# Suscol Report 2016

# Summary

 This is ICARE's thirteenth year of working on Suscol Creek. The population dynamics of steelhead in Suscol Creek reflected an average annual flow, however the high flow events were not conducive for highly successful steelhead spawning. There was below average precipitation in February which limited spawning access to the upper portion of the basin, and there was above average precipitation in March which scoured out many of the redds.

 Until 2013 we used the long-term precipitation station at the Napa State Hospital for our precipitation analysis. The records began in 1893. Unfortunately, the recording station has become intermittent during the last few years. We are now using the data from the partner’s precipitation gage within the Suscol Creek Watershed. The precipitation for the water year was 22.6 inches, while the long-term average at the state hospital is approximately 25 inches. Two months had higher than average precipitation (January and March). January had 6.5 inches of precipitation (average is 5.0 inches) and March had 7.5 inches (average is 3.5 inches). Only one month had significantly less precipitation than the long-term average, which was February which had 1.0 inch (average is 4.5 inches).

 We conducted our usual June survey of the Suscol Creek watershed. In our long-term study reach, we observed: 53 age-0 steelhead, 42 age-1+ steelhead, and 2 age-2+ steelhead age.

 This is also the ninth year that we completed a survey of upper Suscol including the 2 forks. We observed: 187 age-0 (YOY) steelhead, 65 age-1 steelhead, and 40 age-2+ steelhead. The number of age-0 steelhead was among the lowest we have counted. Many steelhead spawned in January but the eggs were destroyed by a late high-flow event in March. Probably the majority of the successful spawning occurred after the March storm. The number of age 1 steelhead was about the long-term average. The number of age-2 steelhead was significantly below the long-term average that we have observed in the upper reach.

 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 between 45-55% in good years. During the current year, survival from YOY to age-1 was 33%. This is about average for the eight years of survey.

During the snorkel survey, no centrachrids 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 centrachids from the pond during the winter storms.

 During the survey we observed that the cattle were allowed in the riparian zone and stream channel during the year in the upper portion of the basin. This resulted in considerable stream damage and increased fine sediment in the stream channel. In the left fork of Suscol Creek, excessive fine sediment was observed and no salmonids were observed in the reach for the second year in a row.

**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 first few years of the project we used the long-term precipitation station at the Napa State Hospital for our precipitation analysis. The records began in 1893. This site is about 5 miles north of the Suscol Creek Watershed. Unfortunately, the recording station has become intermittent during the last few years. The last three years, we have used the precipitation data collected by the Suscol Creek partners (See Table 1). We did continue to use the Napa State Hospital long-term averages for comparison. The average annual precipitation for this water year was 22.6 inches, just under the long-term average at the Napa State Hospital of about 25 inches.

 Monthly precipitation was below average for October through December. January precipitation was 6.47 inches (or 126% of normal). February precipitation was .98 inches (or 22% of normal). March precipitation was 7.7 inches (or 230% of normal). April through September monthly totals were all below average.

**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: 53 age-0 steelhead, 42 age-1+ steelhead , and 2 age-2+ steelhead age (Table 2). The number of all ages of steelhead was significantly less than the average observed over the last ten years.

During the June snorkel count, for the third year in a row, the stream reach from just below the middle bridge up to near the top of the pond had significantly less water in it than we had seen during previous snorkel counts. Part of this was undoubtedly due to the lower than average precipitation for three years in a row previous to this one. However, in all three years, the pump or pumps were running to fill the pond adjacent to the stream reach in question.

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

 Upper Suscol (Map 1)

This was the ninth 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 187 age 0 steelhead, 65- age 1, and 40-age 2 steelhead (Table 2). The number of YOY and age-1 steelhead were below average. The reason for this was that no salmonids were observed in the left fork of Suscol Creek. The left fork of Suscol Creek receives considerable sediment as a result of cattle spending considerable time in the creek in that reach. This increased sediment also affects the downstream reaches of Suscol Creek. There were 40 age-2 steelhead in the upper section of Suscol Creek. This is below average. There were no age-2 steelhead in the left fork of Suscol. In several previous years a substantial number of steelhead were found in the left fork.

**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 number of age-0 steelhead observed in all of Suscol Creek has varied between 165 and 1,303 fish (Table 3, Figure 3). It is typical for the number of steelhead age-0's to fluctuate widely from year to year. 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.

Survival of the age-0 to age-1steelhead averages between 45%-55% in good years and as low as 10% in poor years. The survival rate for YOY to age-1 steelhead was 33%, below average but not unusual for a year with slightly below average annual precipitation.

Survival of age 1 steelhead to age 2+ steelhead was approximately 60% in good years for these large fish, while it was as low as 17% in poor years. During the current year, the survival rate of age-1 to age-2 fish was 68%. This is the highest survival rate we have observed during the surveys.

During the current year, the survival of YOY to age-1 steelhead was below average, while during the current year, the age-1 to age-2 steelhead had the highest survival rate observed over the years of survey. The habitat requirements of these different ages of steelhead differ and they are affected differently by factors like sediment and floods. We will discuss this in detail subsequently.

 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 in years with less than average precipitation. It is likely that groundwater pumping to fill the pond is at least contributing to the lower than expected stream flows in that reach. During the last three years, pumping was occurring when the low stream flows in that reach were observed.

 The survey and analysis suggests that cattle grazing was the greatest factor affecting the steelhead populations in Suscol Creek during the 2015-2016 water year. A fence crossed the creek just upstream of our major restoration project of the last few years. Above the fence, cattle had access to the riparian zone and stream channels in the entire upper basin. The damage to the stream and riparian zones were the greatest that we have observed during the surveys. In the left fork of Suscol Creek, no salmonids were observed and fine sediment was inches deep in all the pools. The riparian zone has a closed canopy with no understory vegetation. The slopes are steep and when cattle cross the slopes, it results in excessive amounts of sediment moving into the stream channel (see photos). Our understanding is that the cattle are grazed to decrease the grass and lower the fire risk; however, the riparian zones in the upper basin have no understory vegetation because the tree canopy is closed.

**Restoration Opportunity**

 We recommend that the cattle be fenced out of the riparian zones and steep slopes in the upper basin, especially the left fork. This would allow cattle grazing to reduce the fire risk, while protecting the upper basin from excessive soil erosion. This recommendation would meet both goals.

 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, 2016, was the thirteenth 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 power tool for identifying restoration opportunities within the basin.

**Precipitation**

 The 2015-2016 water year was lower than average for the fourth year in a row. However, during this water year, annual precipitation was near the long-term average. Precipitation in January and March were above average while precipitation in February was significantly below average.

**Snorkel Count**

 The 2016 annual snorkel count was completed in June. The number of steelhead in Suscol Creek was lower than the long-term average. In upper Suscol, no steelhead were observed in the left fork. Excessive amounts of fine sediment were observed in the left fork stream channel. The source of the sediment was cattle crossing steep slopes and banks that have no understory vegetation because of the closed tree canopy.

 We recommend that the cattle be fenced out of riparian zones and steep slopes with closed tree canopy in the upper portions of the watershed. Excluding the cattle from these areas will lower erosion and bank failure, while still allowing the cattle to graze the forage and reduce the fire risk.

 We also recommend continuing with the HBB removal. Also, maintenance is necessary at restoration site #2 as HBB is returning to the areas where we removed it and planted willow.

 We also recommend continuing to plant willow in riparian areas where the cattle have been excluded from the riparian zone.