

Smith River Volunteer Adult Salmonid Surveys Summer 2022

With a 34-year Data Comparison



Survey Crew

Photo: *Gustavo Vasquez*

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A Smith River Alliance Report by:

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Acknowledgements

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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-four 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-four-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 rimitulus*) 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 34 survey years. We report on the observations of the 2022 volunteer survey effort and how these data compare to the 34-year data set. We limited the number of participants for the 2022 survey effort due to COVID-19 safety concerns.

Overall, we found the density of coastal cutthroat trout (CCT) in the South Fork was higher than average and near the average density of the total data set with densities at 1.51 times greater than average compared to the 34-year data set. 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 Chinook salmon and steelhead trout in 2022 were less than the average of the long-term data set. However, the density of half-pounder steelhead trout (<12-15") was higher than average on the South Fork. The density of rainbow trout was higher than average, though after removing outlining abnormally high counts on two reaches the density was found to be close to average on the South Fork. Klamath small-scale sucker densities were also near the average in the South Fork in 2022 compared to the data set.

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 34-year data set of adult salmonids in the Smith River basin has been collected from 1989 to 2022.

This report describes the results of the survey conducted on the South Fork Smith River on August 6, 2022. Additionally, it summarizes the cumulative 34-year data set and explain how the 2022 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 6, 2022 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 surveyed 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, we limited the number of participants in 2022 and therefore had a smaller survey effort than prior to the pandemic. While the majority of the volunteers had participated in the event during recent years, a small training was held for new participants and returning individuals interested in practicing fish ID and survey technique. Protocols and training materials were shared with all participants prior to the event to ensure uniform data collection and survey technique.

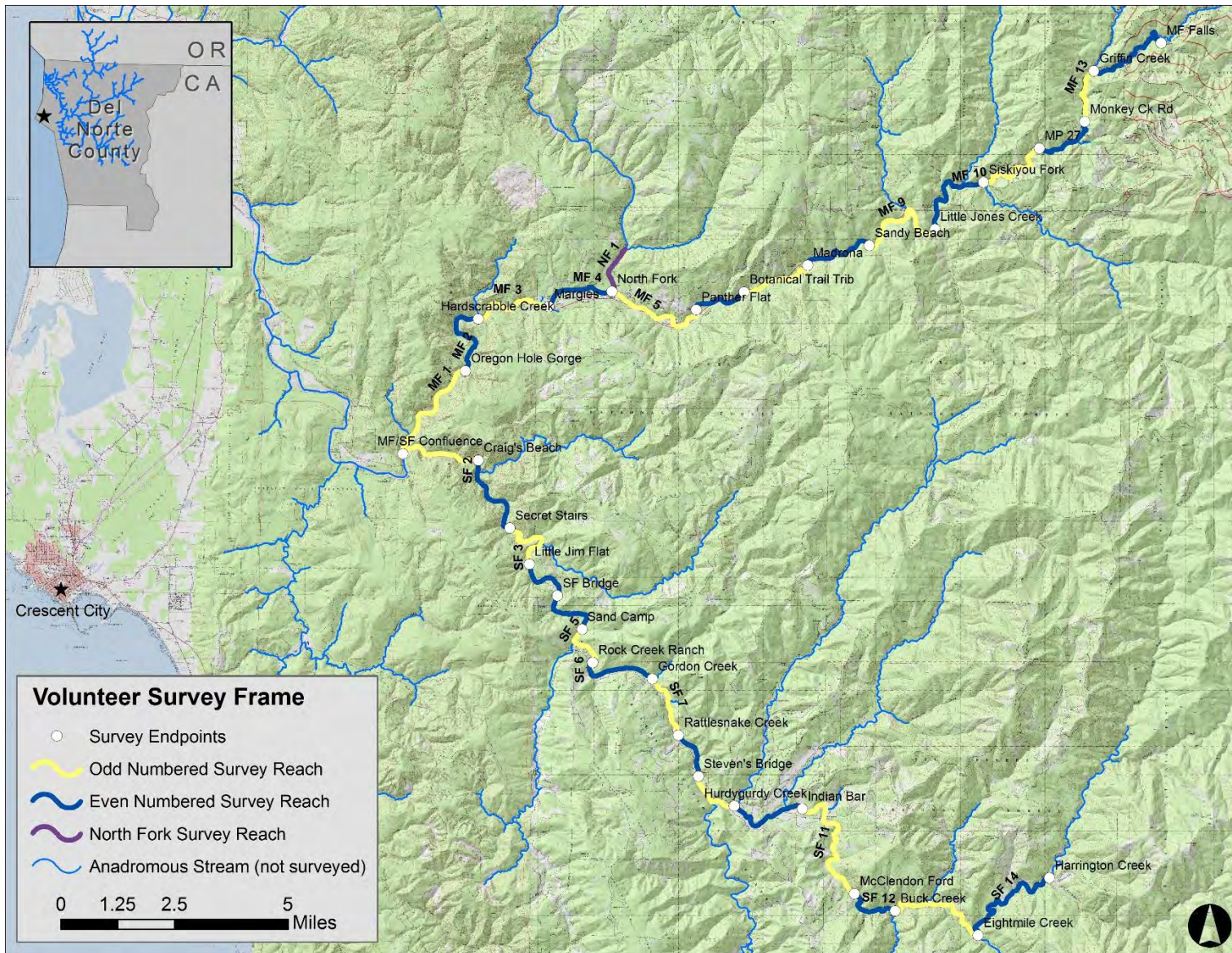


Figure 1. Stream reaches available to be surveyed during volunteer adult salmonid summer snorkel surveys in the Smith River basin, Del Norte County, CA.

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

2022 Results

A total of 10 reaches were surveyed on August 6, 2022, with the help of 36 snorkeling volunteers and an additional 7 volunteers that assisted with kitchen and logistic tasks. While larger than in 2020, this was still a reduced effort compared to previous years, which was a result of safety precautions taken and volunteer cancelations due to COVID-19. Regardless surveys covered 15.07 miles of stream, slightly less the average number of South Fork miles surveyed in the 34-year data set (Figure 2). A continuous stretch of the South Fork was surveyed, from Indian Bar to Craig's Beach. (Table 1).

The USGS gauge near Smith River (11532500) recorded a daily mean flow of 435 cubic feet per second (cfs) (USGS 2021); nearly a third higher than the average daily flow of 340 cfs during past fish counts. A total of 718 coastal cutthroat trout, 4 summer steelhead trout, 8 steelhead half-pounders, 179 Rainbow trout, 5 Klamath small-scale suckers, and no spring Chinook Salmon were observed across all surveys (Table 1).

Cumulative Long-term Results

Similar to recent years, this year's total count of Coastal Cutthroat Trout (CCT) per mile was higher than average throughout the South Fork and near the average density of the total data set with densities at 1.51 times greater than average (Figure 3). 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).

A total of four summer steelhead trout were observed. This density is below the average of past years surveys (Figure 7). A total of eight half-pounders were observed, higher than average on the South Fork (Figure 8). No spring Chinook salmon were observed, densities that are lower than average for the South Fork (Figure 9). However, we experienced a higher-than-average water flow due to late spring and early summer rains. These increased flows may have allowed fish prolonged access to suitable habitats further upstream than our volunteer efforts can safely complete. Therefore, our lower reported densities may not be representative of this year's adult summer steelhead and spring Chinook Salmon. A total of 179 Rainbow trout were detected this year, a higher-than-average density on the South Fork. However, upon review of the data this high density is the result of outlying abnormally high counts on two reaches. As such these data are not included in the annual density graph (Figure 10) but are included in the annual data (Table 1, Appendix A). A total of 21 Klamath small-scale suckers were observed, with a density higher than average on the South Fork but lower than average on the Middle Fork (Figure 11). Additionally, 6 juvenile coho salmon were observed in the most upstream reach surveyed (SF 10, from Indian Bar to Hurdygurdy Creek).

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 this year. Foothill yellow-legged frog (*Rana boylei*) adults and juveniles were recorded in two South Fork Reaches, SF3 and SF8. Northern Red-legged frogs were observed in two consecutive reaches (SF 4B – 5) from Rock Creek Ranch to the South Fork Bridge. Additionally, three aquatic garter snakes were recorded in reaches SF3, SF4B, and SF8. All these species are cryptic animals and are difficult to detect with our survey protocol, so observations are incidental.

Table 1. Complete counts of fish observed across the South Fork (SF) Smith River during the volunteer fish count on August 6, 2022.

Reach	Top	Bottom	Length (miles)	Cutthroat <12"	Cutthroat >12"	Spring Chinook	Summer Steelhead	Half Pounder	Rainbow Trout	Sucker	Crew Lead	Crew #
SF2	Secret Stairs	Craigs Beach	2.04	35	8	0	0	0	5	0	J. Guczek	3
SF3	Little Jim Flat	Secret Stairs	1.74	60	35	0	1	0	0	2	A.Chione	3
SF4A	SF Bridge	Little Jim Flat	1.25	24	4	0	0	2	2	0	K.McNamee	4
SF4B	Sand Camp	SF Bridge	1.41	52	14	0	0	0	0	0	A. Morin	4
SF5	Rock Creek Ranch	Sand Camp	1.08	68	40	0	0	0	5	0	J. Deibner-Hanson	4
SF6	Gordon Creek	Rock Creek Ranch	1.78	53	14	0	0	0	1	2	P. Kohl	3
SF7	Rattlesnake Creek	Gordon Creek	1.49	46	22	0	1	3	0	0	W.Boucher	4
SF8	Steven's Bridge	Rattlesnake Creek	1.12	30	15	0	1	1	4	0	A. Broido	4
SF9	Hurdygurdy Creek	Steven's Bridge	1.21	79	32	0	1	1	138*	1	M.Ramos	3
SF10	Indian Bar	Hurdygurdy Creek	1.94	55	32	0	0	1	24*	0	A. Singh	4
South Fork Totals			15.07	502	216	0	4	8	179	5		

*not included in density summary

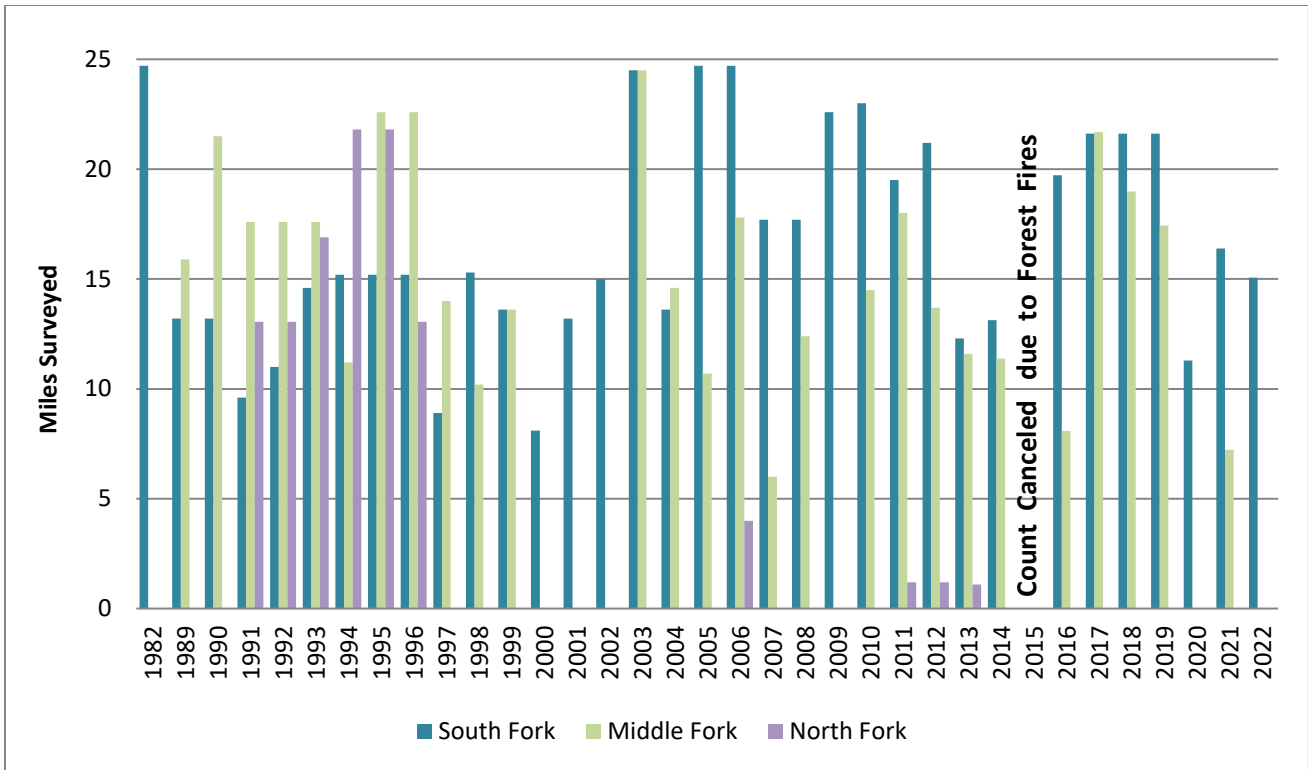


Figure 2. Number of stream miles surveyed each year fish counts have been conducted from 1982 to 2022 on the South Fork, Middle Fork, and North Fork Smith River. Surveys were not conducted on all forks every survey year, refer to Appendix A, B, and C for survey effort.

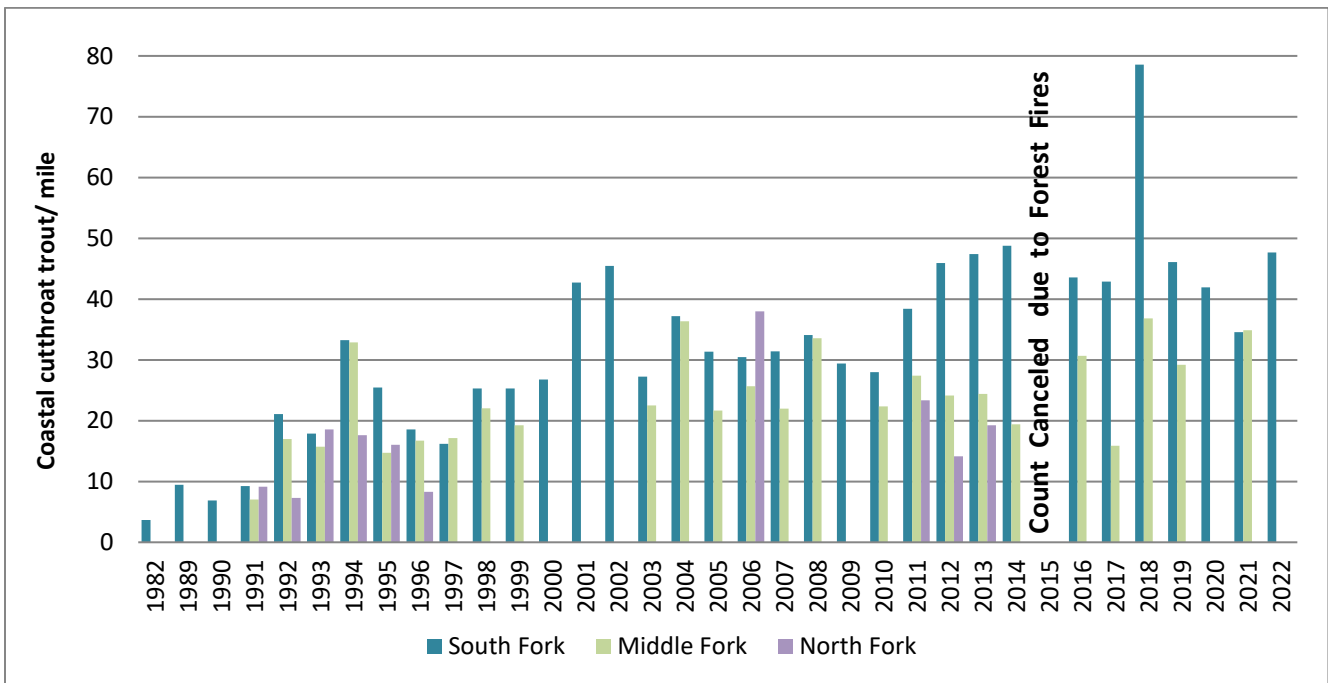


Figure 3. Density of total Coastal Cutthroat Trout counted per mile based on miles of river surveyed in the South Fork, Middle Fork, and North Fork Smith River from 1982 to 2021. Surveys were not conducted on all forks every survey year, refer to Appendix A, B, and C for survey effort.

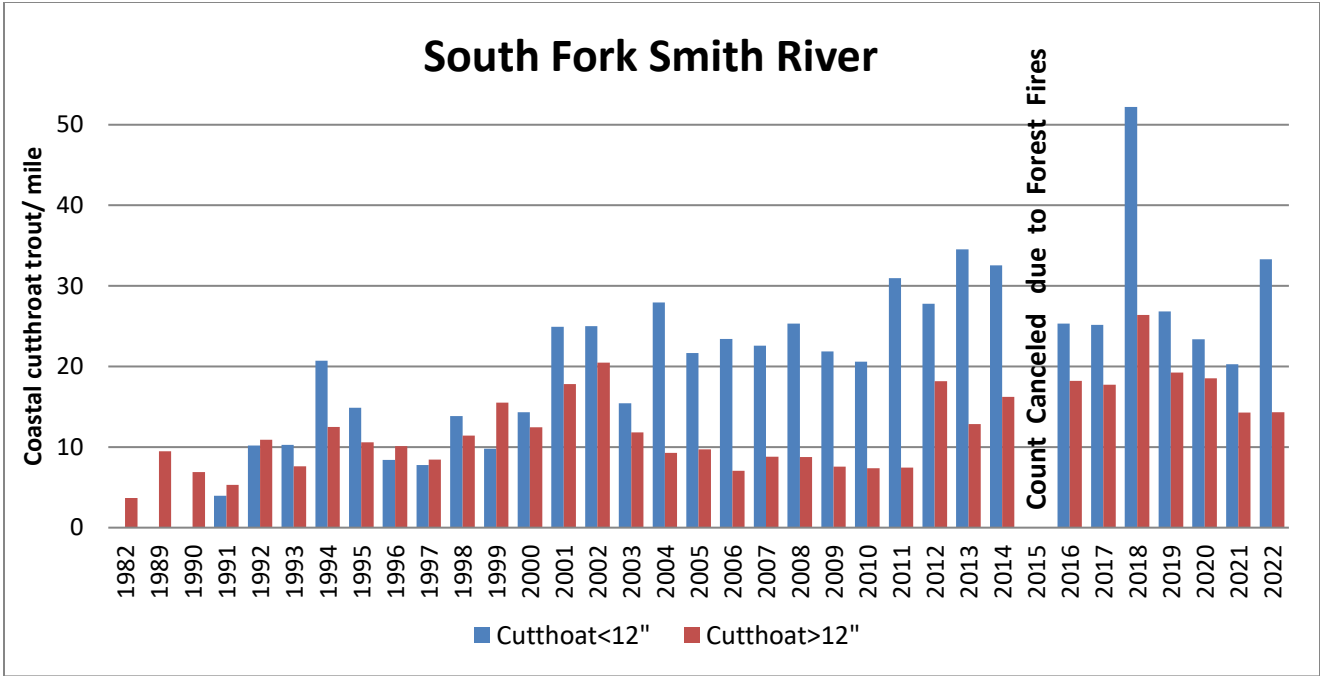


Figure 4. Density of small (<12") and large (>12") Coastal Cutthroat Trout based on counts per mile of river surveyed on the South Fork Smith River from 1982 to 2022.

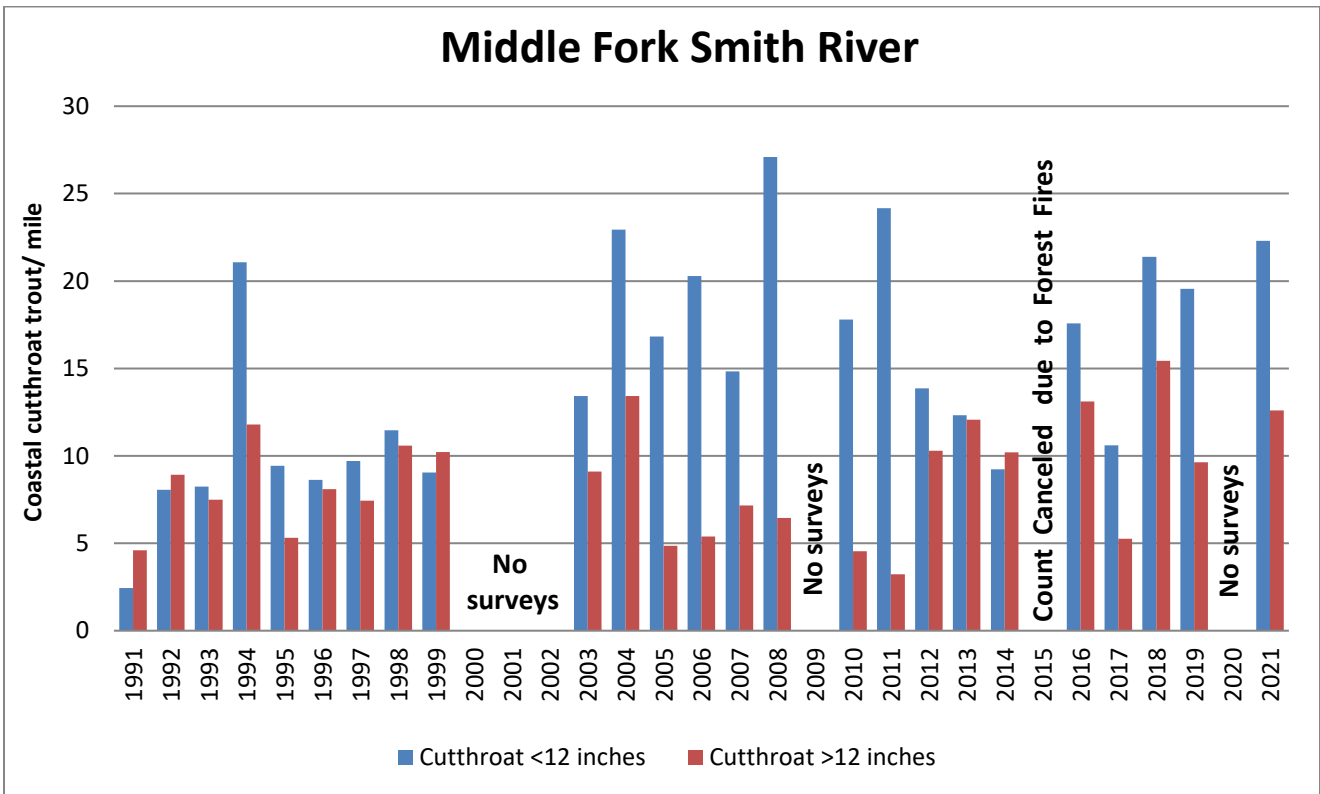


Figure 5. Density of small (<12") and large (>12") Coastal Cutthroat Trout based on counts per mile of river surveyed on the Middle Fork Smith River from 1991 to 2021. No surveys occurred on the Middle Fork in 2022.

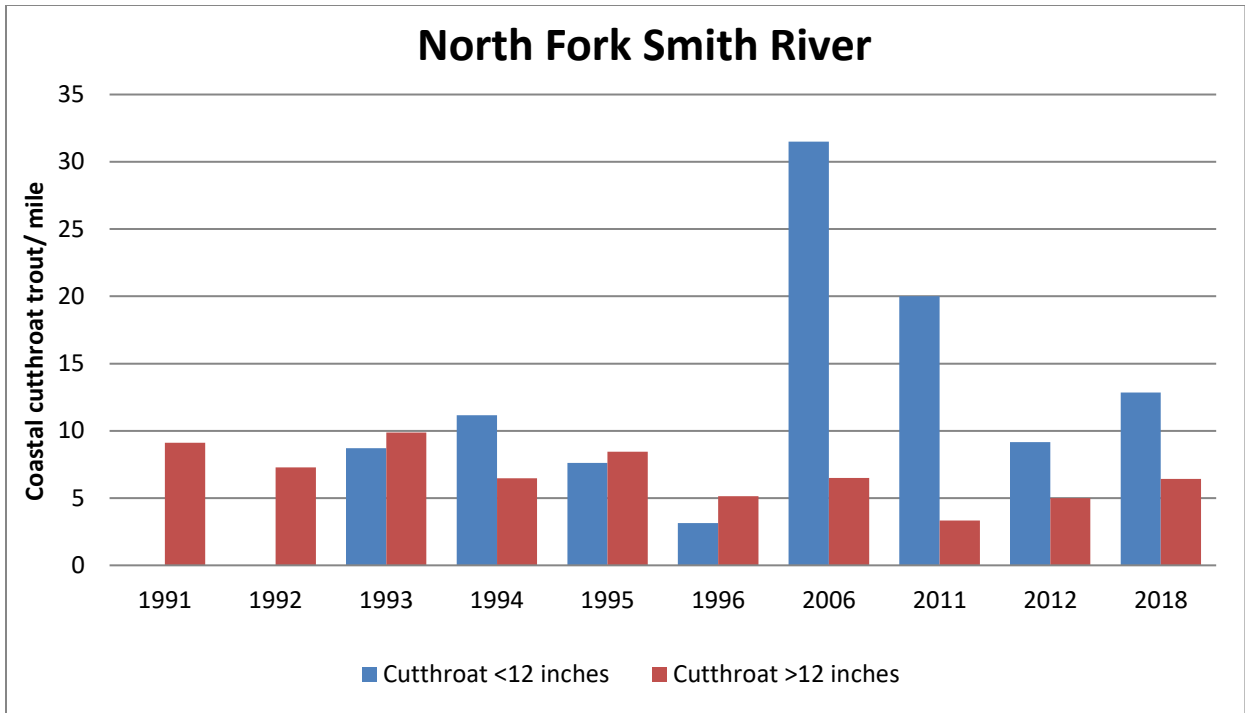


Figure 6. Density of small (<12”) and large (>12”) Coastal Cutthroat Trout based on counts per mile of river surveyed on the North Fork Smith River from 1992 to 2018 during ten years of surveys. The North Fork was not surveyed from 2019 - 2022.

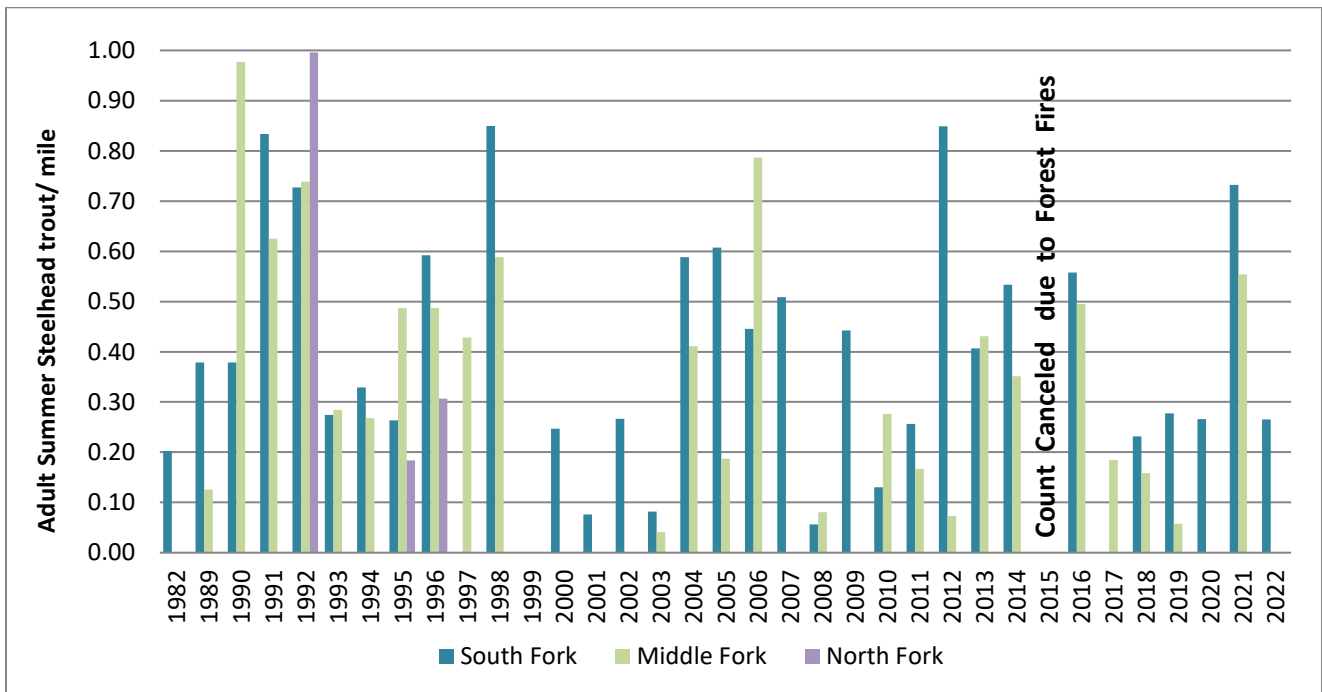


Figure 7. Density of adult Summer Steelhead trout (>16”) based on total counts per mile surveyed along the South Fork, Middle Fork and North Fork of the Smith River during surveys conducted from 1982 to 2022. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

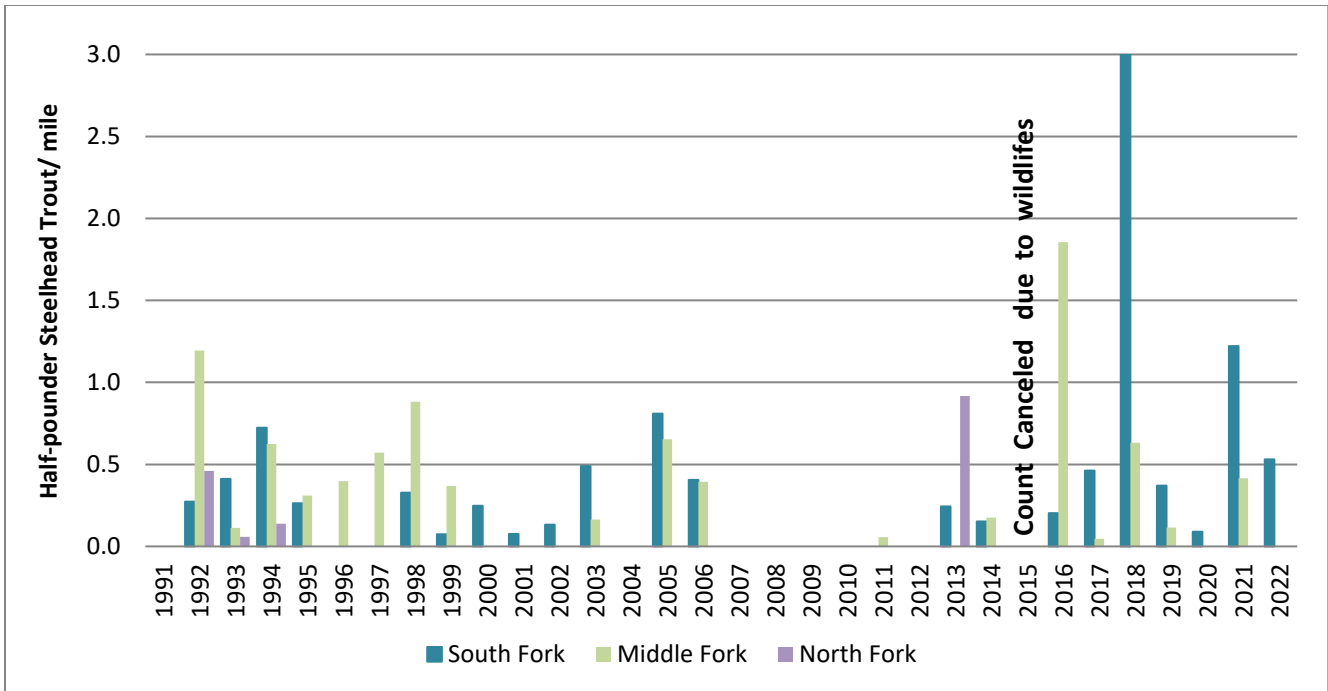


Figure 8. Density of Half-pounder Steelhead trout (12''- 16'') based on total counts per mile surveyed along the South Fork, Middle Fork, and North Fork of the Smith River during surveys conducted from 1982 to 2022. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

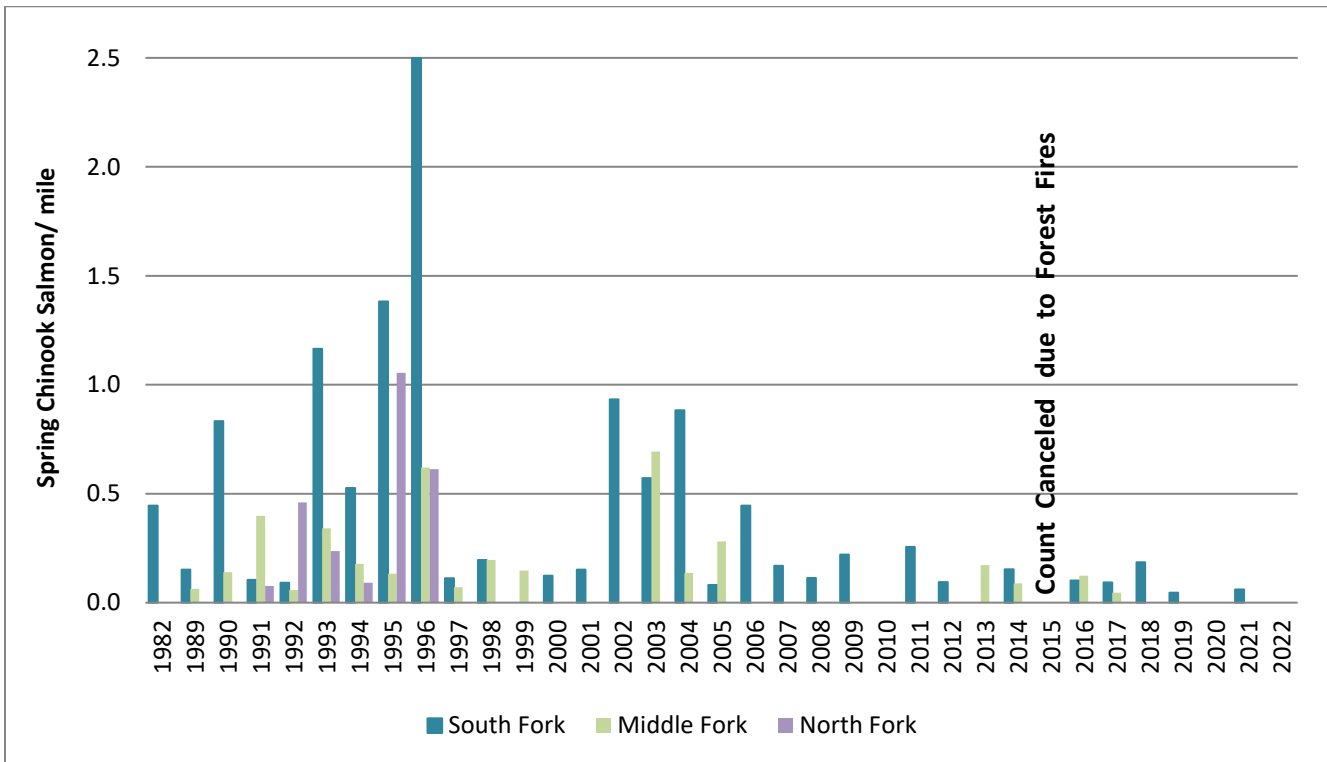


Figure 9. Density of adult Spring Chinook Salmon based on total counts per mile surveyed along the South Fork, Middle Fork and North Fork of the Smith River during surveys conducted from 1982 to 2022. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

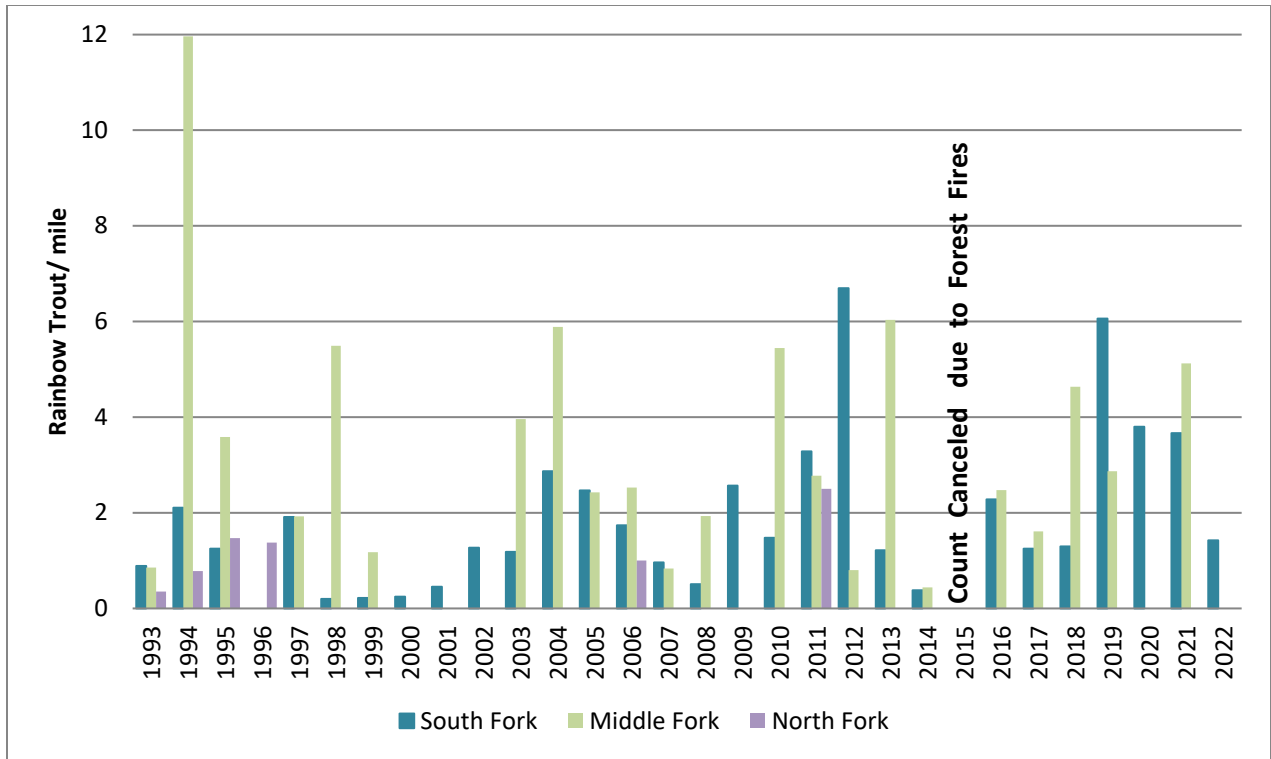


Figure 10. Density of adult Rainbow Trout (>10") based on total counts per mile surveyed along the South Fork, Middle Fork, and North Fork of the Smith River during surveys conducted from 1989 to 2022. Outlying abnormally high counts on a few reaches in 2020 and 2022 are not shown in this density summary. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

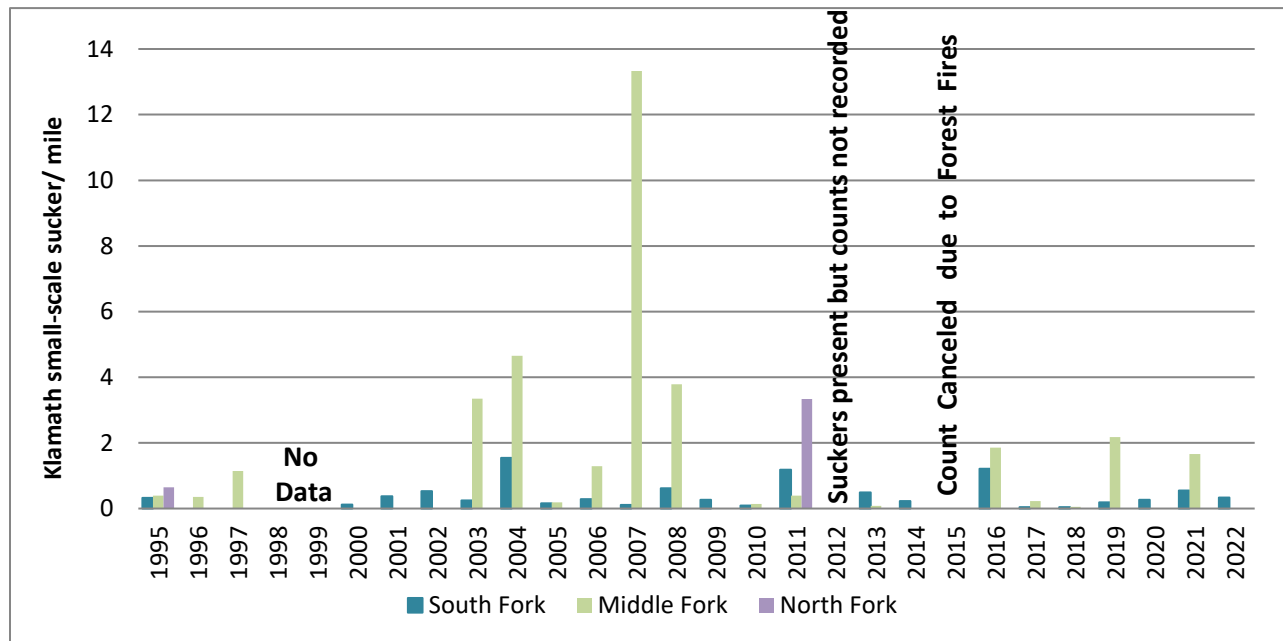


Figure 11. Density of Klamath small-scale suckers (> 6") based on total counts per mile surveyed along the South Fork, Middle Fork, and North Fork of the Smith River during surveys conducted from 1995 to 2022 when observations of suckers were recorded. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

Literature Cited

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Appendices

Appendix A. Summary of counts from all summer adult fish surveys in the South Fork Smith River. When a 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	131	8	6	1	4
2020	9.4	264	209	0	3	1	127	3
2021	16.38	332	234	1	12	20	60	9
2022	15.07	502	216	0	4	8	179	5

Appendix B. Summary of counts from all summer adult fish surveys in the Middle Fork Smith River. If a 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	50	2	1	0	38
2021	7.22	161	91	0	4	3	37	12

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