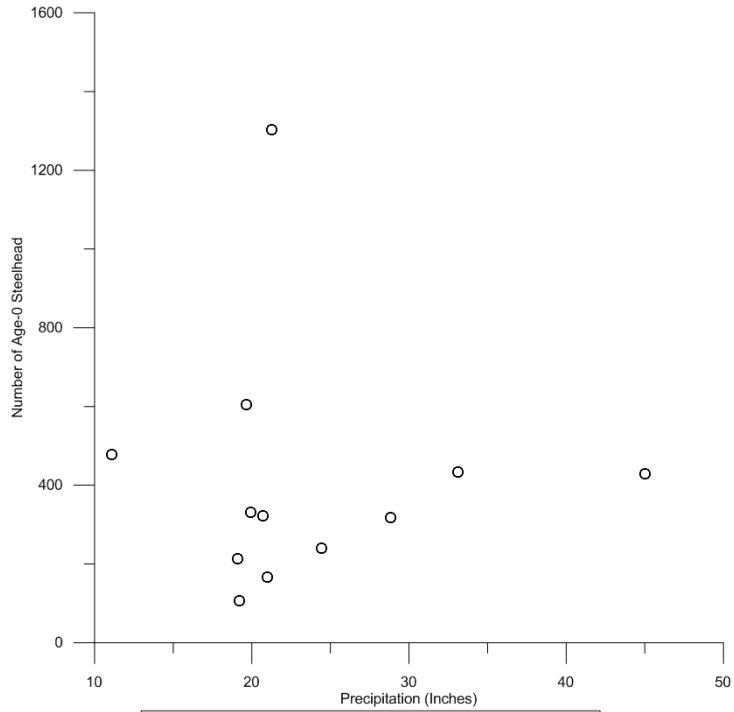


Figure 3. Precipitation vs Number of Age-0 Steelhead in Suscol Creek

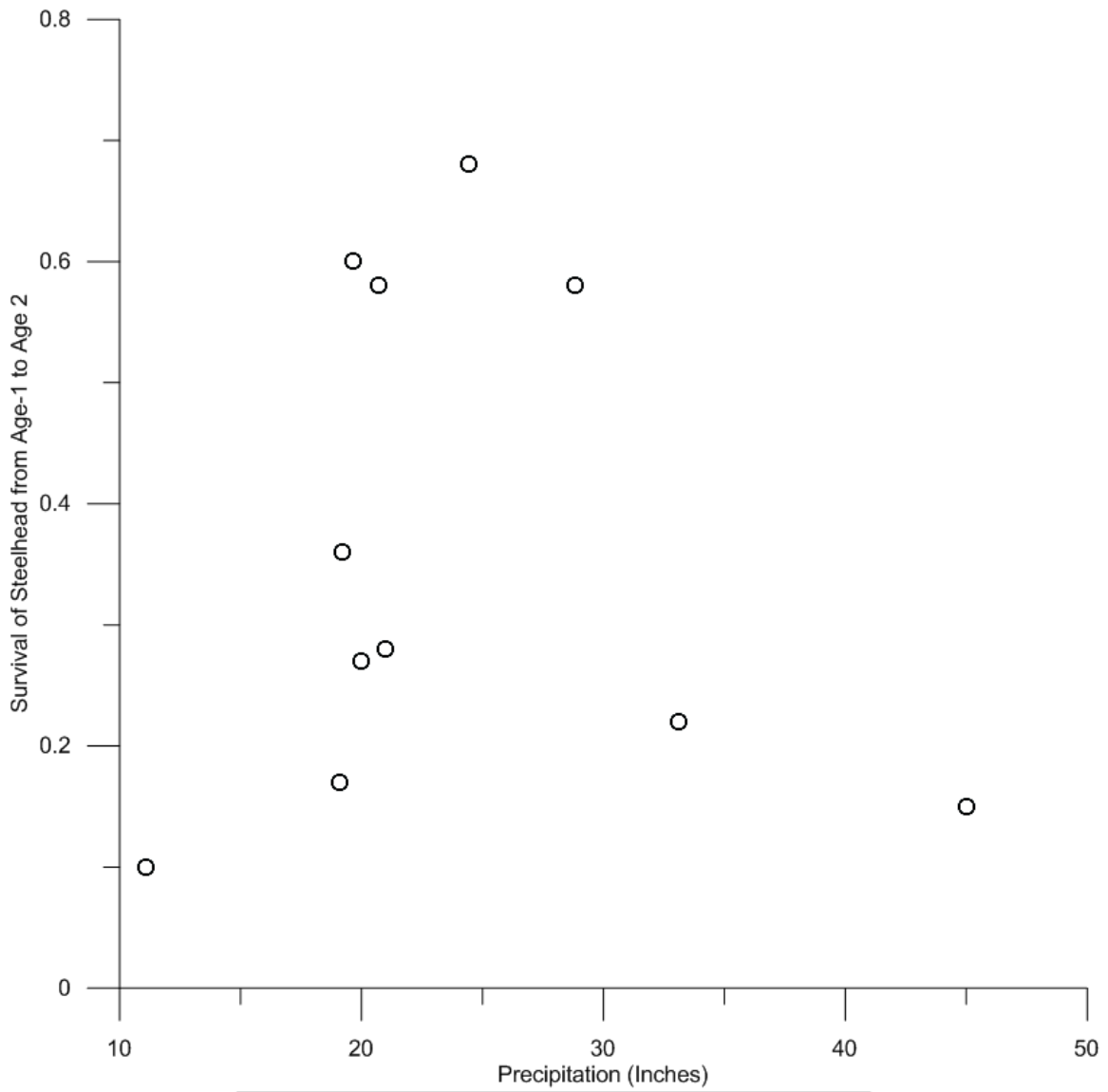


Figure 5. Precipitation vs Survival of Age-1 to Age-2 Steelhead

Month	precipitation	long-term		
O	0	1.36		
N	0.9	2.98		
D	5.34	4.5		
J	1.79	5.14		
F	0.01	4.38		
May	0.86	3.35		
A	0.66	1.65		
May	1.51	0.68		
J	0	0.21		
J	0	0.02		
A	0.01	0.06		
S	0.01	0.31		