Suscol Creek Collaborative Partnership and Restoration Project: 2016 Site 1 lower Suscol Creek where cattle crossing causes loss of vegetation and sediment impairment

Restoration Site 1: Cattle removed; sediment control devices working to improve steelhead habitat

Suscol Report 2023

Summary

The Institute of Conservation, Advocacy, Research, and Education, ICARE, completed our annual snorkel survey on Suscol Creek during June 3-4, 2023. This year turned out to be unusual in that most of the population of steelhead were found in one pool. This pool was located at restoration site 2 where Himalayan blackberry/HBB had been extensively removed in 2013 and 200 native willows were planted. (See Map 1 enclosed herein)

The precipitation for the water year 2023 was 30.64 inches, which is about 25% above the long-term average. This is significantly more water than what has been observed during the previous couple of water years. 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. The months of December, January, March and May recorded higher than average monthly precipitation, while all the rest of the months recorded less than average precipitation. In particular, the more than double rainfall recorded during January and March set the stage for steelhead during the year. On one hand, higher than average rainfall in January is generally

favorable for steelhead as they can move high into the headwaters to spawn on freshly cleaned gravel; on the other hand, large storms in March destroy the steelhead redds and young-of-the-year that have just hatched. This suggests it was not a good year for steelhead young-of-the-year. January and February is when steelhead spawn in Suscol Creek. They normally head upstream during storms. They can only run to the headwaters to spawn during large storms. The large storms in January allowed them to run into both forks to spawn.

This water year was higher than normal after three years of less than average precipitation. With the higher rainfall, it might have been expected that the lower section of Suscol Creek would provide habitat for steelhead as it has in the past. This was not the case. The result was many areas of lower Suscol Creek (see Map 1) were dry or were isolated pools with little or no stream flow passing through them. They are not suitable steelhead habitat and the visibility in these isolated pools is less than 6 inches, making them impossible to observe steelhead if any were there. There was no significant water in the stream until even with the upper end of the reservoir (a detention from groundwater pumping) located in lower Suscol Creek near the green bridge. (map 1)

Andrew Dewberry and Bethany Dewberry conducted the survey with the help of Chris Malan (ICARE Executive Director) and Alyx Howell, (ICARE Board Members). Andrew has been conducting snorkel surveys for the last five years in Oregon. In addition, he helped with the survey on Suscol Creek last year. In our long-term study reach/aka lower Suscol Creek, we observed: no age-0 steelhead, no age-1+ steelhead, and no age-2+ steelhead age. This is the second year that we have not observed any steelhead in the lower Suscol Creek.

We completed a survey of upper Suscol, (map 1) including the 2 forks. We observed: 226 age-0 (YOY) steelhead, 27 age-1 steelhead, and 86 age-2+ steelhead. The number of age-0 steelhead were significantly below the long-term average of about 400 fish, while the number of age-1 was about one-quarter of the long-term average of 122 fish. During the survey this year, 86 age-2 steelhead were observed, while the long-term average number of Age-2 steelhead is 56.

We were unable to fully complete the life history analysis because we were unable to snorkel the beaver pond during the 2022 survey. Visibility was too poor do to recent beaver activity (map 1). The preferred habitat of age-1 and age-2 steelhead in a small stream such as Suscol Creek is beaver ponds. It is quite likely that the majority of age-1 and age-2 steelhead were

in the pond last year. The pond blew out during the winter storms. The cohort of steelhead that were age-2+ in Suscol Creek this year, started out in 2021 with 170 age-0 fish, which is less than 50% of the average long-term population. We do not know how many age-1 fish there were last year as we could not count them in the beaver pond. There were 86 age-2 fish this year, which is three times higher than the long-term average for age-2 steelhead. This suggests that the survival rates of these fish in the beaver pond were high, which is what we would expect.

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

Introduction

The Suscol Project began in 1999 as a partnership between ICARE and collaborative 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 and use adaptive management actions and tools to benefit aquatic eco-system.
3) Use the biological information to develop the restoration opportunities within the property.

In 2008, with the purchase of the upper Suscol watershed (map 1) by the partnership, the three goals were expanded to the entire Suscol Creek 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 herein) The average annual precipitation for this water year was 30.64", which is about 25% greater 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 on Suscol Creek. This water year follows three that were below average.

Monthly precipitation totals during the water year were significantly higher in the months of December, January, March, and May, while all the other months were less than average. In particular, the more than double rainfall recorded during January and March set the stage for age-0 steelhead during the year. On the one hand, higher than average rainfall in January is generally favorable for steelhead spawning, as the adults can move high into the forks in the headwaters to spawn on freshly cleaned gravel; on the other hand, large storms in March destroyed the steelhead redds (nests) and the young-of-the-year that had recently hatched. The context of the water year suggests that it was a mixed year for the young-of-the-year steelhead.

This higher than normal water year after three years of below average water years did not restore permanent stream flow in lower Suscol Creek. The majority of the stream below the middle bridge was dry or had isolated stagnant pools. These pools were not suitable habitat for steelhead. Also, visibility in these pools is less than a foot, making accurate snorkel counts impossible. Prior to 2021, a number of steelhead of all ages were found in the lower section of Suscol Creek. In the last two years, no steelhead have been found lower Suscol Creek.

Steelhead Population

Long-term Study Reach (map 1)

We conducted our annual June survey (June 3-4) beginning above the highway 29. In our lower study reach, we observed no steelhead (Table 2 snorkel survey results data attached herein this email). This was the second year no salmonids were observed in the lower section of the stream. The range of age-0 estimated each year in the lower reach has been between 0 and 577 fish with a long-term average of 126 fish. Also, no age-1 or age-2 steelhead were observed in lower Suscol Creek.

The lower reaches of Suscol Creek were mostly dry or stagnant isolated pools. No suitable habitat for steelhead was observed below the reservoir detention. Only at the top of the reservoir did the divers encounter flowing water.

No centrarchids were observed in several pools below the reservoir over-flow pipe. The mesh placed over the outlet pipes to the reservoir worked as designed and implemented.

In upper Suscol Creek, there were 221 age-0 steelhead, 27 age-1 steelhead, and 86 age-2 steelhead (Table 2). The number of age-0 steelhead has ranged between 74 and 910 fish with an average of approximately 400 fish. The number of age-0 steelhead in the upper reach of Suscol Creek was about 50% of the long-term average in 2023. The number of age-1 steelhead has ranged from 13 to 265 fish with an average of about 74 fish. During

2023, there were 57 age-1 steelhead estimated in the upper reaches of Suscol Creek. This is about one-half of the average. The number of age-2 steelhead in the upper reach has ranged from 0 to 101 fish with an average of 27 fish. Eighty-six age-2 steelhead were found during the 2023 survey.

The number of young-of-the-year steelhead was about 50% of the long-term average. The adult steelhead were able to migrate into the forks in the headwaters during the January storms. However, no age-0 steelhead were found in the right fork and the population estimate in the left fork was 5 fish. This suggests that the March storm destroyed the steelhead redds and the young-of-the-year fish in the forks. The majority of the age-0 fish were found in one pool. Again this suggests that survival was very low.

The number of age-1 steelhead was also about 75% of normal. This will be discussed in greater detail in the following section.

The number of age-2 fish estimated in Suscol Creek was 86. All fish were observed the upper Suscol Creek.

Life-history Analysis (Table 3 lha data 2008-2020 attached separately in this email)

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 106 and 1,303 fish with an average of 394 fish (Table 3). The population estimate of age-0 (YOY) steelhead in Suscol Creek during 2023 was 226 fish. This is about 60% of the long-term 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 (2022-2023) was not conducive to successful steelhead spawning. The January and March rainfall was above average. This meant that adult steelhead were able to migrate to the forks in the headwaters to spawn in January. However, the high flows in March destroyed the redds or young-of-the-year. The fact that no age-0 steelhead were observed in the right fork and an estimate of 5 were estimated in the left fork illustrates that the spawning was not successful, probably because of the March storms.

Survival of the age-0 to age-1steelhead 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 5 percent, which is significantly below average (Table 2 snorkel survey results 2004-2023 data attached in this email). The major storms in January and March probably account for most mortality during the 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 could not be determined because we could not count the number of age-1 steelhead in the beaver pond, because of low visibility in the pond due to beaver activity. It was expected that a significant number of them were in the pond. However, there were 86 age-2+ steelhead estimated in Suscol creek in 2023. This is three times the long-term average. These fish started out in 2021 as age-0 fish. Their estimated population in 2021was 170 fish which is less than 50% of the long-term average number of age-0 fish. So, the survival rates of these fish were high during their life-time, since as age-2 fish there are three times the long-term average this year.

The surveys of steelhead trout on Suscol Creek indicate that the population is currently sustainable. However, the distribution and life-history analysis suggests that the reach at and below the detention reservoir no longer sustains steelhead of any age. In dry years, this stream reach consists

of dry stretches with intermittent stagnant pools. During this wetter year, it looked basically the same.

Restoration Efforts

The long-term efforts to remove Himalayan Black Berry (HBB) have led to significant benefits improving the health of the riparian zone and the stream channel. The primarily restoration site was the recent site of the beaver activity. The beavers took advantage of the restored willow plantings for food and the construction of it's dam. The beavers' use of willow greatly increased the growth of the willow.

We should continue the efforts at controlling the HBB. Much progress has been made but new areas of HBB were observed during the snorkel survey.

Summary

Precipitation

This water year (2022-2023) had higher than average rainfall for the first time in three years. There were two significant periods of storms during the year January and March. The January storms were beneficial, allowing

the steelhead to migrate into the forks in the headwaters to spawn. The March storms destroyed redds and young-of-the-year steelhead.

Snorkel Count

The 2023 annual snorkel count was completed in June. The total number of age-0 steelhead in Suscol Creek was 50% below the long-term average for the basin, while the number of age-1 was about a quarter of the long-term average. The age-2 steelhead population was estimated to be three times the long-term average. The higher survival rates of age-1 and age—2 steelhead in the beaver pond probably account for the high number of age-2 fish.

Restoration Efforts

The riparian vegetation growth is responding nicely to having the cattle removed from the entire stream corridor. At restoration site 2 (map 1), the HBB had been removed twice and willow planted, was the site where the beaver constructed the dam. The beaver greatly speeded the recovery of the riparian area and the stream channel. Hopefully, a beaver return to Suscol Creek soon.

The long-term efforts to remove HBB have improved the riparian and stream habitat along Suscol Creek. These efforts should be continued.

Note: Precipitation data herein; Tables 2 & 3 data included as attachments 2 and 3 per email

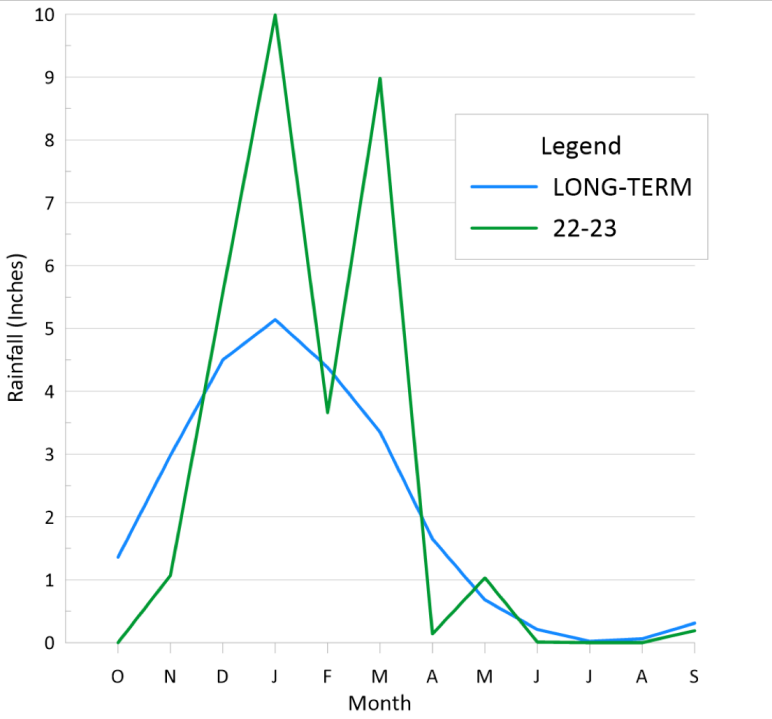

Fig 1. Rainfall current water year and long-term average for Suscol Creek

Table 1. Rainfall in the Suscol Creek Basin water year 2022-23.				
Month	precipitation	long-term		
O	0	1.36		
N	1.07	2.98		
D	5.57	4.5		
J	9.99	5.14		
F	3.66	4.38		
March	8.98	3.35		
A	0.14	1.65		
May	1.03	0.68		
J	0.01	0.21		
J	0	0.02		
A	0	0.06		
S	0.19	0.31		