



2021 Steamboat Creek Snorkel Survey



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Prepared by Pacific Rivers, a 501(c)(3) organization

EXECUTIVE SUMMARY

The Frank and Jeanne Moore Steelhead Sanctuary, which was established in March 2019, created a 100,000 acres sanctuary for steelhead and for a temperature refuge for not only Steamboat Creek but the North Umpqua River, itself. During 2021, Andrew Dewberry, Emma Latendresse, Rhiana Pritchett, and Charley Dewberry completed the snorkel surveys. The survey included the mainstem of Steamboat Creek above Cedar Creek and all the tributaries along the mainstem above Cedar Creek. We completed all the mainstem and tributary reaches outside of the areas restricted on Steamboat creek because of the wildfires. We began the surveys on July 1, the same week that the first fires started in the basin.

The water year (October 1 to September 30) was a typical water year in that the two highest flow events occurred in December and January and each of the subsequent major storms was of less high flow than the previous one. However, the high flow events were only about 8,000 cubic feet per second (cfs). This is enough flow to get the steelhead into the tributaries, but it is not enough to make it easy for the fish to make it far into the headwaters of the tributary streams. During the summer months, the low-flows were significantly lower than average. The median low-flow in September is about 45cfs. During the current year, the low-flows in September were approximately 25cfs. On the whole, this water year was conducive to producing a large age-0 steelhead emergence, but the low flows in summer undoubtedly led to reduced habitat and higher than normal stream temperatures.

The information from this year's snorkel surveys will be formatted and analyzed differently from previous years because we were restricted to only surveying a portion of the basin in 2021, therefore we could not compare the total basin counts between the years. Instead, we analyzed each tributary and mainstem reach separately and compared them over the three years of surveys.

In 2019, age-0 steelhead estimates were significantly lower at all sites than the other years, because of a major storm in April 2019. This storm destroyed a sizable portion of the eggs and emerging steelhead fry.

Comparing the surveys from 2020 with the surveys of 2021 yielded some observations with regard to the age-0 fish. In general, i.e., on two of three mainstem reaches and three of five tributaries, the populations of age-0 steelhead were greater in 2020 than in 2021. However, a couple of exceptions were significantly different. In the mainstem reach from Little Rock to Horse Heaven the population of age-0 fish increased from 4,921 to 9,001 and in City Creek the population of age-0 steelhead increased from 1,919 to 6,498 fish.

The general pattern for age-1 steelhead is that 2020 was the year with the largest populations and both 2019 and 2021 had lower populations. There are three exceptions to the pattern: Cedar, Little Rock, and East Fork Steamboat Creek.

The general pattern for age-2 steelhead in the mainstem of Steamboat Creek is that 2020 had the highest populations. This is the same pattern as the age-1 fish. There is less of a pattern in the tributaries. The only tributary that has the same pattern as the mainstem reaches is Horse Heaven. Big Bend had the largest population in 2019, and City and Little Rock had their largest populations in 2021.

The general pattern for Cutthroat trout in the mainstem of Steamboat Creek is that the highest populations occurred during the 2020 year in all three reaches that were surveyed in all three years. There were too few fish to establish patterns in the tributaries.

INTRODUCTION

The Frank and Jeanne Moore Steelhead Sanctuary, which was established in March 2019, created a 100,000 acres sanctuary for steelhead and for a temperature refuge for not only Steamboat Creek but the North Umpqua River, itself. During 2021, Andrew Dewberry, Emma Larendresse, Rhiana Pritchett, and Charley Dewberry completed snorkel surveys of the mainstem and tributaries. The surveys included the mainstem of Steamboat Creek above Cedar Creek and all the tributaries of Steamboat Creek above Cedar Creek.

The snorkel surveys enable us to construct a snapshot of summer rearing of salmonids in Steamboat Creek. This snapshot of the abundance and distribution of steelhead (the dominant salmonid) in the basin and the evaluation of the stream habitat and landscape processes provide basic information to identify restoration opportunities within the basin. With each additional year of survey, the trends in the population of each salmonid and age class of steelhead become clearer. It also allows us to greater understand the factors affecting the abundance and distribution of the salmonids in the basin.

STUDY AREA

Steamboat Creek is a major tributary of the North Umpqua River basin (Figure 1). The drainage area is approximately 100,000 acres. Steamboat Creek is a strategically important producer of steelhead trout, coho salmon, chinook salmon and cutthroat trout within the North Umpqua drainage.

The basin is entirely within the western Cascades. The geology is dominated by weathered Tertiary volcanic rocks. The dominant forest community is western Hemlock- Douglas fir.

METHODS

The snorkel surveys were conducted during July and August using the Hankin-Reeves method (Hankin and Reeves 1990). A dive crew consisting of two or more people work their way upstream through their designated stream reach. The stream channel was divided into three habitat types: riffles, pools, and glides. For each habitat unit, the length and width were estimated. The frequency of the surveyed units was: 1:10 riffles; 1:8 glides; and 1:5 pools. All salmonids were counted in each surveyed stream habitat. In the habitat units that were snorkeled, the length and width of the habitat units were measured.

For these surveys, age-0 and 1 trout include both steelhead and cutthroat trout. While some individuals are easy to identify into their respective species, others are very difficult. As a result, we elected to combine both species into these age categories. Age-2 steelhead were differentiated from age-2 cutthroat trout. Adult salmonids were observed in the surveys; however, they were not counted.



RESULTS AND DISCUSSION

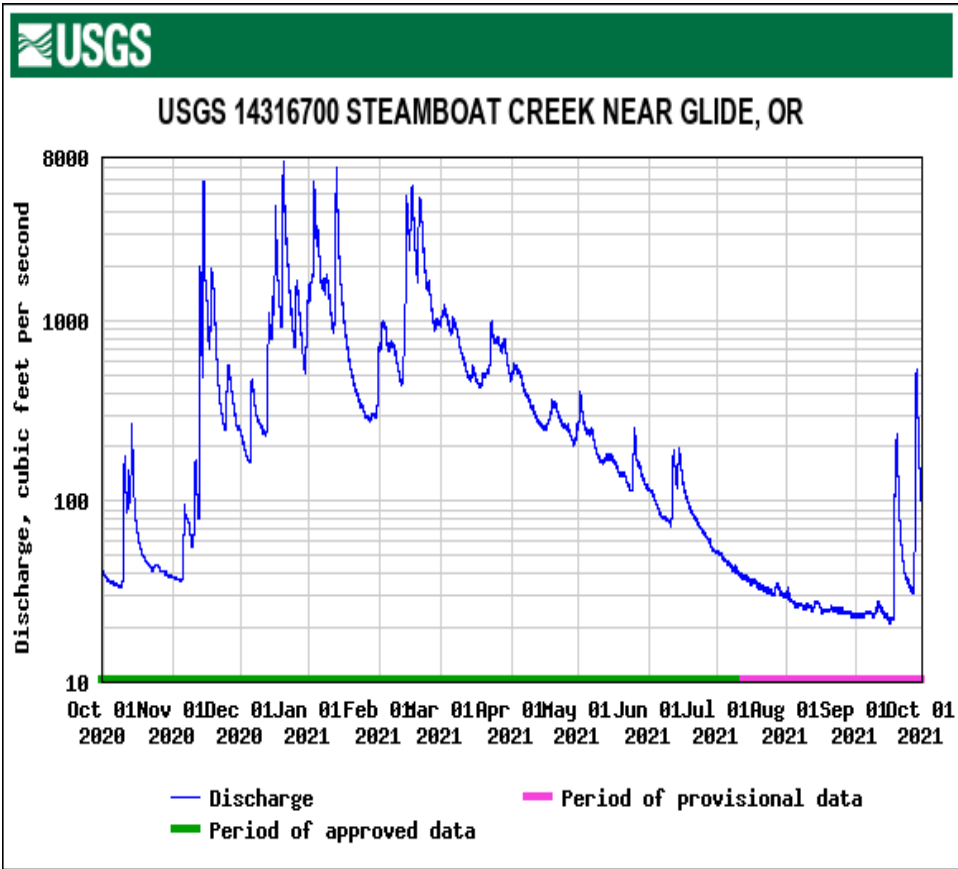
The Water Year

The water year (October 1, 2020 to September 30, 2021) was a fairly typical water year in that there were two high flow events of about equal size that occurred in December and January in the Steamboat basin, including Canton Creek, and each of the subsequent major storms had a lower flow than the previous one (Figure 1).

However, the high flow events were only about 8,000 cubic feet per second (cfs). This is enough flow to get the steelhead into the tributaries, but it is not enough to make it easy for the fish to make it far into the headwaters of the tributary streams. The fish were able to make it into the tributary streams in January and the subsequent storms were not large enough to scour the eggs out of the redds (nests). On the whole, this water year

was conducive to successful spawning and fry emergence. This situation usually produces a larger than average age-0 steelhead population. However, the summer

low-flows were significantly below average. The median low flow at the Steamboat Creek USGS gage for the 65 years of record is about 45 cfs. The flows recorded for much of September were about 25 cfs. This lower-than-average flow reduces stream habitat and increases stream temperature issues for the summer months.



SURVEYED REACHES

During July and August of 2021, the snorkel survey of the basin was completed. The following tributaries were surveyed: Buster Creek, City Creek, E. Fork of Steamboat Creek, Horse Heaven Creek, and Little Rock Creek. (see Figure 2).

All of the mainstem of Steamboat was surveyed above Cedar Creek. These are the only areas of Steamboat Creek that we could complete during the year, because of the wildfires. The resulting road and land closures by the U.S. Forest Service meant that we did not have access to the rest of the basin. Enclosed are the individual surveys of Steamboat Creek by year starting in 2019. (Tables 1-3)

Salmonid Population Estimates

The results of the three years of snorkel surveys are summarized in Tables 1-3. Steelhead trout, and cutthroat trout were observed and their populations estimated in the basin.

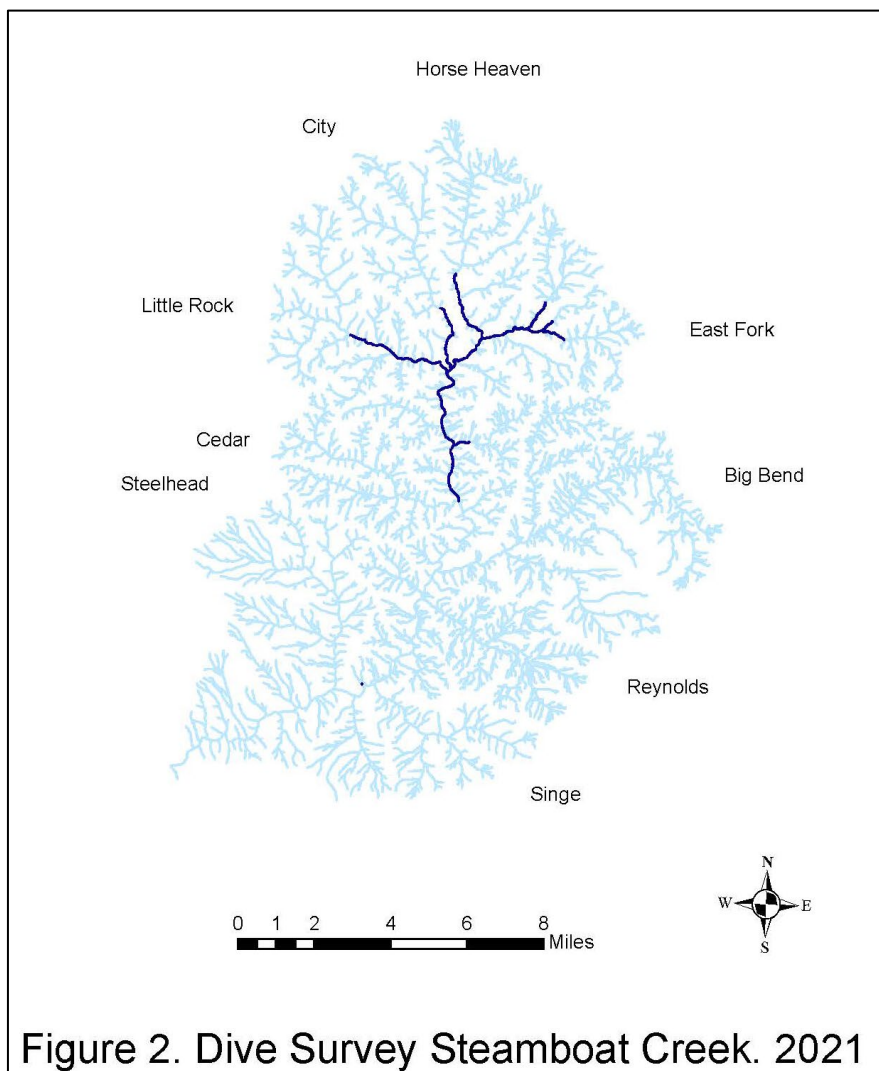


Figure 2. Dive Survey Steamboat Creek. 2021

Table 1. Salmonid population estimates from section of the mainstem Steamboat Creek and tributaries 2019.

Stream Reach	Steelhead age-0	Steelhead age-1	Steelhead age-2	Cutthroat
Mainstem:				
Mouth to Falls	60	117	177	20
Steelhead to Singe Creek	134	246	161	36
Big Bend to Cedar Creek	179	132	44	26
Cedar to Little Rock Creek	760	91	8	16
Little Rock to Horse Heaven Creek	1896	336	58	9
Horse Heaven to Headwaters	240	183	0	28

Table 2. Total number of Salmonids in Steamboat Creek Basin 2020

Stream Reach	Steelhead age-0	Steelhead age-1	Steelhead age-2	Cutthroat
Mainstem:				
Mouth to Steelhead	10148	1633	1461	274
Steelhead to Reynolds	7420	727	320	88
Reynolds to Big Bend	2088	32	21	59
Big Bend to Cedar Creek	2555	131	11	151
Cedar to Little Rock Creek	8897	284	105	133
Little Rock to Horse Heaven Creek	4921	151	174	39
Horse Heaven to Headwaters	4549	203	16	32
Totals	40578	3161	2108	776

Table 3 . Total number of Salmonids in Steamboat Creek Basin 2021

Stream Reach	Steelhead age-0	Steelhead age-1	Steelhead age-2	Cutthroat
Mainstem:	-	-	-	-
Mouth to Steelhead	-	-	-	-
Steelhead to Reynolds	-	-	-	-
Reynolds to Big Bend	-	-	-	-
Big Bend to Cedar Creek	-	-	-	-
Cedar to Little Rock Creek	8433	380	38	40
Little Rock to Horse Heaven Creek	9001	277	6	11
Horse Heaven to Headwaters	2950	238	16	
Totals	20384	895	60	51

Age-0 Steelhead

In 2019, age-0 steelhead estimates were significantly lower at all but one site than in the other years, because of a major storm in April 2019 (Table 4). This storm destroyed a significant portion of the eggs and emerging steelhead fry. The exception was Cedar Creek which had 2,864 age-0 steelhead in 2019 and 2,410 individuals in 2020. It appears that the 2019 storm had less effect on age-0 steelhead in the tributary than it did in the rest of the basin. In contrast, in 2019, Little Rock had the highest number of age-0 steelhead in the tributaries 3,968 individuals, but it also had 14,685 fish in 2020. Clearly, the storm affected Little Rock to a greater extent than it did Cedar Creek. The 2019 storm also greatly affected the number of age-0 steelhead in City and Horse Heaven Creeks. In 2019, City and Horse Heaven Creeks had 1,278 and 1,281 individuals, respectively. In the next year, City and Horse Heaven Creeks had 1,919 and 5,771 fish, respectively.

In the mainstem of Steamboat Creek above Cedar Creek, all three sections had greatly reduced numbers in 2019, also assumed to be the result of the April storm. In two of the three mainstem reaches the number of age-0 fish was less than 10% of the number of fish in the following year.

In conclusion, the storm of 2019 severely reduced the populations of age-0 steelhead in all the mainstem reaches and all the tributaries except Cedar Creek where a similar number of fish were observed in the two years. Little Rock Creek has the largest population of age-0 steelhead in the tributaries.

Comparing the surveys from 2020 with the surveys of 2021 yielded a few observations with regard to the age-0 fish. In general, i.e., on two of three mainstem reaches and three of five tributaries, the populations of age-0 steelhead were greater in 2020 than in 2021. However, a couple of the exceptions were significantly different. In the mainstem reach from Little Rock to Horse Heaven the population of age-0 fish increased from 4,921 to 9,001 and in City Creek the population of age-0 steelhead increased from 1,919 to 6,498 fish. It is interesting that the two exceptions were adjacent reaches.

Table 4. Age-0 salmonid population estimates from sections of the mainstem Steamboat Creek and tributaries 2019-21.

Stream Reach	2019	2020	2021
<i>Mainstem:</i>			
Mouth to Falls	60		
Steelhead to Singe Creek	134		
Big Bend to Cedar Creek	179		
Cedar to Little Rock Creek	760	8897	8433
Little Rock to Horse Heaven Creek	1896	4921	9001
Horse Heaven to Headwaters	240	4549	2950
<i>Tributaries</i>	2019	2020	2021
Big Bend Creek	362	2843	
Buster Creek		185	206
Cedar Creek	2,864	2410	
City Creek	1,278	1919	6498
East Fork Steamboat Creek	26	572	374
Horse Heaven Creek	1,281	5771	5503
Little Rock Creek	3,968	14685	9915
Reynolds Creek	639	198	
Singe Creek	171	156	
Steelhead Creek	921	525	
East Fork Headwaters	19		

Age-1 Steelhead

The general pattern for age-1 steelhead in the tributaries is that 2020 was the year with the largest populations and both 2019 and 2021 had lower populations (Table 5). There are three exceptions to the pattern: Cedar, Little Rock, and East Fork Steamboat Creek. In Cedar Creek, the number of age-1 Steelhead was significantly higher in 2019, while the East Fork and Little Rock Creeks were higher in 2021. It is curious that the majority of sites had their highest age-1 steelhead populations in 2020, as almost without exception the age-0 populations were their lowest the year before. This suggests that the number of age-0 steelhead is not what is limiting the production of steelhead to age-1.

In the three mainstem reaches, no pattern was observed. In the reach from Cedar to Little Rock Creeks year 2022 had the largest populations. In the reach from Little Rock to Horse Heaven Creeks year 2020 had the largest populations. And in the reach above Horse Heaven year 2020 had a slightly greater population than 2022.

Table 5. Age-1 salmonid population estimates from sections of the mainstem Steamboat Creek and tributaries 2019- 2021.

Stream Reach	2019	2020	2021
<i>Mainstem:</i>			
Cedar to Little Rock Creek	91	284	380
Little Rock to Horse Heaven Creek	336	151	277
Horse Heaven to Headwaters	183	203	238
	2019	2020	2021
<i>Tributaries</i>			
Big Bend Creek	114	308	
Buster Creek		19	8
Cedar Creek	893	135	
City Creek	125	282	244
East Fork Steamboat Creek	12	6	42
Horse Heaven Creek	116	243	377
Little Rock Creek	166	312	530
Reynolds Creek	241	142	
Singe Creek	85	87	
Steelhead Creek	363	215	
East Fork Headwaters	13		

Age-2 Steelhead

The general pattern for age-2 steelhead in the mainstem of Steamboat Creek is that 2020 had the highest populations (Table 6). The highest populations in the mainstem reaches were between Cedar and Horse Heaven Creeks. This is the same pattern as the age-1 fish. There is less of a pattern in the tributaries. The only tributary that has the same pattern as the mainstem reaches is Horse Heaven. Big Bend had the largest population in 2019, and City and Little Rock had their largest populations in 2021.

Table 6. Age-2 salmonid population estimates from sections of the mainstem Steamboat Creek and tributaries 2019- 2021.

Stream Reach	2019	2020	2021
<i>Mainstem:</i>			
Cedar to Little Rock Creek	8	105	38
Little Rock to Horse Heaven Creek	58	174	6
Horse Heaven to Headwaters	0	16	16
	2019	2020	2021
<i>Tributaries</i>			
Big Bend Creek	164	45	
Buster Creek		5	0
Cedar Creek	115	118	
City Creek	15	35	40
East Fork Steamboat Creek	0	0	11
Horse Heaven Creek	24	76	17
Little Rock Creek	24	12	84
Reynolds Creek	47	16	
Singe Creek	76	21	
Steelhead Creek	64	63	
East Fork Headwaters	0		

Cutthroat Trout

The general pattern for Cutthroat trout in the mainstem of Steamboat Creek is that the highest populations occurred during the 2020 year in all three reaches that were surveyed in all three years (Table 7). This is the same pattern as age-1 and age-2 steelhead. There were too few fish to establish patterns in the tributaries.

Table 7. Cutthroat trout population estimates from sections of the mainstem Steamboat Creek and tributaries 2019- 2021.

Stream Reach	2019	2020	2021
<i>Mainstem:</i>			
Cedar to Little Rock Creek	16	133	40
Little Rock to Horse Heaven Creek	9	39	11
Horse Heaven to Headwaters	28	32	0

	2019	2020	2021
<i>Tributaries</i>			
Big Bend Creek	38	53	
Buster Creek		5	0
Cedar Creek	98	10	
City Creek	5	0	6
East Fork Steamboat Creek	34	22	0
Horse Heaven Creek	10	26	9
Little Rock Creek	49	12	5
Reynolds Creek	47	0	
Singe Creek	19	5	
Steelhead Creek	33	5	
East Fork Headwaters	0		

Summary

The water year (October 1, 2020 to September 30, 2021) was a fairly typical water year in that there were two high flow events of about equal size that occurred in December and January and each of the subsequent major storms had a lower flow than the previous one. However, the high flow events were only about 8,000 cfs. This is enough flow to get the steelhead into the tributaries, but it is not enough to make it easy for the fish to make it far into the headwaters of the tributary streams. The fish were able to make it into the tributary streams in January and the subsequent storms were not large enough to scour the eggs out of the redds (nests). On the whole, this water year was conducive to successful spawning and fry emergence. This situation usually produces a larger than average age-0 steelhead population. However, the summer low-flows were significantly below average. The median low-flow at the Steamboat Creek USGS gage for the 65 years of record is about 45 cfs. The flows recorded for much of September were about 25 cfs. This lower-than-average flow reduces stream habitat and increases stream temperature issues for the summer months.

Conclusions

A general pattern in the steelhead population estimates of all ages was that the highest number of individuals was found in many mainstem reaches and tributaries during the 2020 survey. The numbers of all ages of steelhead were low in the 2019 survey as a result of a large magnitude April Storm. Age-0 steelhead were higher in the Cedar Creek basin in 2019 than in 2020. This suggests that the storm may have affected this creek less than the others. Little Rock Creek has the largest population of age-0 steelhead in the basin.

Age-1 steelhead also were generally most abundant during the 2020 survey. This is a curious phenomenon. In the previous year, the age-0 fish had the lowest population levels. In the next year as age-1 fish they have the highest population levels.

Age-2 steelhead in the mainstem were most abundant in the year 2020. In the upper part of the basin, they are most abundant from Cedar Creek to Horse Heaven Creeks. Age-2 steelhead in the tributaries did not show a dominant

pattern.

Cutthroat trout also showed the same pattern in the mainstem reaches that were surveyed in all three years. They were most abundant in 2020. There were too few cutthroat to establish a pattern in the tributaries.

