Institute for Conservation Advocacy Research and Education
ICARE

Suscol Creek Collaborative Partnership and Restoration Project

Final Report 2010

Prepared by Charley Dewberry for Napa Wine Estates LLC
Jan 1, 2010

Summary

This is ICARE's seventh year, of working on Suscol Creek. It was unusual but it also greatly helped us understand the dynamics of steelhead trout in Suscol Creek. It became clear from the surveys that a significant number of age 1 and 2 steelhead had moved from the upper section into the lower section of Suscol Creek during the year.

The water year 2009 (from October to September) was a wet year when compared with the past 90 years of record from the recording station at the Napa State Hospital. The average precipitation for the water year was 28.85 inches, which is about 18% more than the long-term average. This higher than normal annual precipitation came after three years of drier than average conditions. Four months had higher than average precipitation: October, January, April, and May. May had about 150% of normal rainfall. January and June had about twice the normal precipitation, while October had about 3 times the normal precipitation.

We conducted our usual June survey of the Suscol Creek watershed. In our long-term study reach we observed: steelhead 152 age 0 steelhead, 44 age 1+ steelhead, and 74 age 2+ steelhead age. In addition, no centrarchids were observed this year. For the second year in a row no centrarchids

moved out of the pond into Suscol Creek. The wire mesh that we placed over the outlet pipes is working well. The number of age 0 steelhead was below the long-term average for the reach. Curiously, no steelhead 0's were observed below the middle bridge. Last year, the number of steelhead 0's was low but all of them were below the middle bridge. The number of age 1 steelhead was about equal to the long-term average. Forty-four age-1+ steelhead are significantly better than the 8 and 12 we observed in the previous 2 years. It is likely that the wetter than average conditions contributed to their higher population estimate. In 2010, we observed 74 steelhead 2+ fish. This is more than 3 times the number of age-2+ we have ever observed in the long-term study reach. It is likely that the higher than average April rainfall allowed them to move downstream from the upper section.

This is also the third year that we completed a survey of upper Suscol including the 2 forks. The number of age-0 steelhead was approximately the same as the previous year. The number of age 1 steelhead was about 10% of the number

that we observed in the previous 2 years, while the number of age 2+ steelhead was slightly lower than the number observed during the previous two surveys.

We began the life-history analysis on the entire population of steelhead in Suscol Creek. A life-history analysis follows the year class of fish through their life cycle. For instance, we start with the YOY steelhead in 2008. In 2009, these fish are now 1 year old. In 2010, these fish are two years old. We are directly calculating their survival with each successive year.

By doing the analysis on the entire population, we eliminate migration between stream reaches as a factor affecting the results. With the completion of these three years of survey on the whole stream, we have enough information to complete and submit a paper on the steelhead dynamics and our restoration framework. We will complete this paper in 2011.

As part of this report we included restoration prescriptions that we believe will greatly improve the habitat of Suscol Creek. In the lower reach a number of alder trees died, creating considerable open canopy which can elevate stream temperatures during the summer. In the upper reach we

identified two stream crossings that are generating considerable sediment that need attention. Also we identified riparian areas for blackberry removal and riparian planting.

Introduction

The 2009-10 Water Year

The water year from October 2009 to September 2010 was a wetter than average year based on the 90 year record from the Napa State Hospital. The average precipitation is normally about 24.8 inches per year. During the current water year, 28.85 inches were observed (Figure 1, Table 1). This is about 20% over the long-term average. October, January, April, and May had monthly totals greater than the long-term average. October had more than three times the normal precipitation. January and April had about twice the average monthly rainfall, while May had about 50% more than the average long-term rainfall for the month.

This is the first year in the last four years with greater than average annual rainfall. The 2007 water year was a severe drought year: annual precipitation was only 15.2 inches or 61% of average precipitation. Water

years 2008 and 2009 received about 80% of normal precipitation. This water year was about 20% greater than the long-term average.

Steelhead Population

Long-term Study Reach

We conducted our annual June survey beginning above the State highway. In our normal study reach we observed: 152 YOY (young-of-year) steelhead, 44 age 1+, and 74 age 2+ steelhead. The number of YOY steelhead was below average for the last seven years (Table 2). Last year, no YOY steelhead were observed in the reach between the middle bridge and the top of the pond Figure 2). This year all the YOY steelhead in the long-term reach was between the middle bridge and the top of the pond. No YOY were observed below the middle bridge. The number of age 1 steelhead were significantly higher than that observed in the previous two years. The number of age 2 steelhead was about three times higher than we have observed in any of the previous seven surveys. In fact, there were only 12 age 1 steelhead observed in the reach during 2009 and there were over 70 observed in the reach this year. Clearly, additional steelhead had moved into

the reach and the most likely place they came from is upstream. That is a very typical migration pattern for steelhead as they age.

No centrarchids were observed in the study reach of Suscol Creek during the surveys. The mesh placed over the outlet pipes to the ponds has successfully kept the centrarchids from moving into the stream during high water.

Upper Suscol

This was the third year that we surveyed upper Suscol. There were steelhead all the way to the forks and up both forks. In upper Suscol there were 207- age 0 steelhead, 9- age 1, and 4-age 2 steelhead (Table 2). Four YOY steelhead were observed in each fork. The number of age 0 steelhead was virtually identical to the number observed in the previous year. The number of age 1 steelhead was about 10% of the number we previously observed. It is highly likely that the age 1 and age 2 steelhead moved downstream during the greater than average April and May stream flow, because downstream we observed double the number of fish of both ages that we saw in the previous two years in the upper section.

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. Prior to this year we analyzed the population using only the counts from the long-term study reach. It takes at least 3 years to have enough information to begin the analysis and this is our third year of survey on the upper property. The results of the 2010 survey suggest that there is a lot of migration of age 1 and 2 steelhead from the upper section into the lower section. As the fish age, they move downstream into larger pools. This migration affects the calculated survival rates. Now that we are able to survey the entire population of steelhead in Suscol Creek, migration will no longer be an issue for the analysis.

The number of age 0 steelhead observed in all of Suscol Creek has varied between 86 and 1,400 fish (Table 3, Fig 3). It is typical for the number of steelhead age 0's to fluctuate widely from year to year. There are lots of factors that affect now 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. Floods play a

major role in scouring out the eggs buried in the gravel. Survival of the age 0 steelhead from 2008 to 2009 was about 11%, while the survival of age 0 steelhead from 2009 to 2010 was 17%. It is expected that survival rates will be higher when the population levels are lower. The fish are able to get more food and occupy better habitat, thus increasing their survival.

The survival of age 1 steelhead to age 2 steelhead was 27% of the 2008 year class and 58% for the 2009. It is likely that the greater stream flow in 2010 was responsible for the better survival rates in 2010.

The surveys of steelhead trout on Suscol Creek indicate that the population is sustainable in all but years with severe drought. There is currently a good population of age 1 and 2 fish within the population. In the last two years the number of YOY steelhead has been considerably below average, but their higher than average survival rates to age 1 have compensated a great deal for the low numbers of YOY.

Restoration

During the summer survey of Suscol Creek, a series of restoration opportunities were identified for Suscol Creek. In the lower reach, a number of alder trees have died in the riparian zone and this has opened the canopy

to additional sunlight, increasing the likelihood of raising stream temperatures. The alder trees captured considerable cobble during the storms the last few years. This has had the desired effect of raising the stream channel in its floodplain. A natural result of raising the stream channel is to kill the alder trees. This is the natural succession of stream in this physical setting.

In the upper reach, five issues were identified: 1) the cattle need to be excluded from the riparian zone and stream channel, 2) the major stream cattle crossing needs to be restored, 3) native tree, shrub, and grass species need to be reestablished in the riparian zone above the cattle crossing, 4) just below the upper stream crossing a large blackberry clump needs to be removed, and 5) a stream crossing needs to be rebuilt.

Restoration Opportunities

In the lower section of Suscol Creek, (Restoration map- lower Restoration site) a number of alder trees died as a result of raising the water table in the creek when the alder trees captured cobble and boulders during large stream flows. This is a natural process and is part of the succession of streams within this physical setting. However, there are also several gaps in

the riparian vegetation, especially on the south side of the stream. We are proposing that native tree species be planted, especially on the south side of the stream in the existing gaps. Also, we propose that some native shrubs, sedges, and grasses be reintroduced in this reach. These actions will aid the natural succession of the stream and improve the stream habitat.

Long-term cattle grazing in the upper section of Suscol Creek has led to significant degradation of the stream habitat and riparian zone. The most important restoration opportunity is the cattle-crossing (Restoration map-Lower Stream crossing_Upper Restoration Site #1). Cattle have broken down the banks and removed all the vegetation in the riparian zone and twenty feet of the uplands in the vicinity of the crossing. This has led to large amounts of sediment entering the stream at the crossing. The sediment has been compacted in the stream channel, creating a raised hard point at the stream crossing. The result is that the gravel in transport is captured above the crossing and this situation has cut off much of the gravel supply to the downstream reaches.

A bridge is proposed at the site. In conjunction with the bridge, native vegetation, trees, shrubs, sedges, and grasses should be reintroduced to stop the sediment inputs and reestablish riparian vegetation at the site.

Above the cattle crossing, long-term cattle grazing in the stream and riparian zone has removed the native shrub, sedge, and grass communities and eliminated the recruitment of trees and shrubs. Also, the cattle have broken down much of the stream banks. In this area (Upper Restoration site #2), the cattle need to be excluded from the stream and riparian zone. Extensive planting of native trees, shrubs, sedges, and grasses needs to be implemented in the riparian zone. In the upper portion of Upper Restoration Site #2, there is an extensive patch of Himalayan Blackberry in the riparian zone that needs to be removed after which native vegetation needs to be reestablished.

The upper stream crossing is currently used by ATV's. The stream had been diverted at the stream crossing and it is carving a new channel through the riparian zone. The stream crossing needs to be reconstructed to stop this stream diversion.

Upper restoration Site #3 is a large bedrock pool with an open canopy. This site results in significant stream warming. Extensive cattle grazing has eliminated the recruitment of willows or native trees at the site. We are proposing to plant willows and native trees in the riparian zones.

Summary

This year, 2010, was the first wet year in three years. October, January, and April had significantly higher rainfall than the long-term monthly average.

The 2010 annual snorkel count was completed during the first weekend in June. We observed a much greater number of age 2 steelhead than any other previous years. Also we did not observe a single YOY steelhead below the middle bridge. Usually YOY steelhead are common in that reach. We also did not observe any centrarchids in Suscol Creek, so our mesh covering of the outlet pipes of the pond are working.

We began the life-history analysis on the entire Suscol Creek watershed this year. This analysis eliminates migration between stream reaches as a factor contributing to the results of the analysis. We now have enough survey information to complete a scientific manuscript on the steelhead population dynamics in Suscol Creek. We will submit the paper to a California journal during 2011.

We designed riparian restoration efforts in both the lower and upper reaches of the creek. In the lower section a number of alder trees died, thereby opening the canopy. We are recommending planting trees and

shrubs in those section of the stream. In the upper section, there are two stream crossings that need considerable work, in addition to Himalayan blackberry removal and riparian planting of native vegetation.

Recommendations for future restoration:

- Continue the snorkel surveys to determined the life-history characteristics of steelhead in Suscol Creek, a tributary of the Napa River
- Continue the snorkel surveys to make sure no centrarchids are moving out of the pond
- Collect 4 macro-invertebrate samples to provide base-line information for the restoration efforts
- Continue photo documentation of the work the Suscol Creek Collaborative Partnership is performing throughout this important watershed
- Remove the cattle from the riparian area and steep hill slopes to protect the bed and banks of the creek from sedimentation and loss of vegetation, as this is the greatest impediment of restoration to Suscol Creek currently OR

- Remove the cattle from the riparian areas and carefully manage the cattle to prevent over grazing in sensitive areas which would include fencing pasture areas and rotating the cattle