The Suscol Creek Collaborative Partnership Restoration Project

Suscol Report 2011

Summary

This is the Institute for Conservation Advocacy Research and Education's (ICARE) eighth year of working on Suscol Creek. This was the most unusual year to date for three reasons: 1) there were only 15 age 0-steelhead observed in the lower one-half of Suscol Creek. (There were an above average number of age-1 and age -2 fish in the lower reach); 2) the number of age-1 and age-2 steelhead observed in 2011 was higher than the number of age-0 and age-1 steelhead observed in 2010 (Either the survey in 2010 underestimated the age-0 and age-1 steelhead and/or a number of age-1 and/or age-2 steelhead migrated into Suscol Creek from the Napa River during the year); and 3) the long-term weather station at the Napa State Hospital which we have been using since the study began did not accurately record monthly precipitation for January through May.

The water year 2010 (from October to September 2011) was a very wet year when compared with the past 90 years of record from the recording station at the Napa State Hospital. October through December had 15.4" of precipitation. The long-term average for those three months is only 8.9". There were over 4.0" of precipitation in February even though they only recorded eight days of precipitation. The long-term average precipitation for February is 4.4". In March, 8.94" of precipitation were recorded even though 12 days were not recorded during the month. The long-term average for March is 3.3". Clearly, this was one of the wettest water years on record. However, peak flows probably did not exceed the two-year recurrence interval during the year.

We conducted our usual June survey of the Suscol Creek watershed. In our long-term study reach we observed: 15 age 0 steelhead, 146 age 1+ steelhead, and 69 age 2+ steelhead age. The number of age 0 steelhead was significantly below the long-term average for the reach. The number of age 1 steelhead was more than double the long-term average. It is likely that the wetter than average conditions contributed to their higher population estimate. In 2011, we observed 69 steelhead 2+ fish. This is about the same number of age-2+ we observed in the long-term study reach last year.

This is also the third year that we completed a survey of upper Suscol, including the 2 forks. We observed: 317 age-0 (YOY) steelhead, 411 age-1 steelhead, and 170 age-2+ steelhead. The number of age-0 steelhead was approximately the same as the previous two years. The number of age 1 steelhead was double the previous high that we observed in the previous year. The number of age-2 steelhead also far exceeded the previous high that we have observed in upper Suscol

A life-history analysis follows the year class of fish through their life cycle. For instance, we start with the YOY steelhead in 2009. In 2010, these fish are now 1 year old. In 2011, these fish are two years old. We are directly calculating their survival with each successive year. The life-history analysis on the entire population of steelhead in Suscol Creek indicated a problem when analyzing the snorkel surveys of the last two years. Either the count was low in 2010 or steelhead migrated into Suscol Creek from the Napa River. The available information suggests that a number of age-1 and age-2 steelhead migrated into the Suscol Creek. It is not unusual for steelhead to move extensively throughout the basin during high flows that occur during

the low-flow period of the year. In 2011, we had to delay our snorkel survey 2 weeks because of high water the first week of June.

During 2011 we collected, four macro-invertebrate samples along Suscol Creek (see bmistudysites.pdf). The first sample, the lower site, was collected next to the state highway. We observed a taxa richness of 35. The second sample was collected at the middle bridge. The taxa richness at this site was 39. The third site was collected at the fence. The taxa richness was 43. The fourth sample was collected in upper Suscol Creek about 300 m below the forks. The taxa richness was 41. The samples were collected in March, 2011. We observed the highest richness of BMI's at the property fence.

During 2011, we worked on three restoration projects (see suscolrestoration.pdf). In lower Suscol Creek, a number of native plants were planted in openings created by dead alder trees. We also identified two stream crossings that were contributing excess amounts of sediment into Suscol Creek. We designed a temporary fix for one of the crossings and helped the partners with the permits and documentation for the restoration project. We also identified additional riparian areas in need of blackberry removal and planting native riparian vegetation.

Introduction

The 2010-11 Water Year

The water year from October 2010 to September 2011 was among the wettest years in the whole 90-year record from the Napa State Hospital precipitation gauge. The average precipitation is normally about 24.8 inches per year. During the current water year, well over 30 inches were observed (Figure 1, Table 1). And this is without any January information and very limited

information February through May. Every month that had complete records exceeded the long-term monthly average, except July, August, and September. From October through December, the long-term average precipitation is 8.9". During this water year, over 15.4" were recorded during the same period. In February, only 8 days of precipitation was recorded. The total for those 8 days was approximately equal to the long-term average monthly precipitation. In March, 8.94" of precipitation were recorded and this greatly exceeded the long-term monthly average of 3.3". Twelve days are missing from the precipitation records during March. In June, 2.61" inches of precipitation were recorded. This amount greatly exceeding the 0.21" average for the 90 years of records.

This is the second year with greater than average annual rainfall. There were three years with below average precipitation proceeding the last two years. 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. The 2010 water year was about 20% greater than the long-term average.

Steelhead Population

Long-term Study Reach (lower Suscol Creek)

We conducted our annual June survey beginning above the state highway. In our long-term study reach (see suscolstudyarea.pdf), we observed: 15 YOY (young-of-year) steelhead, 146 age 1+, and 69 age 2+ steelhead (Suscol Study Area Map). The number of YOY steelhead was significantly below the average for the last seven years (Figure 3A, Table 2). This is by far the lowest number of YOY we have observed in the lower study reach since the beginning of the project in 2004.

It is likely that the sediment generated from the two stream crossings is causing a decline in the survival of steelhead eggs and YOY juveniles. This suggestion is further substantiated by the macro-invertebrate sample collected during the year. Normally, the number of macro-invertebrate species richness will increase from the headwaters to the mouth of the stream. We collected one sample from upper Suscol Creek, one from the fence delineating the two properties, one from the middle bridge, and one sample immediately above the lower bridge near the highway (see bmistudysites.pdf). The taxa richness from the top to the bottom were 41, 43. 39, and 35, respectively. And the EPT taxa (mayflies, stoneflies, and caddisflies) were 20, 17, 13, and 12, respectively. In both cases the number of taxa declined comparing the top two sites with the bottom two sites. In high quality habitat the taxa richness and EPT taxa should increase in the downstream direction. The EPT decreased between the upper site and the fence. This suggests that the sediment generated from stream crossing is having an effect downstream through lower Suscol Creek.

The number of age 1 steelhead were significantly higher than that observed in any previous year of survey (Figure 3B). Also, the number of age 2 steelhead was about the same as the previous year which was the highest on record (Figure 3C). These high population estimates illustrate that the steelhead in Suscol Creek can rapidly rebound from several years of drier than average conditions.

No centrarchids were observed in the study reach of Suscol Creek during the 2011 surveys. The mesh placed over the outlet pipes to the ponds has successfully kept the centrarchids from moving into the stream during high water for the last three years.

Upper Suscol

This was the fourth year that we surveyed upper Suscol Creek. There were steelhead all the way to the forks and up both forks. In upper Suscol Creek, there were 244- age 0 steelhead, 245- age 1, and 95-age 2 steelhead (Table 2). The number of YOY steelhead was average for the last four years (Figure 4A). The number of age-1 steelhead was more than 10 times the number observed during the previous four years of survey (Figure 4B). The number of age-2 steelhead was also significantly higher than the average for the previous four years (Figure 4C).

The number of all three ages of steelhead were about average for the last 4 years in the forks of Suscol Creek.

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 317 and 1,300 fish (Table 3, Fig 5). 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. Floods play a major role in scouring out the eggs buried in the gravel.

Survival of the age 0 steelhead from 2008 to 2009 and 2009 to 2010 was about 11% and 17%, respectively; however, from 2010 to 2011, survival was approximately 100%. This survival

rate is not plausible. Either our survey under-estimated the steelhead in 2010 or there was significant migration of steelhead age-1 steelhead into Suscol Creek from the Napa basin. There was nothing unusual about the 2010 survey. There were a couple of the usual difficulties. We did have to skip two pools because visibility was not acceptable because cattle crossed the pools in front of us. We also skipped a couple of pools because we spooked mallard ducks from the pools. These problems rarely cause more than 10% difference in the estimates. The estimates from 2010 were significantly lower than average.

It is plausible that steelhead juveniles moved into Suscol Creek from the Napa River during one or more of the high flow events that occurred during the year. When high flow events occur, especially during normal low flow period, it can trigger steelhead to make extensive migrations within the Napa basin. One such event occurred during the first week of June. Suscol Creek was approximately a foot higher than normal and we had to delay our snorkel survey a couple of weeks. At present, we do not know for sure if the survey in 2010 was unusually low or the steelhead moved from somewhere else in the Napa basin. It is possible that it is a combination of the two scenarios.

In 2010, there were 57 age-1 steelhead. In 2011, there were 170 age-2+ steelhead. This is clearly not possible. This problem was discussed above. In this case, it suggests strongly that a number of steelhead migrated into Suscol Creek from the Napa River. In thirty-years of diving, we have never underestimated age-1 steelhead by an amount necessary to account for the discrepancy. Our estimates for age-1 steelhead rarely vary by greater than 10%. The survival of

age-1 steelhead to age-2 steelhead was 27% of the 2008 year class and 58% for 2009. Therefore, it is likely that many age-2 steelhead moved into Suscol Creek from the Napa River.

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.

Photo Points

In September 2004, ICARE established a series of photo points along the riparian zone of Suscol Creek to document the success of Himalayan Black Berry, (HBB) removal. We have periodically re-photographed each of the photo points since their establishment. In all cases, the HBB stands were successfully removed after several years. In all the larger sites, the removal and subsequent treatment to keep them from reestablishing has been successful. In a couple of the smaller sites, continued treatment is necessary.

The largest site is located downstream of the middle bridge. The HBB were removed in 2004 and native vegetation was planted. In September 2004, we established photo points to document the recovery of the riparian zone after the HBB removal (see photos 2004 1 and 2). By 2006, no HBB were observed in the section and the native plants were becoming well established (see photos 2006 1 and 2).

During 2012, we will re-photograph all the established photo points. In addition, we will add several points to document the success of the riparian planting that has occurred during the last couple of years.

Restoration (Figure 6)

Last year in lower Suscol Creek, we identified a number of openings in the riparian zone created by dead alder trees. During this year, native vegetation was planted in a number of the openings (see suscolplantings.pdf). The success rate of the riparian plantings were good. They were greatly aided by the wetter than average precipitation during the year.

Last year we also identified five restoration opportunities in upper Suscol Creek: 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.

The two stream crossings are generating considerable sediment. It is likely that this sediment is causing downstream reduced survival of steelhead. It is probably also causing the depressed macro-invertebrate taxa richness in the downstream reaches.

During the year, a temporary structure was designed to reduce the amount of sediment generated by one of the stream crossings. During the summer, a structure was constructed by the land-owner according to California Department of Fish and Game modifications to our design. This structure should decrease the amount of sediment generated by the stream crossing.

Restoration Opportunities

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 (see suscolrestoration.pdf; 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 (see suscolrestoration.pdf; 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.

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 once the cattle are removed (being planned soon).

During 2010, a temporary structure was constructed in the upper stream crossing to keep the stream from continuing to cut a new channel and generating considerable amounts of sediment. During this year, in conjunction with the landowners, we will design and implement a permanent stream crossing. This work will stop one of the largest sediment sources along Suscol Creek.

Summary

This year, 2011, was among the wettest years in this century. All months with precipitation estimates were higher than average except for the summer low flow period.

The 2011 annual snorkel count was completed in June. Our initial attempt to complete the survey was rained out. Once we did the survey, we observed a much larger number of age-1 and age-2 steelhead than in any previous year. We also did not observe any centrarchids in Suscol Creek for the third consecutive year. Therefore, our mesh covering over the outlet pipes of the pond are working.

Our life-history analysis indicated that the number of age-1 and age-2 steelhead were greater than possible. It is likely that steelhead moved into Suscol Creek from the Napa River during one of the high-flow events that occurred during the low-flow period.

The restoration opportunities in upper Suscol Creek include: 1) Fixing the major cattle crossing that is generating considerable amounts of sediment; 2) Designing and implementing a permanent fix to the upper stream crossing that is the second major source of sediment in Suscol Creek; 3) Riparian restoration including removing a major blackberry clump, and extensive riparian planting.