



Annual Report FY 2022
And Summary of 2019 – 2022 Results
Steamboat Creek Snorkel Surveys

Prepared by Pacific Rivers

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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 2022, a snorkel survey was completed by Andrew Dewberry, Emma Latendresse, Isaiah Hall, and Charley Dewberry. The survey included all of the mainstem of Steamboat Creek and all the major tributaries except Big Bend Creek. This is the fourth year of our survey.

In 2022, we surveyed all the mainstem of Steamboat Creek including Black Gorge and all the major tributaries except Big Bend, where the flows did not drop until the end of the season, and we were not able to finish it by the end of August. Big Bend Creek is characterized by high summer base-flows which make good snorkel estimates difficult until late in the summer in a normal year. Several minor tributaries including Singe, Reynolds, the headwaters of Steamboat Creek, and the East Fork of Steamboat Creek were not surveyed as we determined in previous years that the majority of fish in them are resident fish, not steelhead.

In 2022, we surveyed all of the mainstem of Steamboat Creek and we estimated that there were about 7,668 age-0 steelhead in the mainstem of Steamboat Creek and we estimated that there were 3,530 age-0 steelhead in the major tributaries of Steamboat Creek. The highest estimate of age-0 fish in the mainstem were in the section from Steelhead Creek to Big Bend. Over 70% of the age-0 steelhead estimated in the tributaries were in Cedar Creek.

Age-1 steelhead were distributed throughout the mainstem of Steamboat Creek. It is estimated that there were 5,509 fish in the mainstem. They were widely distributed and the reach from Steelhead Creek to Big Bend had the highest number. The estimated number of age-1 steelhead in the tributaries was 1,826 fish. Over 50% of the age-1 fish in the tributaries were in Little Rock Creek.

Age-2 steelhead were primarily observed in the mainstem of Steamboat Creek. We estimated that there were 2,604 age-2 fish in the mainstem with 38% of them in the reach from Steelhead to Big Bend Creek. It is estimated that there were 569 age-2 steelhead in the tributaries and 40% of them were in Little Rock Creek.

Cutthroat trout are primarily observed in the mainstem of Steamboat Creek. We estimated the population in the mainstem as 983 fish; again, the reach from Steelhead Creek to Big Bend Creek had over 50% of the estimated population. We estimated that there were 40 cutthroat in tributaries.

The water year (October 1 to September 30) was a typical water year from October to January. There were a series of 6 storms, each larger than the previous one. The largest peak flow of the year occurred in early January. It was a little under 8,000 cubic feet per second (cfs), which is less than normal. 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. After the January storm there was not a major storm until early March. In early March there started a series of nine storms between 1,000- 4,000 cfs which did not end until mid-June. As a result of these storms, the summer base-flows were higher than normal.

The population of age-0 steelhead in the mainstem of Steamboat Creek was the second lowest of the four sample years. The lowest year estimates of age-0 steelhead occurred 2019. There was a storm in April, with a peak-flow of 18,000 cfs, which scoured out the eggs from the redds. During this year, there were the series of storms from March through mid-June that probably greatly reduced the survival of the age-0 steelhead emerging from the gravel. The middle two years with more normal flows had significantly greater number of age-0 steelhead. For example, during the two more normal years, over 8,000 age-0 steelhead were observed in the mainstem reach from Cedar Creek to Little Rock Creek. This is higher than the 7,668 fish observed in the entire mainstem during the current year.

In the tributaries, a similar pattern to the mainstem was observed for age-0 steelhead, except in a couple tributaries this year had the lowest number of age-0 steelhead. For example, In Little Rock Creek, the estimated populations of age-0 steelhead for the four years was 3,968 in 2019, 14,685 in 2020, 9,915 in 2021, and 399 in 2022. Curiously, Cedar Creek had estimates between 2,400 and 2,800 in the three years it has been surveyed, including this year.

For age-1 steelhead, this survey year had by far the greatest population estimate of fish in the mainstem. Every stream reach within the mainstem had the highest estimate of the four years. In the tributaries, age-1 steelhead generally were higher this year than other years, but there were exceptions. In Cedar Creek, the estimated number of age-1 steelhead was 893 in 2019, the year of the major storm, and it was 198 during the current year. In Little Rock Creek the four years of survey were: 166 in 2019, 312 in 2020, 530 in 2021, and 930 in 2022. It appears that the series of storms in the spring were a benefit to age-1 steelhead in the tributaries.

Age-2 steelhead are predominantly found in the mainstem of Steamboat rather than in the tributaries. During the current year, the population estimate was higher than previous years in all reaches of the mainstem except one, Little Rock Creek to Horse Heaven Creek. In the tributaries, Little Rock Creek and City Creeks had the highest estimates of the four years.

Cutthroat trout are primarily found in the major pools in the mainstem of Steamboat Creek. The population estimate was probably highest in 2022, but 2020 was a close second. This year the highest estimated population was in the reach between Steelhead Creek and Big Bend Creek.

In summary, what characterized this water year was a typical year from October to December, which likely led to above average spawning success. However, the series of high flows from April to June were highly detrimental to age-0 steelhead as they were emerging from the gravel. The other age classes of steelhead trout and cutthroat trout likely benefited from the higher-than-average summer flows, maintaining more habitat and buffering stream temperatures.

INTRODUCTION

The Frank and Jeanne Moore Steelhead Sanctuary, 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 2022 a snorkel survey of the mainstem and tributaries was completed by Andrew Dewberry, Emma Larendresse, Isaiah Hall, and Charley Dewberry. The survey included all of the mainstem of Steamboat Creek and all the major tributaries of Steamboat Creek except Big Bend 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 provides 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. 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.

THE WATER YEAR

The water year (October 1 to September 30) was a typical water year from October to January (Figure 1). There were a series of six storms, each larger than the previous one. The largest peak flow of the year occurred in early January. It was a little under 8,000 cfs, which is less than normal. 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. After the January storm, there was not a major storm until early March. In early March, there started a series of nine storms between 1,000- 4,000 cfs which did not end until mid-June. As a result of these storms, the summer base-flows were higher than normal.

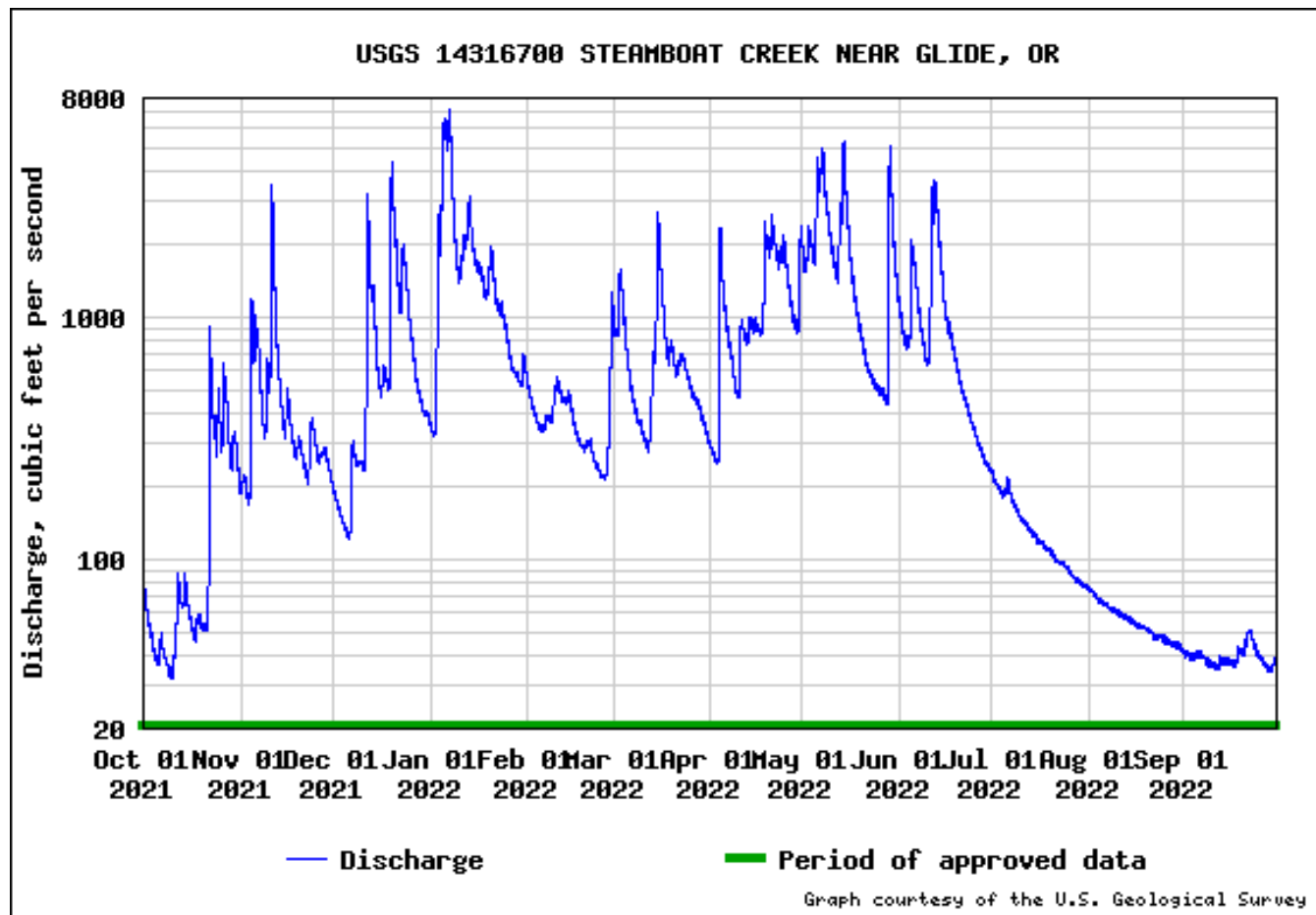


Figure 1: Annual hydrograph for Water Year 2022.

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 chose 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

Surveyed Reaches

During July and August 2022, the snorkel survey of the basin was completed. All of the mainstem of Steamboat Creek and all of the major tributaries except Big Bend Creek were surveyed. (See Figure 2 and Appendix Figure B-1).

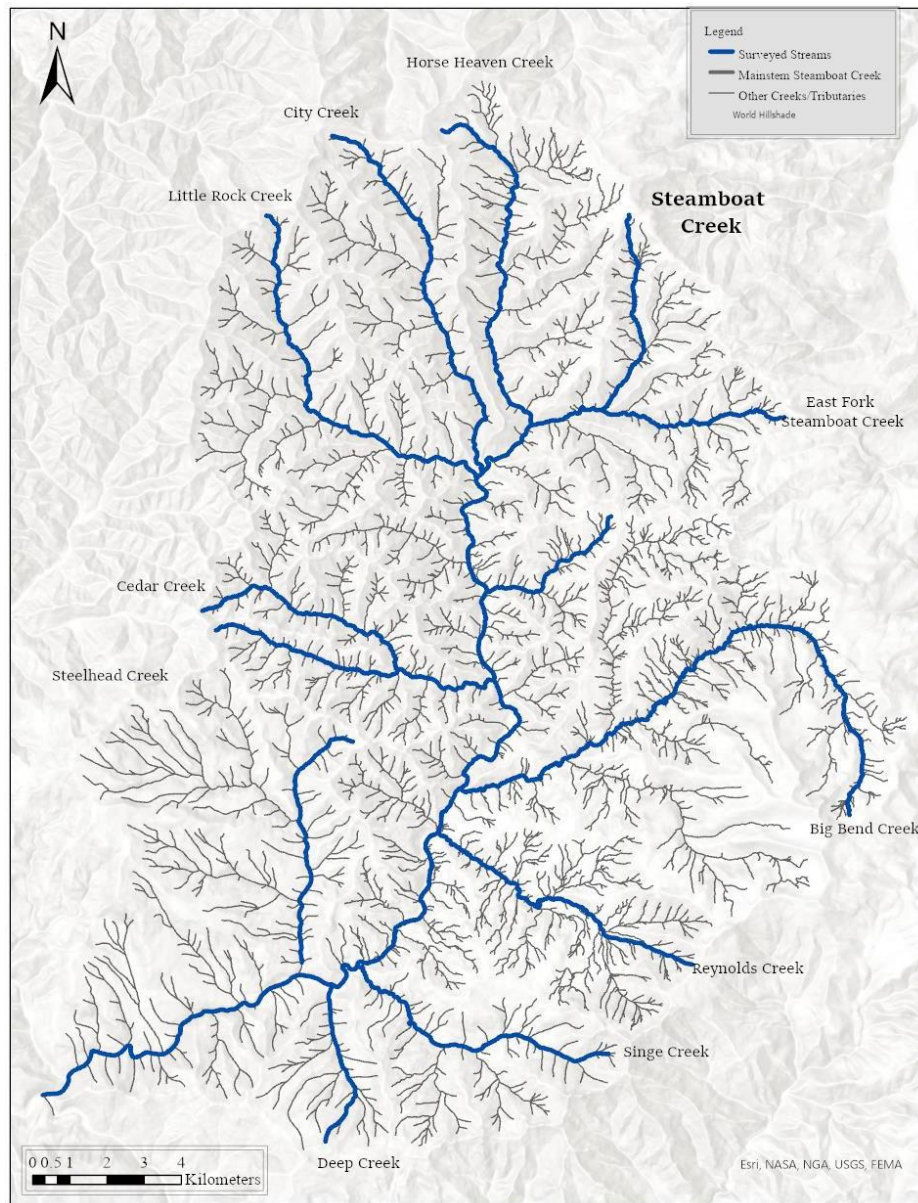


Figure 2: Surveyed tributaries in the Steamboat Creek watershed. Note the full reach of each tributary may not have been surveyed, only those reaches that an adult salmonid could have access to.

Analysis of Steelhead Populations by Age

Age-0 Steelhead

In 2022, we surveyed all of the mainstem of Steamboat Creek and we estimated that there were about 7,668 age-0 steelhead in the mainstem of Steamboat Creek and we estimated that there were 3,530 age-0 steelhead in the major tributaries of Steamboat Creek (Table 1). The highest estimate of age-0 fish in the mainstem were in the reach from Steelhead Creek to Big Bend Creek. The distribution of age-0 steelhead followed a bell-shaped curve with the highest estimated population in the reach from Steelhead Creek to Big Bend Creek. The estimates decreased in a series both upstream and downstream of that reach. The population estimates of age-0 steelhead in each of the tributaries were under 400, except for Cedar Creek which had an estimated population of 2,581 fish, which is over 70% of the age-0 steelhead estimated in all the tributaries.

Table 1: Salmonid population estimates from section of the mainstem Steamboat Creek and tributaries 2022.

Stream Reach

Mainstem:	STHD-0	STHD-1	STHD-2	CUT
Mouth- Little Falls	294	143	279	114
Little Falls to Steelhead	720	1119	373	104
Steelhead- Big Bend	2,203	1919	998	503
Big Bend-Cedar	1620	424	343	65
Cedar- Little Rock	1450	1187	428	144
Little Rock- Horse Heaven	900	466	127	20
H.H. - Headwaters	481	251	56	33
	7,668	5,509	2,604	983

Tributaries	STHD-0	STHD-1	STHD-2	CUT
Buster	21	36		10
Cedar	2,581	198	80	0
City Creek	171	396	100	6
Horse Heaven Creek	231	108	5	5
Little Rock Creek	399	930	246	9
Steelhead Creek	127	158	138	10
	3,530	1,826	569	40

The population of age-0 steelhead in the mainstem of Steamboat Creek was the second lowest of the four sample years (previous year's data are provided in Appendix A, Tables A1-A3). The lowest year estimates of age-0 Steelhead occurred in 2019. There was a storm in April 2019, with a peak-flow of 18,000 cfs, which scoured out the eggs from the redds. During this year, there were the series of storms from March through mid-June that probably greatly reduced the survival of the age-0 steelhead emerging from the gravel. The middle two years with more normal flows had significantly greater number of age-0 steelhead than did 2019 or 2022. For example, during the two more normal years, over 8,000 age-0 steelhead were observed in the mainstem reach from Cedar Creek to Little Rock Creek. This is higher than the 7,668 fish observed in the entire mainstem during the current year.

In the tributaries a similar pattern is observed for age-0 steelhead, except several tributaries this year had the lowest number of age-0 steelhead. For example, in Little Rock Creek, the estimated populations of age-0 steelhead for the four years was 3,968 in 2019, 14,685 in 2020, 9,915 in 2021, and 399 in 2022. Curiously, Cedar Creek had estimates between 2400 and 2800 in the three years it has been surveyed, including this year.

Age-1 Steelhead

Age-1 steelhead are distributed throughout the mainstem of Steamboat Creek. It is estimated that there were 5,509 fish in the mainstem in 2022. They were widely distributed and the reach from Steelhead Creek to Big Bend had the highest number. In general, the highest reaches in the basin from Little Rock Creek upstream and below Little Falls had lower population estimates than the other reaches of the mainstem. The sole exception was the reach from Big Bend to Cedar that had only an estimate of 424 fish. The estimated number of age-1 steelhead in the tributaries was 1,826 fish. Over 50% of the age-1 fish in the tributaries were in Little Rock Creek.

For age-1 steelhead, this survey year had by far the greatest population estimate of fish in the mainstem (Table 2). Every stream reach within the mainstem was had the highest estimate of the four years. In the tributaries, age-1 steelhead generally were higher this year than other years, but there were exceptions. In Cedar Creek, the estimated number of age-1 steelhead was 893 in 2019, the year of the major storm, and it was 198 during the current year. In Little Rock Creek the four years of survey were: 166 in 2019, 312 in 2020, 530 in 2021, and 930 in 2022. It appears that the series of storms in the spring were a benefit to age-1 steelhead in the Steamboat Basin. Also, the number of age-0 steelhead in the Steamboat Basin during 2021 was higher than average. With average survival from 2021 to 2022 it is expected that the age-1 steelhead would have a high population estimate for the year.

Table 2: Age-1 salmonid population estimates from sections of the mainstem Steamboat Creek and tributaries 2019- 2022.

Stream Reach				
Mainstem:	2019	2020	2021	2022
Mouth- Little Falls	117			143
Little Falls to Steelhead				1119
Steelhead to Big Bend		163		1919
Big Bend to Cedar	132	131		424
Cedar- Little Rock	91	284	380	1187
Little Rock- Horse Heaven	336	151	277	466
H.H. - Headwaters	183	203	238	251

Tributaries	2019	2020	2021	2022
Big Bend Creek	114	308		
Buster		19	8	36
Cedar	893	135		198
City Creek	125	282	244	396
E. Fork Steamboat	12	6	42	
Horse Heaven Creek	116	243	377	108
Little Rock Creek	166	312	530	930

Reynolds	241	142		
Singe Creek	85	87		
Steelhead Creek	363	215		158
E. Fork Headwaters	13			

Age-2 Steelhead

Age-2 steelhead were primarily observed in the mainstem of Steamboat Creek in 2022 (Table 3). We estimated that there were 2,604 age-2 fish in the mainstem with 38% of them in the reach from Steelhead to Big Bend Creek. The population estimate of age-2 steelhead is basically a bell-shaped curve centered in the Steelhead to Big Bend reach and decreases in a series both upstream and downstream. The only minor exception is that the reach from Cedar Creek to Little Rock Creek had an estimated population about 100 fish more than expected. It is estimated that there were 569 age-2 steelhead in the tributaries and 40% of them were in Little Rock Creek.

During the current year, the population estimate was higher than previous years in all reaches of the mainstem except one, Little Rock Creek to Horse Heaven Creek. Therefore, this year had the highest population estimate of age-2 fish of the four sample years. In the tributaries, Little Rock Creek and City Creeks had the highest estimates of the four years. It appears that this cohort

had a number of things going for it. First, there were a large number of age-0 fish in 2020 which established this cohort. Second, survival to age-1 in 2021 was good. This led to a high population estimate last year (2021). Three, the current water year was favorable to high survival rates for these fish.

Table 3: Age-2 salmonid population estimates from sections of the mainstem Steamboat Creek and tributaries 2019- 2022.

Stream Reach				
Mainstem:	2019	2020	2021	2022
Mouth to Little Falls	177			279
Little Falls to Steelhead				373
Steelhead to Big Bend		341		998
Big Bend to Cedar	44	11		343
Cedar- Little Rock	8	105	38	428
Little Rock- Horse Heaven	58	174	6	127
H.H. - Headwaters	0	16	16	56

Tributaries	2019	2020	2021	2022
Big Bend Creek	164	45		
Buster		5	0	0
Cedar	115	118		80
City Creek	15	35	40	100
E.Fork Steamboat	0	0	11	
Horse Heaven Creek	24	76	17	5
Little Rock Creek	24	12	84	246
Reynolds	47	16		
Singe Creek	76	21		
Steelhead Creek	64	63		138

Cutthroat Trout

Cutthroat trout are primarily observed in the mainstem of Steamboat Creek. We estimated the population in the mainstem as 983 fish, again the reach from Steelhead Creek to Big Bend Creek had over 50% of the estimated population. The distribution is a weak bell-shaped curve, much like the age-2 Steelhead. We estimated that there were 40 cutthroat trout in the tributaries.

Cutthroat trout are primarily found in the major pools in the mainstem of Steamboat Creek. The population estimate was probably highest in 2022, but 2020 was a close second. This year the highest estimated population was in the reach between Steelhead Creek and Big Bend Creek.

The reasons for the high population estimates are probably similar to the reasons that the age-2 steelhead estimates were high: a large number of age-0 fish in 2020, good survival to 2021, and a favorable water year with good survival in 2022.

Table 4: Cutthroat trout population estimates from sections of the Mainstem Steamboat Creek and tributaries 2019- 2022.

Stream Reach				
Mainstem:	2019	2020	2021	2022
Mouth to Little Falls	20			114
Little Falls to Steelhead				104
Steelhead to Big Bend		147		503
Big Bend to Cedar	26	151		65
Cedar- Little Rock	16	133	40	144
Little Rock- Horse Heaven	9	39	11	20
H.H. - Headwaters	28	32	0	33

Tributaries	2019	2020	2021	2022
Big Bend Creek	38	53		
Buster		5	0	10
Cedar	98	10		0
City Creek	5	0	6	6
E.Fork Steamboat	34	22	0	
Horse Heaven Creek	10	26	9	5
Little Rock Creek	49	12	5	9
Reynolds	47	0		
Singe Creek	19	5		
Steelhead Creek	33	5		10
E.Fork Hdwaters	0			

SUMMARY

During the current year we were able to complete the survey of the entire mainstem of Steamboat Creek and all of the major tributaries except Big Bend Creek. The population estimate for age-0 steelhead was probably low during the current year because of the series of storms from April through mid-June. Age-1 and age-2 steelhead and cutthroat all had population estimates that were high among the four years of sampling. The larger salmonids were less impacted by the series of storms than the age-0 fish.

APPENDIX A

SUPPLEMENTAL DATA SUMMARIES

<i>Table A-1. Snorkel survey results Steamboat Creek and Tributaries, 2004 to 2019.</i>					
Year	Reach	Sthd 0	Sthd 1+	Sthd 2+	Centrarchids
2002**	lower	139	24		
June 3 2004	lower	119	27*		108
June 4/2005	lower	577	49	23	101
June 3/2006	lower	183	110	27	0
June 2/ 2007	lower	223	25	17	25
June 7-8/ 2008	lower	393	8	15	0
Jun-08	Upper	601	87	23	
Jun-08	Right Fork	234	8	1	
Jun-08	Left Fork	75	8	5	
<i>2008 total</i>		<i>1303</i>	<i>111</i>	<i>44</i>	
June 2009	lower	116	12	11	0
June 2009	upper	210	105	19	
June 2009	right fork	4	4	0	
June 2009	left fork	0	26	0	
<i>2009 total</i>		<i>330</i>	<i>147</i>	<i>30</i>	
June 2010	lower	152	44	74	
June 2010	upper	207	9	4	
June 2010	right fork	43	4	4	
June 2010	left lork	8	0	4	
<i>2010 totals</i>		<i>410</i>	<i>57</i>	<i>86</i>	
June 2011	lower	15	146	69	
June 2011	upper	244	245	95	
June 2011	RF	42	12	0	
June 2011	LF	16	8	6	
<i>2011 totals</i>		<i>317</i>	<i>411</i>	<i>170</i>	
June 2012	lower	93	90	95	
June 2012	upper	66	39	18	
June 2012	RF	8	12	0	
June 2012	LF	0	4	4	
<i>2012 Totals</i>		<i>167</i>	<i>145</i>	<i>117</i>	
June 2013	lower	30	13	13	

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June 2013	upper	173	38	0
June 2013	RF	11	11	11
June 2013	LF	0	15	0
<i>2013 Totals</i>		<i>214</i>	<i>77</i>	<i>24</i>
June 2014	lower	197	32	16
June 2014	upper	320	61	22
June 2014	RF	87	26	0
June 2014	LF	0	0	8
<i>2014 Totals</i>		<i>604</i>	<i>119</i>	<i>46</i>
June 2015	lower	22	18	32
June 2015	upper	272	29	17
June 2015	RF	27	15	20
June 2015	LF	0	0	0
<i>2015 Totals</i>		<i>321</i>	<i>62</i>	<i>69</i>
June 2016	lower	53	42	2
June 2016	upper	93	60	37
June 2016	RF	94	5	3
June 2016	LF	0	0	0
<i>2016 Totals</i>		<i>240</i>	<i>107</i>	<i>42</i>
June 2017	lower	9	26	0
June 2017	upper	399	142	16
June 2017	RF	21	0	0
June 2017	LF	0	0	0
<i>2017 Totals</i>		<i>429</i>	<i>168</i>	<i>16</i>
June 2018	lower	0	9	30
June 2018	upper	78	102	28
June 2018	right	28	15	2
Jun-18	left	0	0	0
<i>2018 Totals</i>		<i>106</i>	<i>126</i>	<i>60</i>
June 2019	lower	18	4	4
June 2019	upper	275	77	23
June 2019	right	134	9	0
June 2019	left	7	0	1
<i>2019 totals</i>		<i>434</i>	<i>90</i>	<i>28</i>

* Includes Sthd 1+ and Sthd 2+

** Number of steelhead trout calculated from electrofishing efforts

APPENDIX A

Table A-2. Total number of Salmonids in Steamboat Creek Basin 2020				
Unit	Steelhead Age-0	Steelhead Age-1	Steelhead Age-2	Cutthroat
Mainstem:				
Mouth-ST	10148	1633	1461	274
ST-Rey	7420	727	320	88
Rey- BB	2088	32	21	59
BB-Cedar	2555	131	11	151
Ced-LR	8897	284	105	133
LR-HH	4921	151	174	39
H.Heaven	4549	203	16	32
Tributaries:				
Big Bend	2843	308	45	53
Buster	185	19	5	5
Cedar	2410	135	118	10
City	1919	282	35	0
E. Fork	572	6	0	22
H Heaven	5771	243	76	26
Little Rock	14685	312	12	12
Reynolds	198	142	16	0
Singe	156	87	21	5
Steelhead	525	215	63	5
<i>Totals</i>	<i>69,842</i>	<i>4,910</i>	<i>2,499</i>	<i>914</i>

Table A-3. Total number of Salmonids in Steamboat Creek Basin 2021				
Unit	Steelhead Age-0	Steelhead Age-1	Steelhead Age-2	Cutthroat
Mainstem:				
Mouth-ST				
ST-Rey				
Rey- BB				
BB-Cedar				
Ced-LR	8433	380	38	40
LR-HH	9001	277	6	11
H.Heaven	2950	238	16	
Tributaries:				
Big Bend				
Buster	206	8	0	0
Cedar				
City	6498	244	40	6
E. Fork	374	42	11	0
H Heaven	5503	377	17	9
Little Rock	9915	530	84	5
Reynolds				
Singe				
Steelhead				
<i>Totals</i>	<i>42,880</i>	<i>2,096</i>	<i>212</i>	<i>71</i>

APPENDIX B - Surveyed Reaches 2022

