

Suscol Creek Collaborative Partnership Restoration Project 2007



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Summary

The water year 2007 (from October to September) was among the 10% driest years when compared with the past 90 years of record from the recording station at the Napa State Hospital. As a result, stream-flow was low and stream temperature became an issue in many pools for the survival of steelhead.

We conducted our usual June survey beginning above the spray fields of Napa Sanitation. Only nine steelhead were observed below the highway 29 bridge. Five of the nine were 2+ age fish. In our normal study reach we observed: steelhead 223 age 0 steelhead, 25 age 1+ steelhead, and 17 age 2+ steelhead age. In addition 25 centrarchids were observed. The number of age 0 steelhead was average for the last five years. The number of age 1 and 2 steelhead was lower than the observed averages over the last five years. We also conducted a second snorkel survey in October to examine the survival of steelhead during the water year. We observed 39 age 0 steelhead, 32 age 1+, and 7 age 2+ steelhead. During the second survey a number of the large pools were totally covered by duckweed and we could not estimate the fish numbers in them.

With five years of survey information we began analysis of the life histories of steelhead in Suscol Creek, which provides the most sensitive tool for tracking the steelhead population over time. The 2004 cohort (generation) has a survival rate of about 50% each year to age 2. This represents an excellent survival rate. The 2005 cohort had a much lower survival rate through age 2. During their first year, the largest storm and flood during the study occurred. During their second year, stream-flow was among the lowest observed in 90 years.

We also were collecting our second year of adult macro-invertebrate samples from Suscol Creek. The number of insects collected in the traps was very low. The traps appeared to be functioning properly. We do not know why we collected so few individual specimens.

During the 2008 season we would like to: continue our June snorkel survey, complete our second year of adult macro-invertebrate collecting, complete the enclosure for the outfall of the pond, and continue with blackberry removal, and continue with the riparian restoration.

The 2006-7 Water Year

The water year from October 2006 to September 2007 was among the driest years observed at the Napa State Hospital during their 90 years of collecting precipitation records. The average precipitation is normally about 24.8 inches per year. During the current water year only 15.2 inches were observed. Only November and February had at least average monthly precipitation. Normal January precipitation is about 4.75 inches and less than one-half an inch was observed in January of the current year. (see Table 1 and Figure 1). Surveys were conducted during the summer months to document stream flow, towards the end of summer stream flow was minimal (see map below)

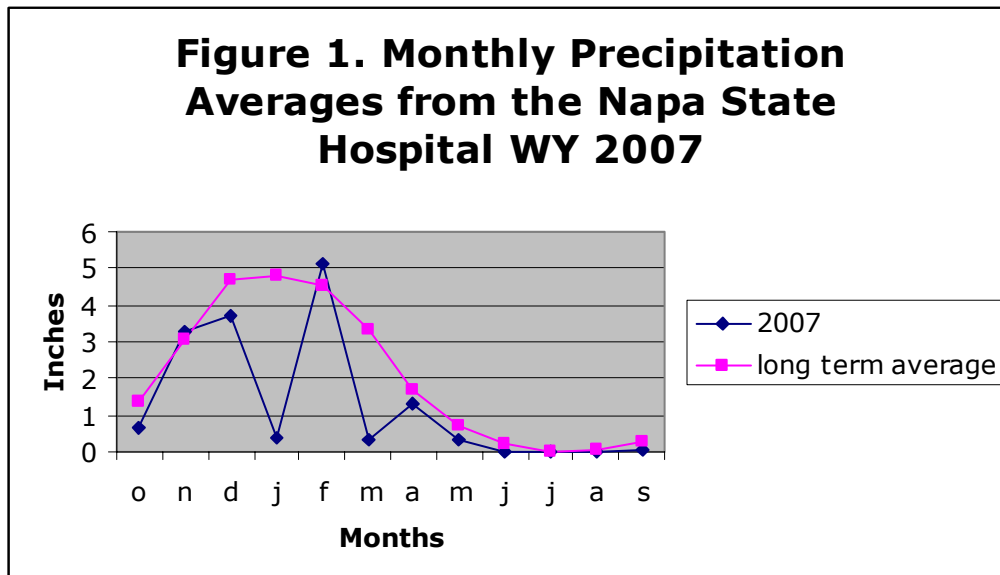
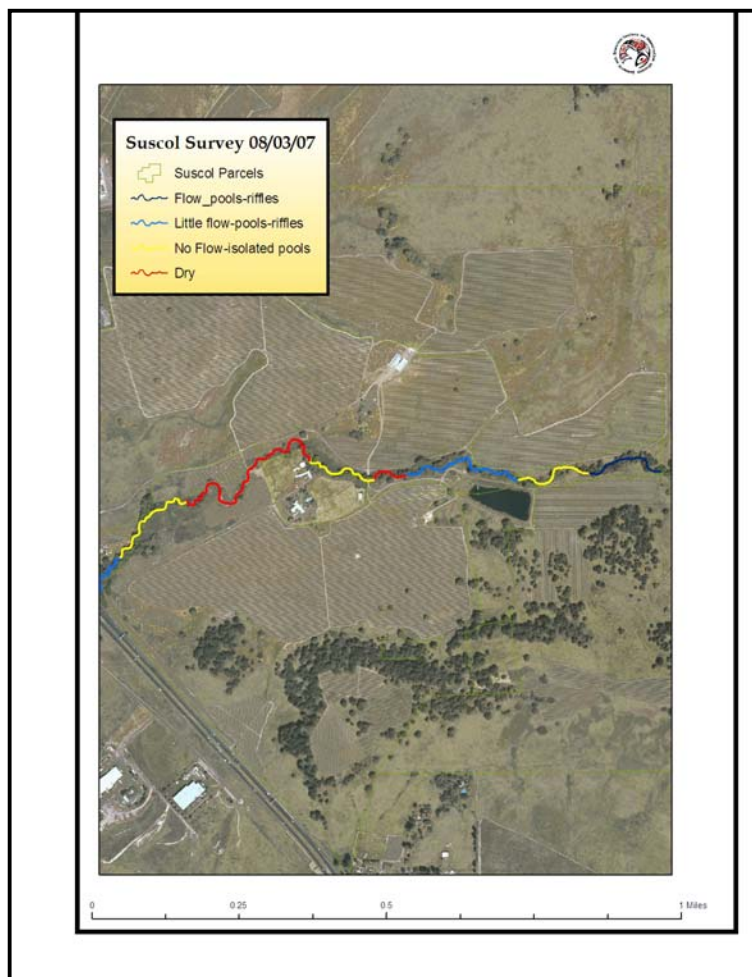


Table 1. Precipitation at the Napa State Hospital, 2006-7 Water Year. (inches)

Month	precipitation	Precipitation
Oct	0.66	1.37
Nov	3.3	3.06
Dec	3.71	4.7
Jan	0.36	4.82
Feb	5.12	4.55
Mar	0.35	3.35
Apr	1.29	1.69
May	0.35	0.7
Jun	0	0.23
Jul	0	0.02
Aug	0	0.08
Sep	0.05	0.27
totals	15.19	24.84



The Suscol Creek Steelhead Population

We conducted two snorkel surveys during the year, one our standard survey at the beginning of summer and a second one in October 2007 to estimate the survival of steelhead through the summer low-flow period during this unusually dry year.

We conducted our usual June survey beginning above the spray fields of Napa Sanitation. Only nine steelhead were observed below the highway 29 bridge. Five of the nine were 2+ age fish. In our normal study reach we observed: 223 age 0 steelhead, 25 age 1+, and 17 age 2+ steelhead. In addition, 25 centrarchids were observed (Table 2).

Table 2. Snorkel survey results from 2004 to 2007.

Year	Sthd 0	Sthd 1+	Sthd 2+	Centrarchids
2002**	139	24		
June 3 2004	119	27*		108
June 4/2005	577	49	23	101
June 3/2006	183	110	27	0
June 2/ 2007	223	25	17	25

* Includes Sthd 1+ and Sthd 2+

** Number of steelhead trout calculated from the electrofishing efforts of Alice Rich.

The number of age 0 steelhead was average for the last five years. The number of age 1 and 2 steelhead was lower than the observed averages over the last five years. We also conducted a second snorkel survey in October to

examine the survival of steelhead during the water year. We observed 39 age 0 steelhead, 32 age 1+, and 7 age 2+. During the second survey a number of the large pools were totally covered by duckweed and we could not estimate the fish numbers in them. These pools usually have a high proportion of age 1 and age 2 steelhead in them. So steelhead survived at least in adequate numbers to sustain the population in Suscol Creek.

The survival of steelhead during the 2007 water year was less than average because of the lower water during the summer months. Age 0 steelhead declined from over 200 to less than 40. Age 1+ steelhead increased from 25 to 32. It is likely that a number of age 1+ steelhead moved downstream into the study area from upstream. Age 2+ steelhead declined from 17 to 7; however, we were not able to count the two largest ponds that harbor the greatest numbers of age 2+ steelhead because duckweed completely covered the water surface. No downstream migration or upstream migration from the lower reaches of Suscol Creek was possible because long reaches of stream were dry from the June to the October sample. So, it is likely that age 2+ steelhead survival was acceptable during this lower water year.

Analysis of the Life history of Steelhead in Suscol Creek

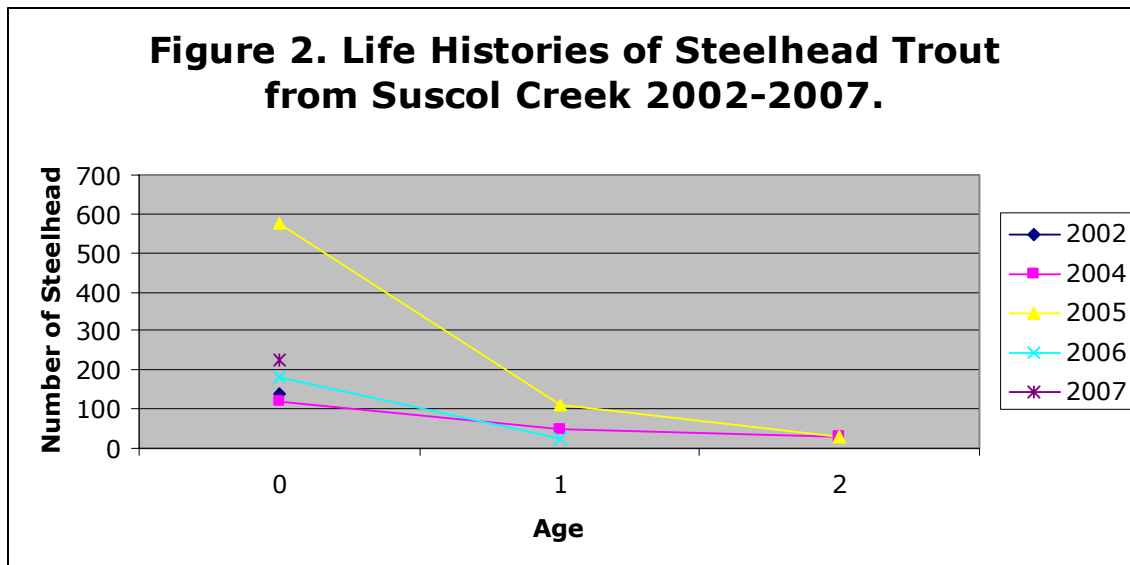
Steelhead have now been sampled in Suscol Creek for 5 of the last 6 years. The first year was sampled by Alice Rich. The subsequent surveys were completed by ICARE. With the five years of surveys we are now in a position to begin analysis of the life history of steelhead in Suscol Creek and their status (see Table 2 and Figure 2).

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This discussion is based on the minimum information possible and is tentative. Additional years of survey will increase the level of confirmation.

The average number of age 0+ steelhead over the 5 years of survey is 248 fish. The low count was 119 in 2004 and the high count was 577 in 2005 (Table 2).

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The lowest two years were in 2002 and 2004. In both 2002 and 2004, stream-flow was lower than average in late winter and spring (see figures 3 and 4).

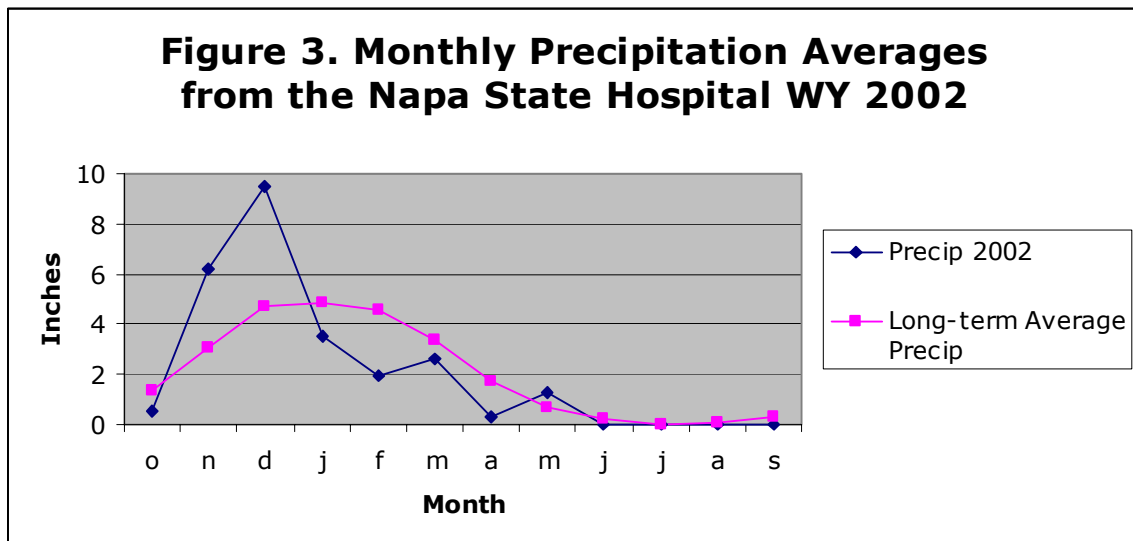
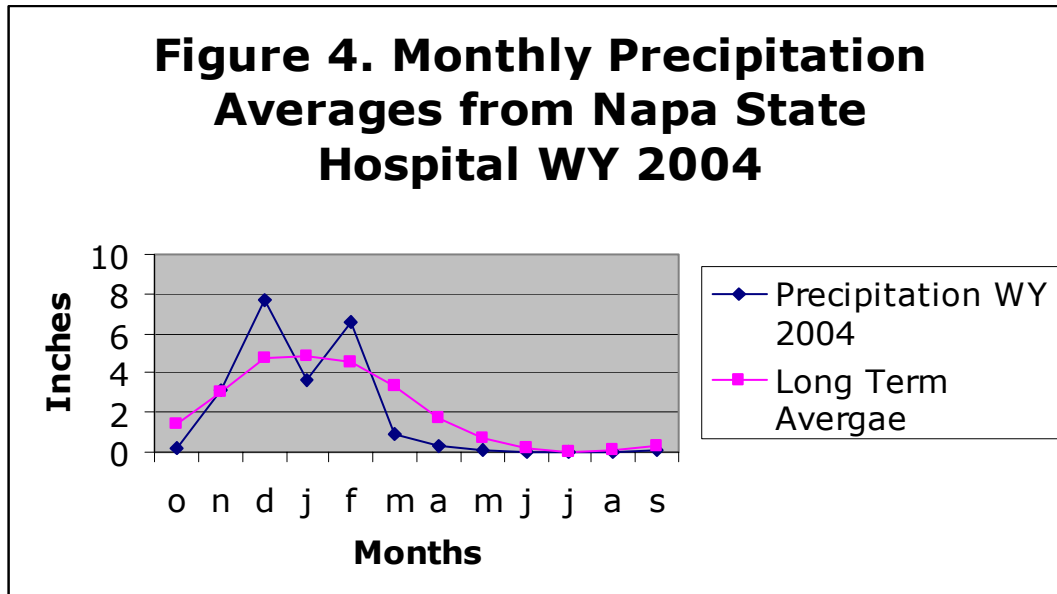
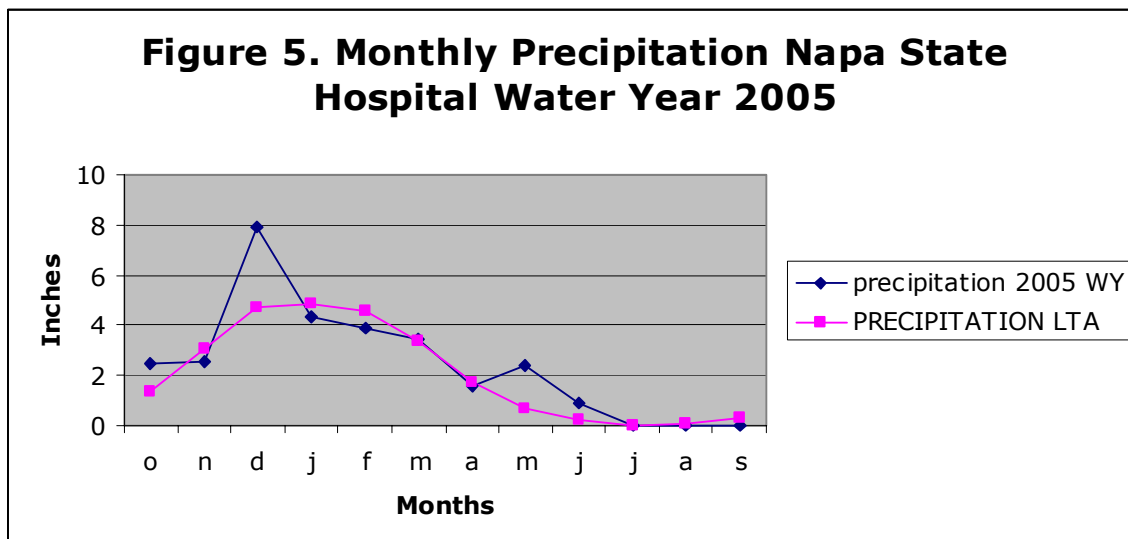


Figure 4. Monthly Precipitation Averages from Napa State Hospital WY 2004



The highest year was 2005 and the late winter and spring stream-flows were above average in each month (see figure 5).

Figure 5. Monthly Precipitation Napa State Hospital Water Year 2005



There was no relationship between the high flows and the number of age 0 steelhead in each year.

The average number of age 1+ steelhead over three years of survey was 61 (in the first two years of the snorkel survey we did not separate age 1+ and age 2+ steelhead). This is an average survival rate of 25%. We do not know if this is average for the Napa basin, but it is clear that the survival rates are high enough to sustain steelhead populations in Suscol Creek at this time.

The average number of age 2+ steelhead over three years of survey was 23. This is an average survival rate from age 1+ of 37% over the three years. Again, we do not know if it is an average survival rate for steelhead in the Napa basin but it is high enough to sustain the population of steelhead in Suscol Creek.

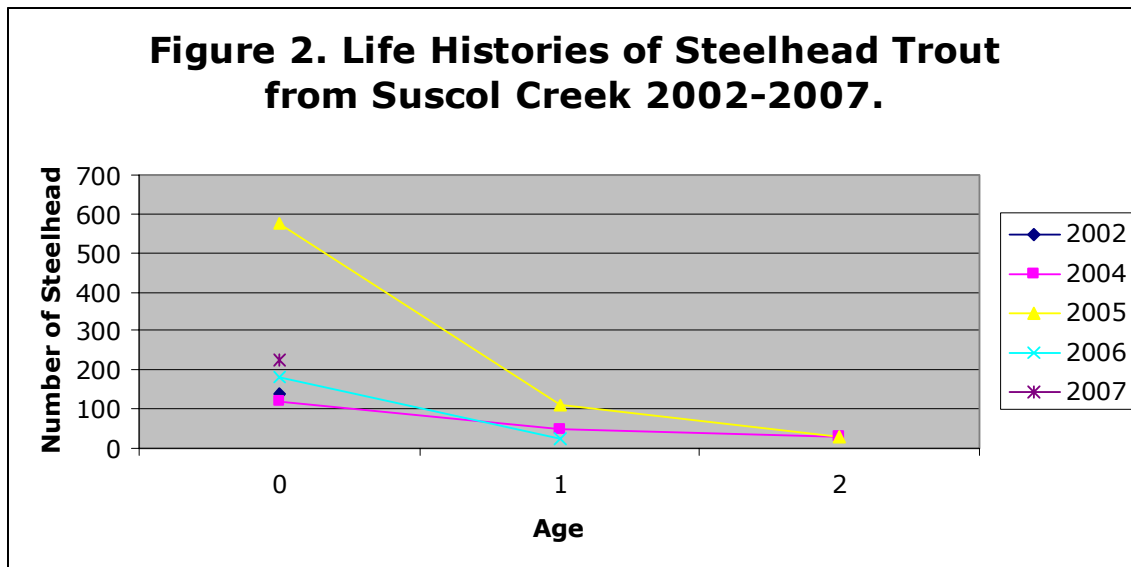
A useful analysis is to follow each year class of steelhead through their life. We can follow each population through their first 2 years starting with the 2004 year class. These steelhead probably began their life history as eggs in redds (nests of gravel) during February 2004. The adults moved upstream and spawned during or after the major winter storm. By June 2004, 119 age 0 steelhead were observed during the survey (Table 2, Figure 2).

Table 2. Snorkel survey results from 2004 to 2007.

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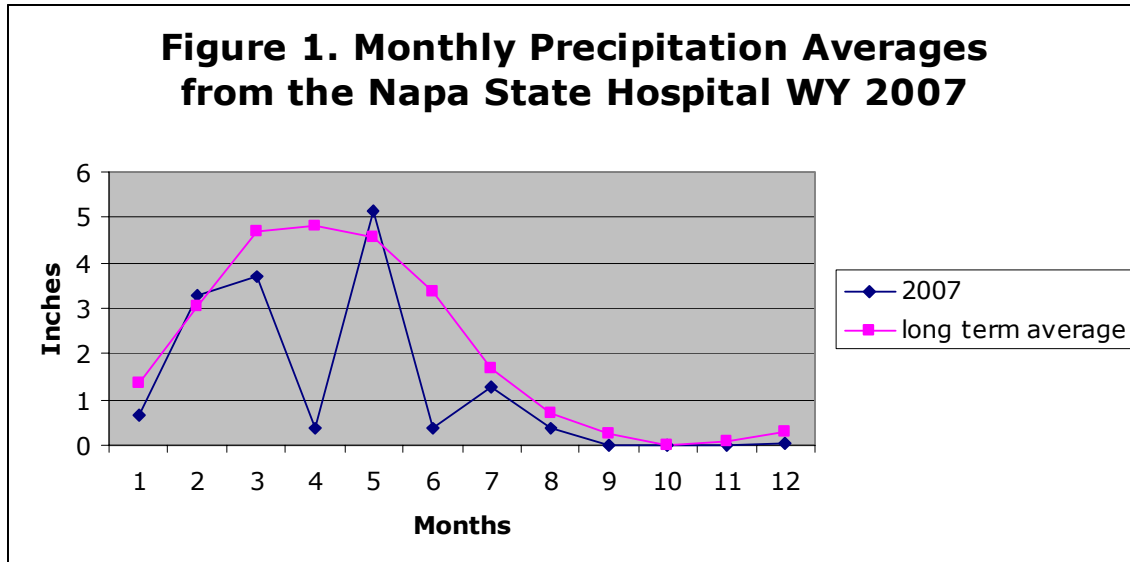


The next summer these fish were age 1+ steelhead and we observed 49 of them. This represents a survival rate of 41%. The following summer a total of 27 age 2+ steelhead were observed. This represents a survival rate of 55%.

Survival rates of 50% are high and indicate high quality stream habitat and a good year for steelhead. In old-growth streams in the Pacific Northwest survival rates of 50% are common, so the survival rates for this year class suggest that the stream habitat quality is high. It is especially

noteworthy that these fish were age 1+ during the major storm of December 2005. The storm did not detrimentally affect their survival.

In the next year class (2005), a total of 577 age 0 steelhead were observed. This is the highest number of age 0 steelhead observed during the whole survey period. The following year a total of 110 age 1+ steelhead were observed. This was the highest number of age 1+ steelhead during the survey period. However, the survival rate from age 0 to age 1+ was 19%. The following year there were only 17 age 2+ fish with an average survival rate of only 15%. The number of 2+ fish was not the highest number of age 2+ fish observed during the surveys. While this year class started with more than twice the average number of fish as age 0's, by their second year they had the fewest number of individuals observed as age 2+ fish. The first year of life for this year class (2005) was an above average water year. It is likely the high number of fish were partly the result of excellent stream-flow during the year. However, in December 2005, this year class which was at the end of their age 0 life-stage went through the major storm of the period of study. Their survival rates are the lowest so far. As age 0's they are not large enough to survive well during major storms. The result was there were still 110 individuals at age 1 but the survival rate from age 0 was low. Also, 2007 was a low water year (Figure 1).



Again their survival was low. The result was that this year class had the lowest number of age 2 fish observed during the 5 years that we have conducted surveys.

The next year class (2006) a total of 183 age 0 steelhead were observed. As age 1+ fish we observed 25 of them, which is a survival rate of 15%. This year class began life most likely as eggs deposited after the December 2005 storm. The result was above average number of age 0 fish. Their survival rate was low during the winter and spring of 2007, which was a drought year.

In summary, the number of age 0 steelhead in Suscol Creek varies considerably from year to year. On average, about 240 age 0 steelhead inhabit the study reach of Suscol Creek each year. The number of age 1+ steelhead observed is about 60 fish. This does not vary as much as the age 0

stage. We observed an average of 23 age 2 fish. Their numbers do not appear to vary greatly from year to year. This is the typical pattern for steelhead. It also suggests that it is the amount of good stream habitat that is limiting their production through age 2+. The habitat in the study reach is excellent but the habitat above and below the study reach is lower quality. As age 0 fish the number each year varies greatly but by the second year the variation is quite low, suggesting that the year to year variation in weather patterns is not primarily driving the dynamics of their population numbers. However, the 2005 year class that went through the December 2005 storm as 0's were significantly affected by the storm and the severe drought during 2007 affected them as well.

Centrarchids

A total of 25 centrarchids were observed during the June 2007 survey. These fish are moving into the stream from the pond during high water. During low-water periods these fish are effective competitors with steelhead. Removal of them is a high priority.

Adult Macro-invertebrates

This year was to be the second year of adult macro-invertebrate collection to build a more complete species list from the study reach. The number of insects collected during the study year was very low. We have no explanation for this result. The traps were in good condition and they were located below the surface of the water. Few spiders were able to find their way into the traps. As a result, of not having insects to sort and identify, we used the budget to conduct the second steelhead survey in October as the end of the long summer drought.

Restoration

During 2006-7 we identified a section of stream bank on the south side of the stream with an open riparian canopy. The stream in this reach consists mostly of a long shallow pool. We began the process of planting vegetation to shade this pool during the summer months. This will lower the stream temperatures in the pool and downstream.

Also, blackberry removal was continued in the study reach. In addition, we contacted additional partners in the basin to coordinate blackberry removal in a greater area of stream. This will make blackberry removal more effective for all landowners in the basin.

Recommendations

- Continue the June snorkel survey. This will enable us to better understand the life history of steelhead in the Suscol Creek basin.
- Continue the basin-wide restoration efforts including blackberry removal.
- Complete the second year of the adult macro-invertebrate collections.
- Screen the outflow of the pond to keep centrarchids out of the creek. This can be accomplished with 4 t-posts, 1 panel of 2" X 4" mesh hog or sheep fencing, and covered by poultry mesh.
- Continue fall removal/lifting of the fence crossing Suscol Creek to allow migration of steelhead for spawning purposes throughout the watershed.
- Continue to map wet and dry segments of the creek during summer and late fall.
- Continue to monitor stream flow with gauges installed in two locations of Suscol Creek.