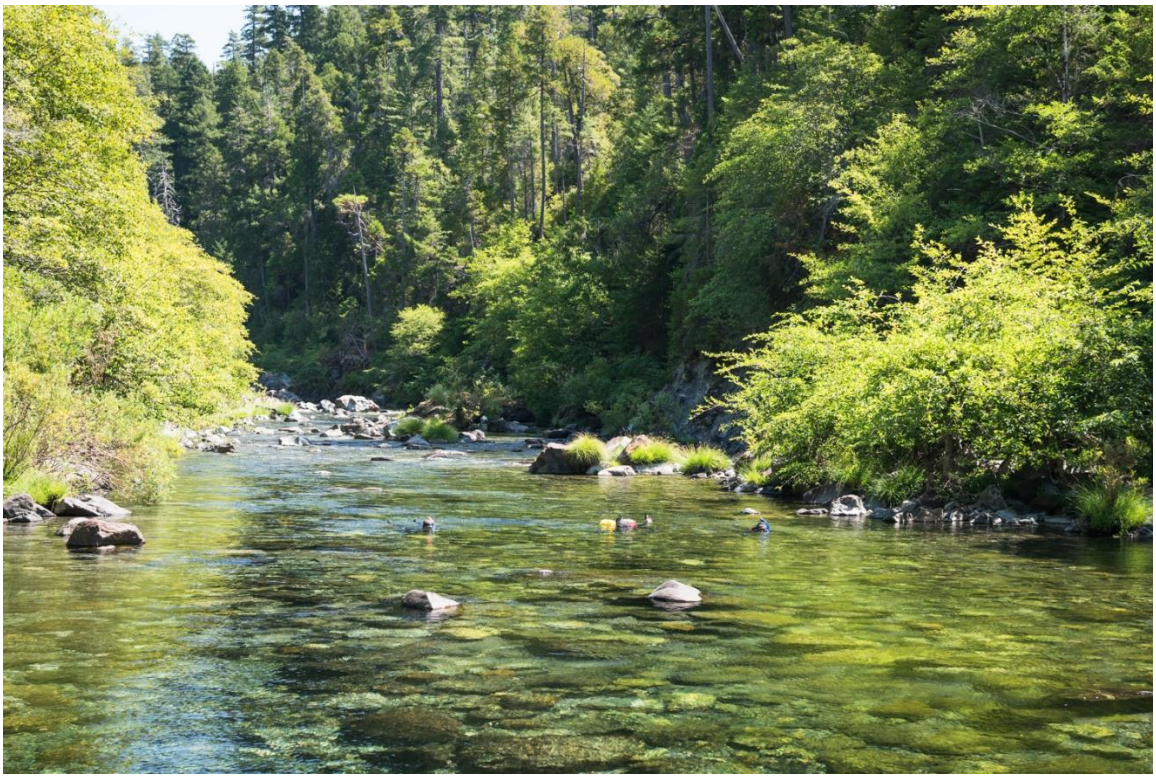
Smith River Volunteer Adult Salmonid Surveys

Summer 2020

With a 32-year Data Comparison



Volunteers surveying in 2019. Photo: *Jason Hartwick*

March 7, 2021

A Smith River Alliance Report by:

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SMITH RIVER ALLIANCE

Acknowledgements

Thanks to all the local volunteers who contributed to the event during a challenging year, your knowledge, survey skills, and continued participation to the event made this survey a reality. Thank you to all crew leaders, Mason London, Melissa Reneski, Vimal Golding, Jeff Borum, Darren Ward, Ali Singh, and John Deibner-Hanson, for leading their small teams in safely collecting the fish observations.

Thank you to Sam Mosey, Rock Creek Ranch caretaker, for hosting us at Rock Creek Ranch, home of Smith River Alliance, and maintaining a safe and sanitized environment. We thank Patty McCleary who continually reviewed COVID safety procedures and provided guidance to ensure this event could be safely conducted, this event would not be possible without you!

Coastal Cutthroat trout (*Oncorhynchus clarki clarki*), Upper South Fork Smith River *Vimal Golding*

Summary

Summer snorkel surveys aimed at searching for adult salmonids have been conducted across the Smith River basin for thirty-two years. The California Department of Fish and Wildlife performed the first surveys in 1982. The U.S. Forest Service and Humboldt State University, conducted surveys annually from 1989 to 1999. The Smith River Alliance continued the effort by organizing surveys from 2000 to present with the help of hundreds of volunteers.

This long-term collaborative effort has resulted in a thirty-two year survey record for the South Fork, twenty-seven years on the Middle Fork, and ten years on the North Fork in the Smith River Basin. Currently surveys record observations of all adult salmonids including Coastal Cutthroat Trout (*Oncorhynchus clarki clarki*), Summer steelhead trout (*O. mykiss*), steelhead half-pounders, spring Chinook Salmon (*O. tshawytscha*), and rainbow trout (*O. mykiss*). Observations of Klamath Small-scale Suckers (*Catostomus rimiculus*) are also documented. Observations of amphibians and reptiles have been recorded since 2011.

The annual total stream miles surveyed has varied over time. Therefore, fish abundance is reported as density per mile to allow for comparison across all 32 survey years. We report on the observations of the 2020 volunteer survey effort and how these data compare to the 32-year data set. The 2020 survey effort was reduced due to COVID-19 safety concerns. As such, volunteers were required to provide their own equipment, reside in Humboldt or Del Norte County, and to have participated in one of the last two years surveys.

Overall, we have found the density of coastal cutthroat trout (CCT) in the South Fork to be higher than the average compared to the 32- year data set but lower than the recent seven years. While, the density of total CCT has cyclically variety throughout the long-term data set, the overall trend shows an increase in density with the trend stabilizing over during recent survey years.

Adult spring Chinook salmon and summer steelhead trout (>16”) are far less common than CCT in the Smith River. Observed densities for both species in 2020 were less than the average of the long-term data set. The density of half-pounder steelhead trout (<12-15”) and rainbow trout were higher than average on the South Fork. Klamath small-scale densities were also lower than average in the South Fork in 2020 comparted to the data set. Other species observed included an adult Pacific Lamprey carcass and adult Green Sturgeon.

Introduction

Successful recognition of fluctuations and trends in a species population requires long-term monitoring. These data can also be used to assess and track a population's response to management, restoration, and environmental change over time. This information can then help guide management and restoration decisions to help protect species productivity and resilience. However, long-term monitoring over a large geographical area requires significant resources. Through collaborative effort and continued volunteer support, a 32-year data set of adult salmonids in the Smith River basin has been collected from 1989 to 2020.

This report describes the results of the survey conducted on the South Fork Smith River on August 1, 2020. Additionally, it summarizes the cumulative 32-year data set and explain how the 2020 species densities compare to the average densities over the longer time horizon.

Background

The Smith River has exceptional water quality and clarity providing an ideal setting to learn to identify, observe and count adult salmonids. The annual volunteer fish census is conducted during the summer with the objective of consistently and accurately counting adult salmonids in the Smith River. These data contribute to a long-term data set that first began in 1982, and has been collected annually since 1989, providing annual population density trends and distribution of adult salmonids. Due to dedicated assistance from citizen volunteers, these surveys also provide increased public awareness of the natural diversity and condition of the Smith River watershed. Surveys were first performed in 1982 by California Department of Fish and Wildlife (CDFW) for summer steelhead in all three Forks of the Smith River. In 1989 and 1990, the U.S. Forest Service (USFS) performed surveys along the majority of the South Fork and Humboldt State University performed surveys along the Middle Fork.

In 1991, CDFW performed the surveys. From 1992 to 1999, the USFS conducted surveys annually until 1999. Since 2000, the Smith River Alliance has led the organization, training, and reporting for these surveys. Survey effort on the South Fork Smith River has remained the highest priority, as this is where there is the longest continuous data set. With sufficient volunteers, additional surveys are conducted on the Middle Fork and North Fork of the Smith River. This report highlights the results from surveys conducted on August 1, 2020 and how these counts compare to those from past years survey efforts.

Study Area

The 725 square mile Smith River basin is recognized as a salmon stronghold, a wild and scenic river, as well as a National Recreation Area. From 2016 through 2018 the California Department of Fish and Wildlife designated a total of approximately 140 miles of South Fork Smith River and

multiple tributaries from the confluence with Craig's Creek upstream to the Island Lake Trail as Wild and Heritage Trout Waters (CDFW 2019).

The quantity of stream miles surveys on any given year is dependent on available volunteer surveyors. The available area to be surveyed includes sections of the South Fork, Middle Fork, and North Fork of the Smith River with a maximum total of 50 miles possible (Figure 1). With volunteers, a single survey stream section (reach) ranges from 1.08 – 3.35 miles.

The volunteer sample frame includes at most, 12 reaches on the South Fork that can be surveyed from the mouth of Buck Creek to the confluence with the Middle Fork, a total of 21.61 miles. The Middle Fork is surveyed from the upper extent of anadromy at the Middle Fork Falls down to the South Fork confluence, a total of 27.29 miles across 14 reaches. A single reach of the North Fork can be surveyed which includes two units upstream from the confluence with Stony Creek to the confluence with the Middle Fork, 1.15 miles. Historic surveys conducted by USFS and CDFW covered a broader area extending into tributaries and upstream to Harrington Creek on the South Fork. Since 2000, the event coordinator has worked to survey the maximum stream miles possible each year depending on the number of volunteer surveyors attending the event.

Survey Methods

During the summer, when flows are low and water clarity is high, groups of 3-5 individuals conduct a snorkel survey along a continuous river reach while floating downstream through all pool habitats. All adult salmonids including Coastal Cutthroat Trout (*Oncorhynchus clarki clarki*), summer steelhead trout (*O. mykiss*), steelhead half-pounders, spring Chinook Salmon (*O. tshawytscha*), and rainbow trout (*O. mykiss*), as well as Klamath Small-scale Suckers (*Catostomus rimiculus*) observed during the survey are counted. Observations of any other adult salmonids observed such as Sockeye Salmon (*O. nerka*) and Chum Salmon (*O. keta*) are also recorded though these species are rare in the Smith River basin (Walkley and Garwood 2017).

During typical survey years all new participating volunteers attend a pre-survey training to practice proper survey methods, fish identification, and measurement techniques with qualified trainers having previous direct experience. Volunteers are taught to employ skills to reduce the probability of double-counting fish as well as how to safely navigate hazards present in the river. Due to COVID – 19 concerns, no training was coordinated for the 2020 volunteer survey. Instead, only volunteers who had participated in the 2018 and/or 2019 event, had background on fish ID and survey techniques, were residents of Humboldt or Del Norte County, and could provide their own equipment, were invited to participate in the 2020 event. Protocols and training materials were shared with all participants prior to the event to ensure uniform data collection and survey technique.

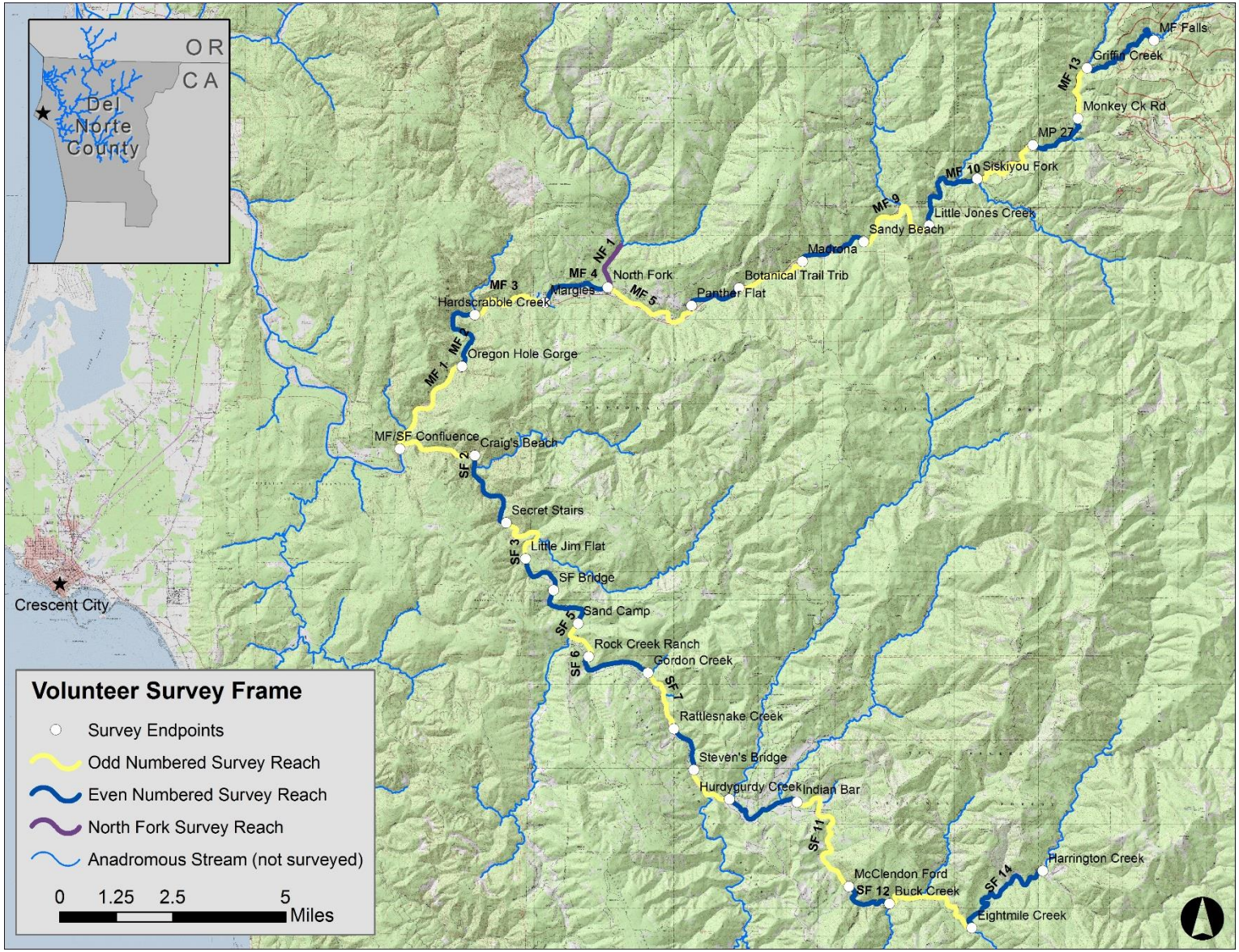

Figure 1. Stream reaches available to be surveyed during volunteer adult salmonid summer snorkel surveys in the Smith River basin, Del Norte County, CA.

Each survey crew was assigned a lead in charge of data recording and reporting while ensuring accurate and safe navigation throughout the assigned survey reach. Each group also included a surveyor comfortable with diving to ensure areas of cover such as boulders, logs, and ledges were thoroughly investigated for hiding fish. Survey members are instructed to watch for fleeing fish while another surveyor dives. Groups are taught to communicate by vocalizing and pointing to ensure fish are not doubled counted. Groups were configured using affinity and skills criteria; individuals who knew each other and had compatible surveying skillset. All surveys are conducted between 9:30 am and 5:00 pm during the optimal lighting conditions.

Only fish lacking juvenile parr marks are counted during a survey. Coastal Cutthroat Trout are counted by dividing them into two groups, small (< 12") and large (> 12") individuals. Summer steelhead trout are divided into adults (≥ 16") and half-pounders (12" – 15"). Also counted are spring Chinook Salmon > 16", rainbow trout > 10", and Klamath Small-scale Suckers > 6". Last, incidental observations of local aquatic mammals, amphibians and aquatic reptiles are also recorded at the reach-level but are not a focus of this survey.

Results

2020 Results

A total of 8 reaches were surveyed on August 1 and 2, 2020 with the help of 21 volunteers, all of which participated in the surveys (i.e., no additional volunteers contributed to shuttling). This was a reduced effort compared to previous years, which was a result of safety precautions taken due to COVID-19. No training was provided and only a limited number of participants were allowed at the event. As such 2020 had the fewest miles surveyed since 2001. Regardless surveys covered 11.29 miles of stream, approximately six miles less than the average South Fork miles surveyed in the 32-year data set (Figure 2). The South Fork was surveyed from Hurdygurdy Creek to the Sand Camp campground. The downstream most reach was also surveyed, from Craig's Beach to confluence with the Middle Fork covering 21.61 miles (Table 1).

The USGS gauge near Smith River (11532500) recorded a preliminary daily mean flow of 343 cubic feet per second (cfs) (USGS 2021); slightly lower than the average daily flow of 353 cfs during past fish counts. No volunteer surveys were conducted on the Middle Fork or North Fork. A total of 473 coastal cutthroat trout, three summer steelhead trout, one steelhead half-pounders, 127 Rainbow trout, three Klamath small-scale suckers, and zero spring Chinook salmon were observed across all surveys (Table 2). Additionally, four adult Green Sturgeon (*Acipenser medirostris*) were observed in the South Fork.

Cumulative Long-term Results

Similar to previous years, this year's total count of Coastal Cutthroat Trout (CCT) per mile was higher on average throughout the South Fork, though was lower than the densities recorded over the last seven years (i.e. since 2011) (Figure 3). Regardless, the total density of cutthroat was near the average of the

entire data set with densities at 1.29 times greater on the South Fork than the average of all previous years. Throughout the data set the density of CCT has increased in both the South Fork and Middle Fork since surveys began, though recent years appear to be fairly stable (Figure 4, Figure 5). As has been observed across the majority of the data set, we observed a higher density of small CCT per mile than large cutthroat per mile this year (Figure 4, Figure 5, Figure 6). As no surveys were conducted in the Middle Fork or North Fork no comparisons can be made to the previous year's data.

A total of three summer steelhead trout were observed. This density is below the average of past years surveys (Figure 7). A total of 127 Rainbow trout were detected this year, a higher-than-average density on the South Fork (Figure 8). Only one half-pounder and no spring Chinook salmon were observed, densities that were lower than average for the South Fork (Table 1, Figure 8, Figure 10). A total of three Klamath small-scale suckers were observed, with densities lower than average on the South Fork (Figure 11).

In 2014 there were high numbers of dead coastal giant salamanders (*Dicamptodon tenebrosus*) observed though the survey area. Fewer dead individuals have been observed annually since and none were observed on the South Fork this year. No juvenile Foothill yellow-legged frogs (*Rana boylii*) or other aquatic amphibians or reptiles were recorded. All of these species are cryptic animals and are difficult to detect with our survey protocol, so observations are incidental. One adult Pacific Lamprey (*Entospenus tridentatus*) carcass was detected in the South Fork. Lastly, four adult Green Sturgeon were observed in the South Fork in the downstream most reach (Table 1).

Table 1. Complete counts of fish observed across the South Fork (SF) Smith River during the volunteer fish count on August 3, 2019.

Reach	Top	Bottom	Length (miles)	Cutthroat <12"	Cutthroat >12"	Spring Chinook	Summer Steelhead	Half Pounder	Rainbow Trout	Sucker	Other/Notes	Crew Lead	Crew #
SF 1	Craig's Beach	Middle Fork	1.88	16	8	NA	NA	NA	10	2	4 green sturgeon	M. London	2
SF 2	Secret Stairs	Craig's Beach	2.04	NA	NA	NA	NA	NA	NA	NA			
SF 3	Little Jim Flat	Secret Stairs	1.74	NA	NA	NA	NA	NA	NA	NA			
SF 4A	SF Bridge	Little Jim Flat	1.25	NA	NA	NA	NA	NA	NA	NA			
SF 4B	Sand Camp	SF Bridge	1.41	101	53	0	2	0	1	0	Pacific Lamprey carcass	M. Reneski	4
SF 5	Rock Creek Ranch	Sand Camp	1.08	25	16	0	0	0	8	0		V. Golding	3
SF 6	Gordon Creek	Rock Creek Ranch	1.78	9	40	0	0	0	2	1		J. Borum	2
SF 7	Rattlesnake Creek	Gordon Creek	1.49	34	29	0	1	0	43	0		D. Ward	3
SF 8	Steven's Bridge	Rattlesnake Creek	1.12	6	17	0	0	0	29	0		A. Singh	4
SF 9	Hurdygurdy Creek	Steven's Bridge	1.21	31	20	0	0	0	7	0		J. Deibner-Hanson	3
SF 10	Indian Bar	Hurdygurdy Creek	1.94	NA	NA	NA	NA	NA	NA	NA			
SF 11	McClendon Ford	Indian Bar	3.35	NA	NA	NA	NA	NA	NA	NA			
SF 12	Buck Creek	McClendon Ford	1.32	42	26	0	0	1	27	0		M. London	2
	South Fork Totals		**21.61**	**264**	**209**	**0**	**3**	**1**	**127**	**3**			

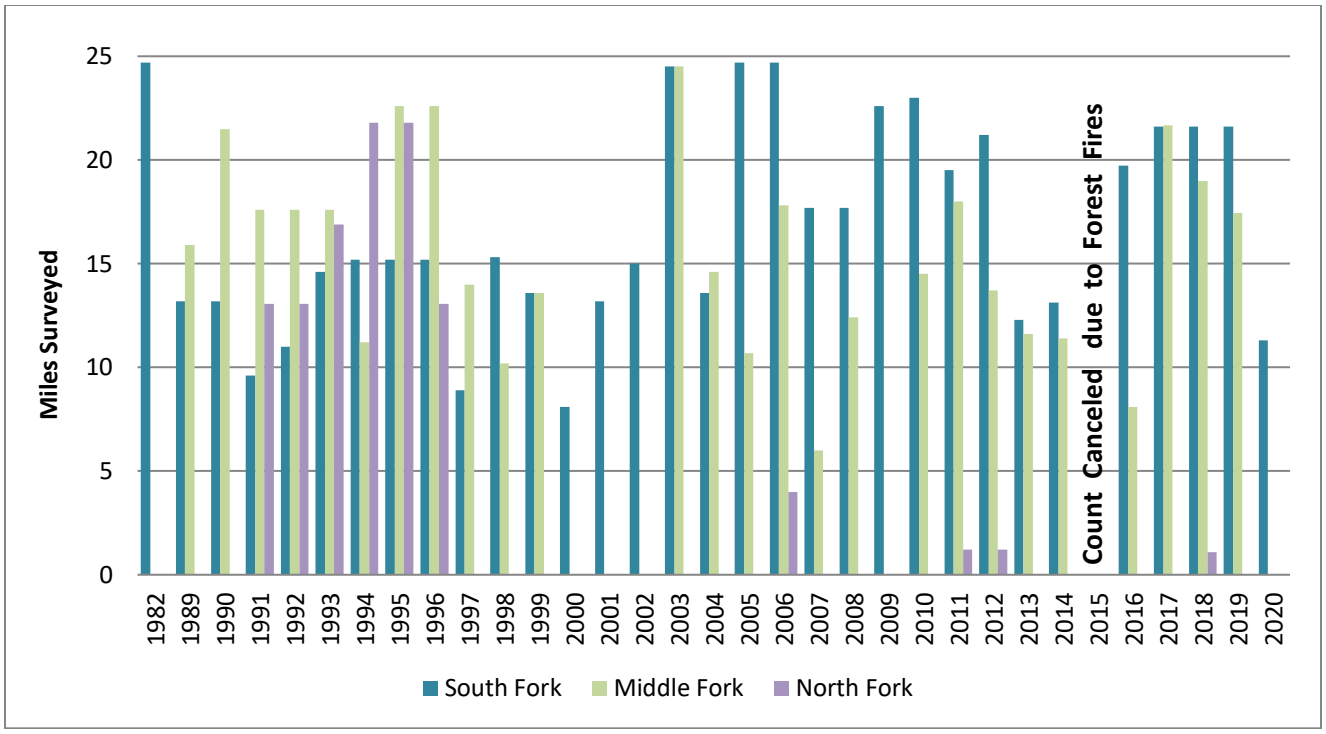

Figure 2. Number of stream miles surveyed each year fish counts have been conducted from 1982 to 2020 on the South Fork, Middle Fork, and North Fork Smith River. Surveys were not conducted on all forks every survey year, refer to Appendix A, B, and C for survey effort.

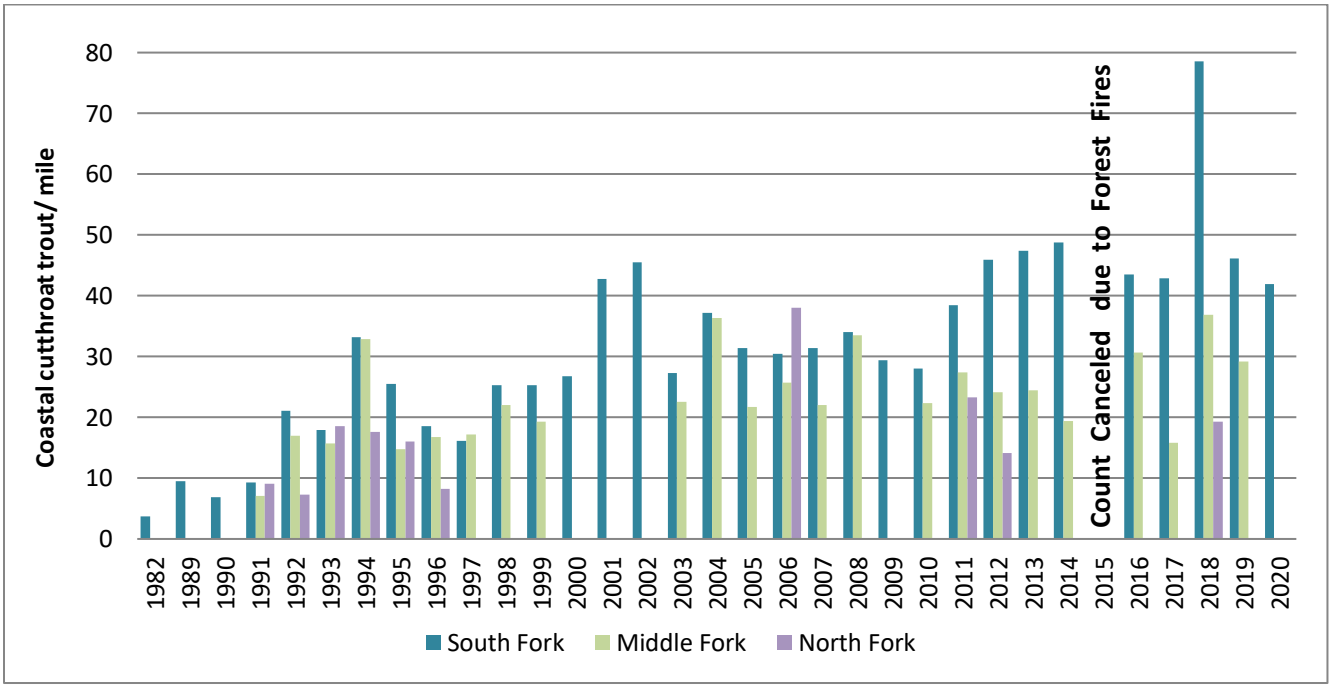

Figure 3. Density of total Coastal Cutthroat Trout counted per mile based on miles of river surveyed in the South Fork, Middle Fork, and North Fork Smith River from 1982 to 2020. Surveys were not conducted on all forks every survey year, refer to Appendix A, B, and C for survey effort.

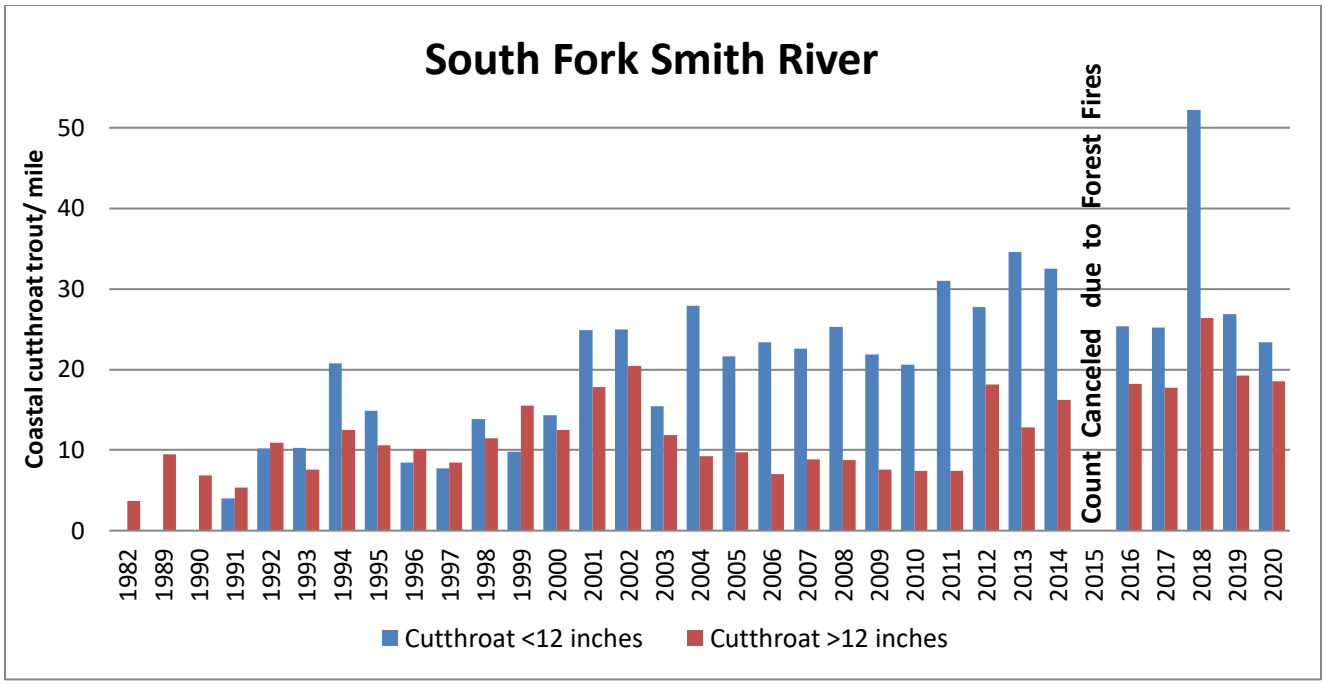

Figure 4. Density of small (<12”) and large (>12”) Coastal Cutthroat Trout based on counts per mile of river surveyed on the South Fork Smith River from 1982 to 2020.

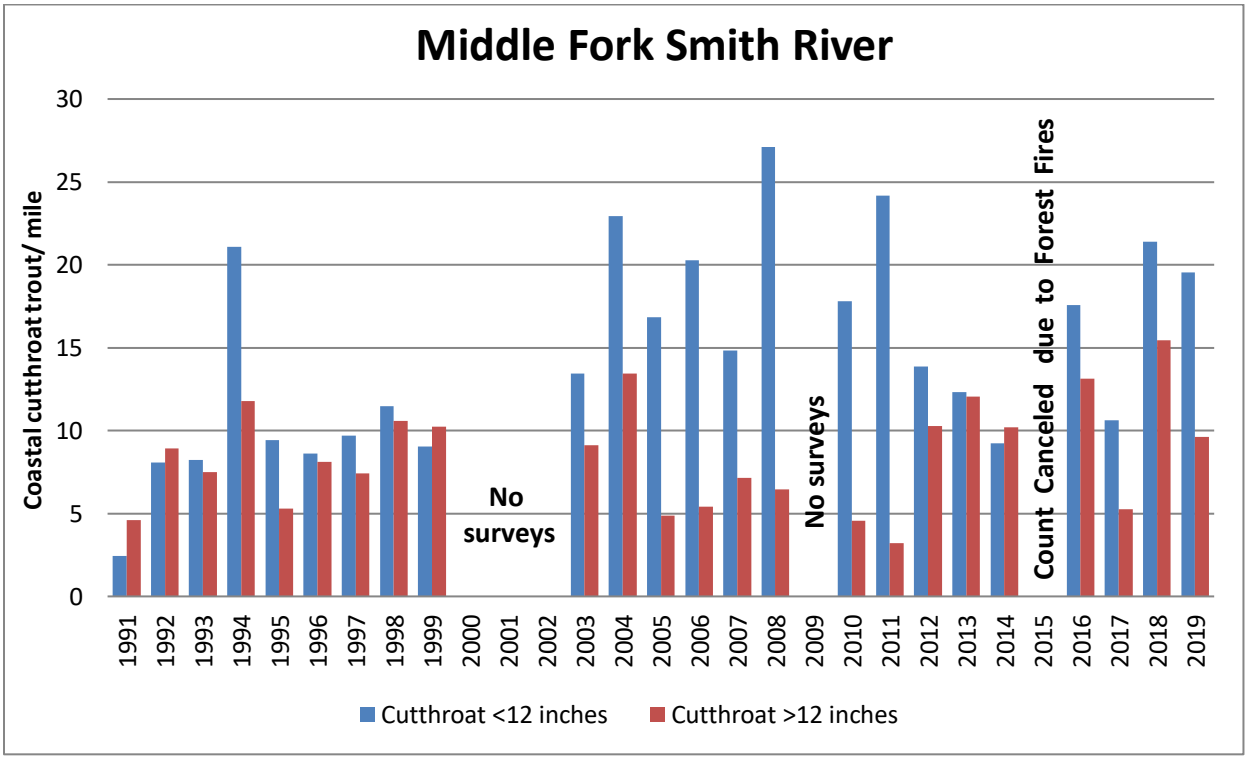

Figure 5. Density of small (<12”) and large (>12”) Coastal Cutthroat Trout based on counts per mile of river surveyed on the Middle Fork Smith River from 1991 to 2019. The Middle Fork was not surveyed in 2020.

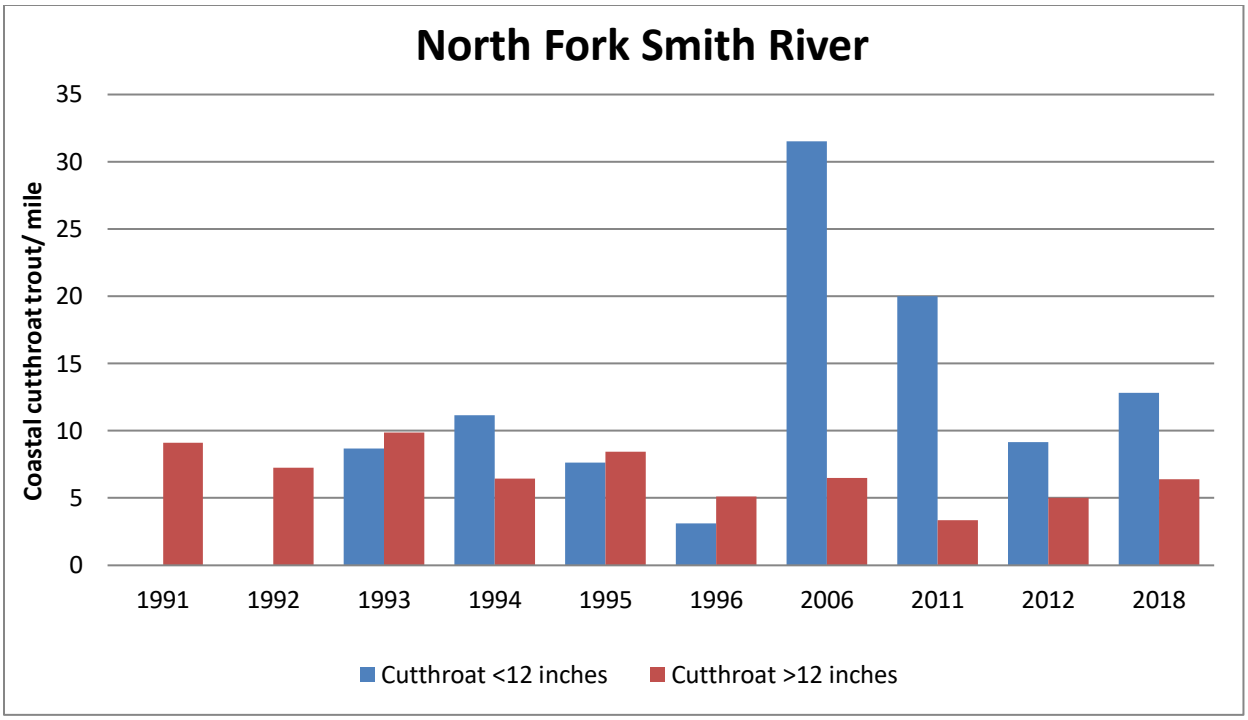

Figure 6. Density of small (<12”) and large (>12”) Coastal Cutthroat Trout based on counts per mile of river surveyed on the North Fork Smith River from 1992 to 2018 during ten years of surveys. The North Fork was not surveyed in 2019 or 2020.

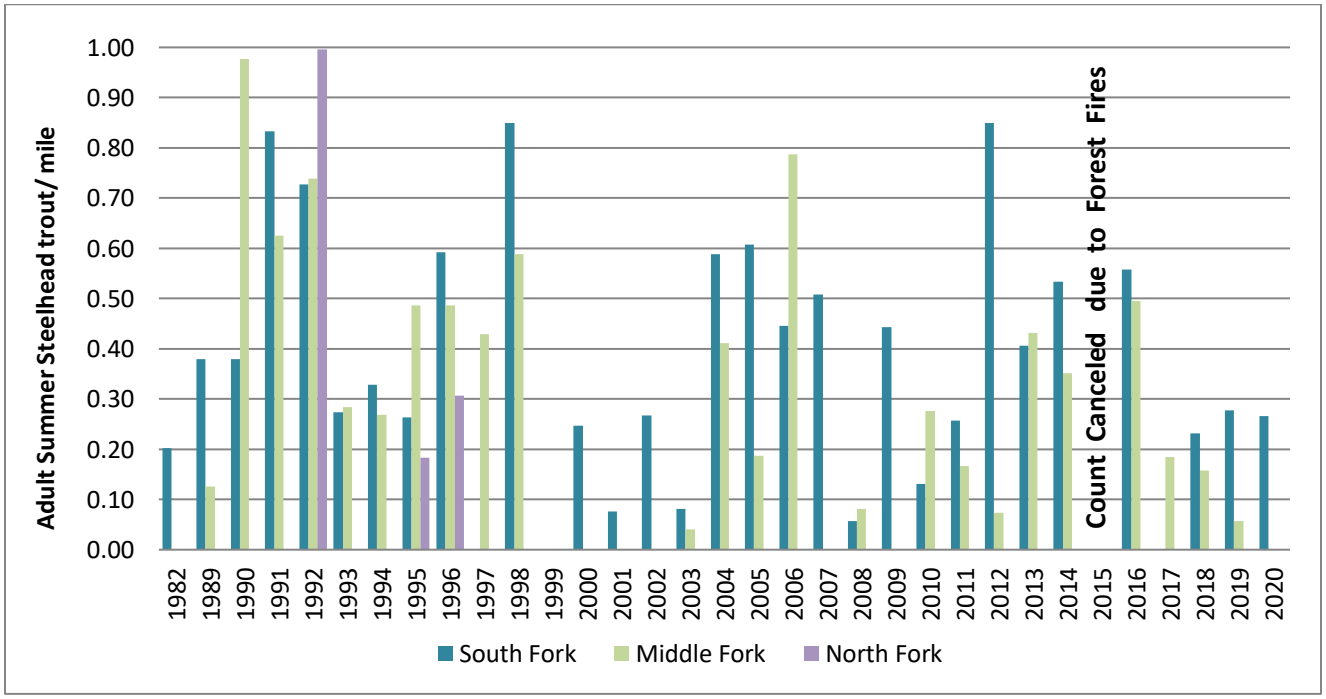

Figure 7. Density of adult Summer Steelhead trout (>16”) based on total counts per mile surveyed along the South Fork, Middle Fork and North Fork of the Smith River during surveys conducted from 1982 to 2020. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

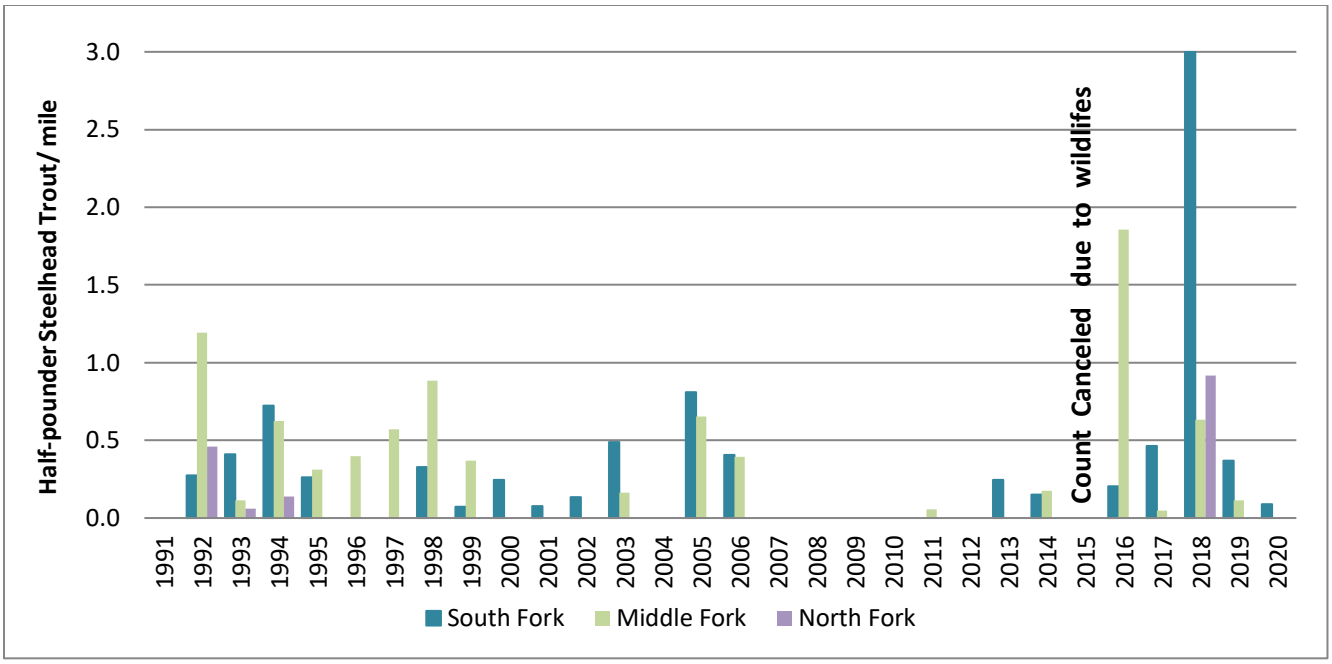

Figure 8. Density of Half-pounder Steelhead trout (12”- 16”) based on total counts per mile surveyed along the South Fork, Middle Fork, and North Fork of the Smith River during surveys conducted from 1982 to 2020. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

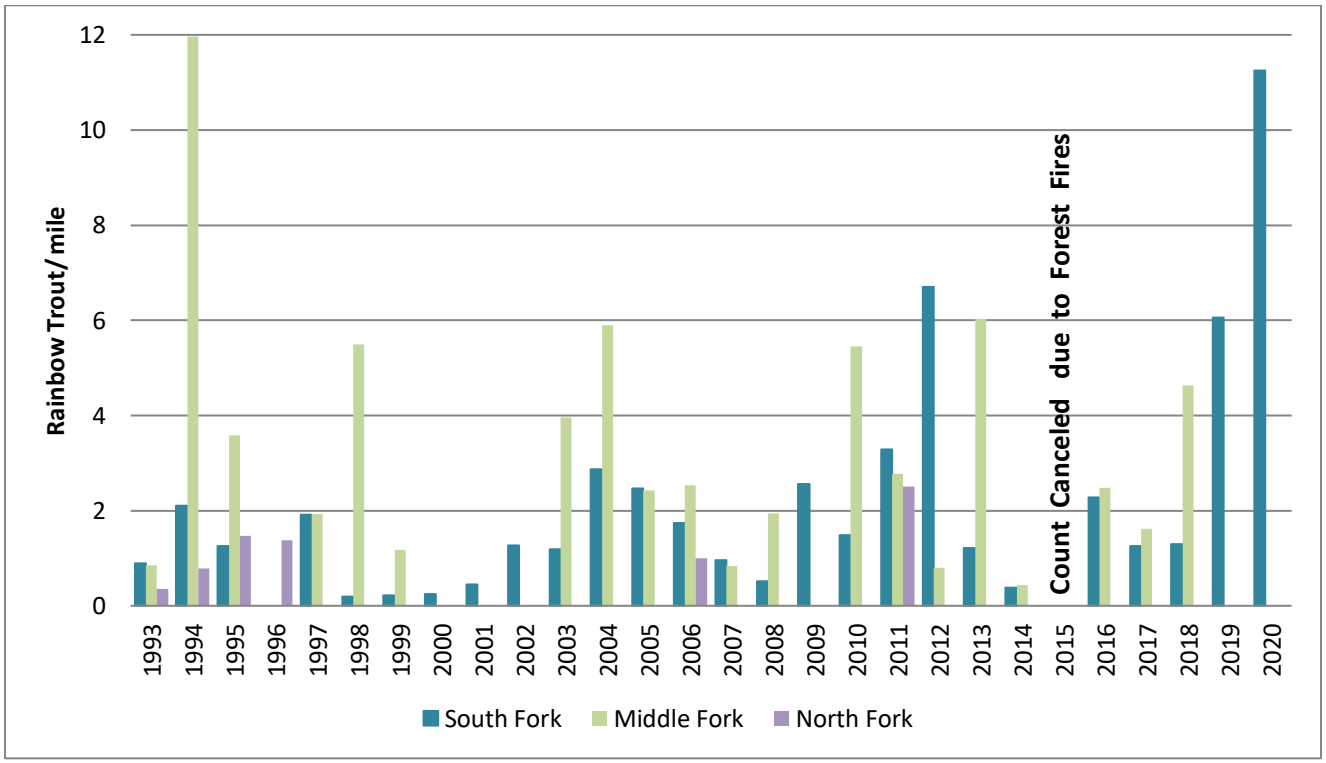

Figure 9. Density of adult Rainbow Trout (>10”) based on total counts per mile surveyed along the South Fork, Middle Fork, and North Fork of the Smith River during surveys conducted from 1989 to 2020. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

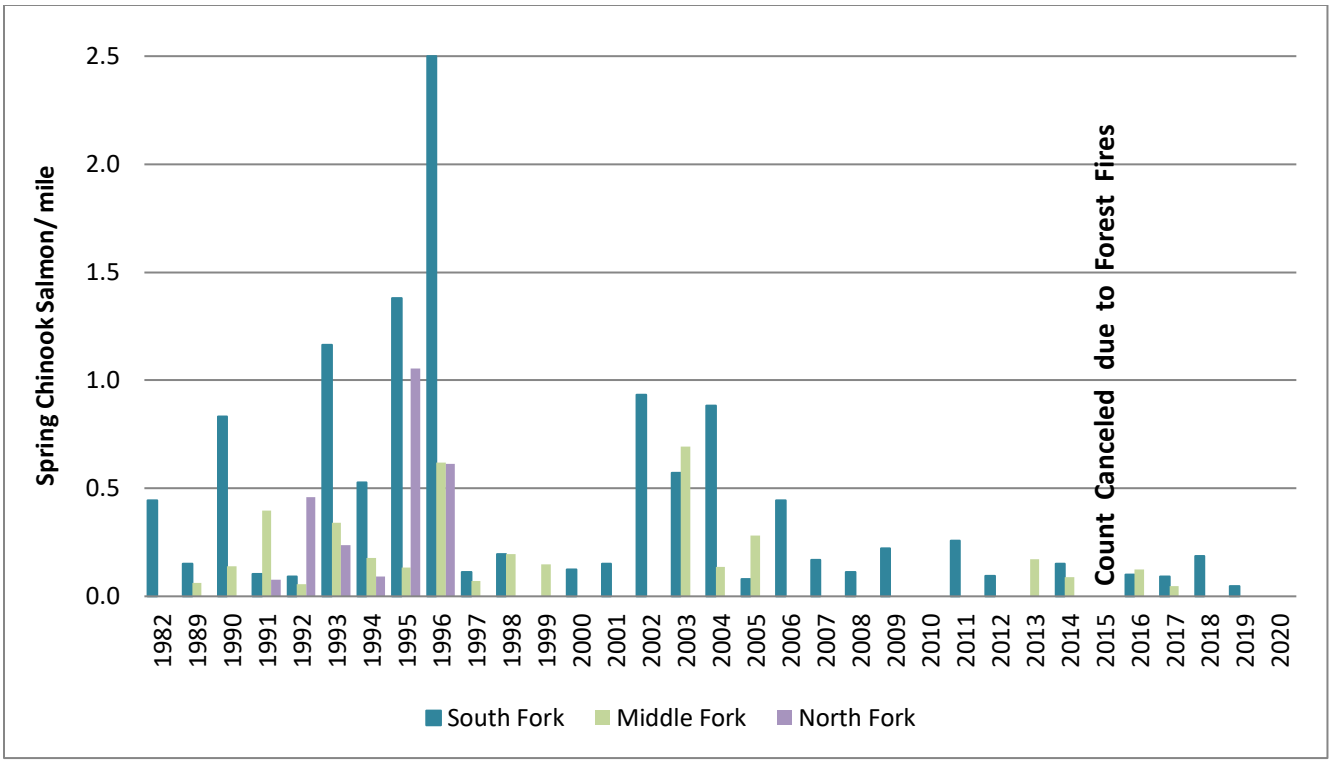

Figure 10. Density of adult Spring Chinook Salmon based on total counts per mile surveyed along the South Fork, Middle Fork and North Fork of the Smith River during surveys conducted from 1982 to 2020. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

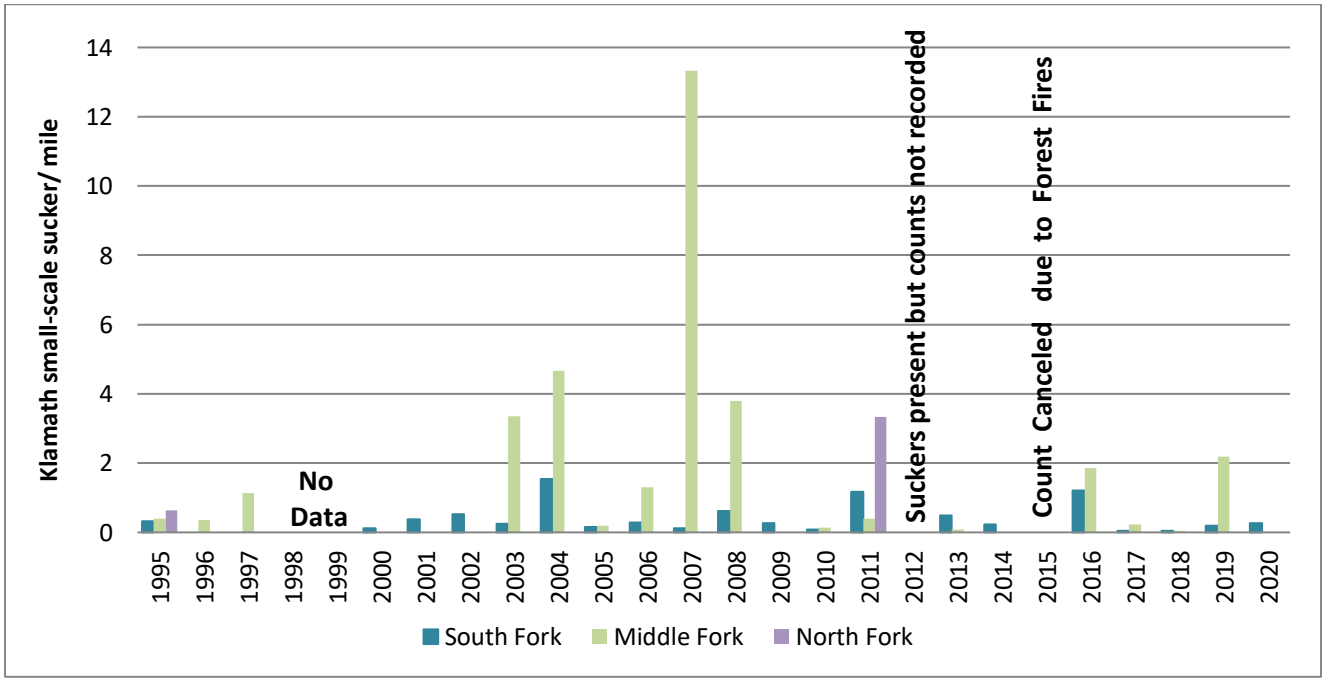

Figure 11. Density of Klamath small-scale suckers (> 6”) based on total counts per mile surveyed along the South Fork, Middle Fork, and North Fork of the Smith River during surveys conducted from 1995 to 2020 when observations of suckers were recorded. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

Literature Cited

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Walkley J. and J. Garwood. 2017. 2011 – 2016 Salmonid Redd Abundance and Juvenile Salmonid Spatial Structure in the Smith River Basin, California and Oregon. Final Report to the California Department of Fish and Wildlife, Fisheries Restoration Grants Program, Contract: P1210524. Smith River Alliance, Crescent City, CA. 88p.

Appendices

Appendix A. Summary of counts from all summer adult fish surveys in the South Fork Smith River. When a particular species was not identified and recorded during a survey year no data (ND) is available for that year.

Year	SF Miles	Cutthroat <12"	Cutthroat >12"	Spring Chinook salmon	Summer Steelhead trout	Steelhead half-pounder	Rainbow trout	Klamath smallscale sucker
1982	25	ND	91	11	5	ND	ND	ND
1989	13.2	ND	125	2	5	ND	ND	ND
1990	13.2	ND	91	11	5	ND	ND	ND
1991	9.6	38	51	1	8	0	ND	ND
1992	11	112	120	1	8	3	ND	ND
1993	14.6	150	111	17	4	6	13	ND
1994	15.2	315	190	8	5	11	32	ND
1995	15.2	226	161	21	4	4	19	5
1996	15.2	128	154	38	9	0	0	0
1997	8.9	69	75	1	0	0	17	0
1998	15.3	212	175	3	13	5	3	0
1999	13.6	133	211	0	0	1	3	0
2000	8.1	116	101	1	2	2	2	1
2001	13.2	329	235	2	1	1	6	5
2002	15	375	307	14	4	2	19	8
2003	24.5	378	290	14	2	12	29	6
2004	13.6	380	126	12	8	0	39	21
2005	24.7	535	240	2	15	20	61	4
2006	24.7	578	174	11	11	10	43	7
2007	17.7	400	156	3	9	0	17	2
2008	17.7	448	155	2	1	0	9	11
2009	22.6	494	171	5	10	0	58	6
2010	23	474	170	0	3	ND	34	2
2011	19.5	604	145	5	5	ND	64	23
2012	21.2	589	385	2	18	5	142	present
2013	12.3	425	158	0	5	3	15	6
2014	13.12	427	213	2	7	2	*5*	3
2016	19.73	500	359	2	11	4	45	24
2017	21.61	544	383	2	0	10	27	1
2018	21.61	1128	570	4	5	65	28	1
2019	21.61	580	416	1	6	8	131	4
2020	9.4	264	209	0	3	1	127	3

Appendix B. Summary of counts from all summer adult fish surveys in the Middle Fork Smith River. If a particular species was not identified and recorded during a survey year no data (ND) is available for that year. Surveys were not conducted on the Middle Fork during the years not reported on in the table.

Year	MF Miles	Cutthroat <12"	Cutthroat >12"	Spring Chinook salmon	Summer Steelhead trout	Steelhead half-pounder	Rainbow trout	Klamath smallscale sucker
1989	15.9	ND	ND	1	2	ND	ND	ND
1990	21.5	ND	ND	3	21	ND	ND	present
1991	17.6	43	81	7	11	0	ND	ND
1992	17.6	142	157	1	13	21	ND	ND
1993	17.6	145	132	6	5	2	15	ND
1994	11.2	236	132	2	3	7	134	ND
1995	22.6	213	120	3	11	7	81	9
1996	22.6	195	183	14	11	9	0	8
1997	14	136	104	1	6	8	27	16
1998	10.2	117	108	2	6	9	56	0
1999	13.6	123	139	2	0	5	16	0
2003	24.5	329	223	17	1	4	97	82
2004	14.6	335	196	2	6	ND	86	68
2005	10.7	180	52	3	2	7	26	2
2006	17.8	361	96	0	14	7	45	23
2007	6	89	43	0	0	0	5	80
2008	12.4	336	80	0	1	0	24	47
2010	14.5	258	66	0	4	ND	79	2
2011	18	435	58	0	3	1	50	7
2012	13.7	190	141	0	1	0	11	ND
2013	11.6	143	140	2	5	0	70	1
2014	11.38	105	116	1	4	2	5	0
2016	8.08	142	106	1	4	15	20	15
2017	21.69	230	114	1	4	1	35	5
2018	18.98	406	293	0	3	12	88	1
2019	17.44	341	168	0	1	6	50	38

Appendix C. Summary of counts from all summer adult fish surveys in the North Fork Smith River. If a particular species was not identified and recorded during a survey year no data (ND) is available for that year.

Year	NF Miles	Cutthroat <12"	Cutthroat >12"	Spring Chinook salmon	Summer Steelhead trout	Steelhead half-pounder	Rainbow trout	Klamath smallscale sucker
1991	13.05	ND	119	1	0	ND	ND	ND
1992	13.05	ND	95	6	13	6	ND	ND
1993	16.9	147	167	4	0	1	6	ND
1994	21.8	243	141	2	0	3	17	ND
1995	21.8	166	184	23	4	0	32	14
1996	13.05	41	67	8	4	0	18	0
2006	4.0	126	26	0	0	0	4	0
2011	1.2	24	4	0	0	0	3	4
2012	1.2	11	6	0	0	0	0	present
2018	1.09	14	7	0	0	1	0	0