Smith River Volunteer Adult Salmonid Surveys

Summer 2018

With a 30-year Data Comparison

Fish identification, survey protocol, and safety training. Photo: *Marisa Parish Hanson*

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A Smith River Alliance Report

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SMITH RIVER ALLIANCE

Acknowledgements

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Chum salmon (*Oncorhynchus keta*) seen in the upper South Fork Smith River. Photo: *Angela Zondervan*

Summary

Summer snorkel surveys aimed at searching for adult salmonids have been conducted across the Smith River basin for 30 years. Contractors to the CDFW performed the first surveys in 1982. Between the U.S. Forest Service and Humboldt State University, surveys were conducted annually from 1989 to 1999. Smith River Alliance has continued these surveys from 2000 to present with the help of numerous volunteers. This long-term collaborative effort has resulted in surveys for 30 years on the South Fork, 25 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 (*Oncorhynchus mykiss*), steelhead half-pounders, spring Chinook salmon (*Oncorhynchus tshawytscha*), and rainbow trout (*Oncorhynchus mykiss*). Observations of Klamath small-scale suckers (*Catostomus rimiculus*) are also documented.

Beginning in 2011 observations of amphibians and reptiles have also been recorded. Total stream miles surveyed has varied over time. Therefore, fish are reported as densities to allow for comparison across all survey years. We report on the observations of the 2018 volunteer survey effort and how these data compare to the 30-year data set. Across the data set, we show that the density of coastal cutthroat trout (CCT) are typically higher on the South Fork than on the Middle or North Forks. Furthermore, there is a higher density of CCT that are <12” in length than density of CCT that are >12” in length. Overall, the density of total CCT has cyclically varied throughout the long-term data set. The observed 2018 CCT densities are the highest recorded.

Comparatively, adult spring Chinook salmon and summer steelhead trout (>16”) are rare in the Smith River: their densities in 2018 were less than the average of the long-term data set. Conversely, the density of half-pounder steelhead trout (<12-15”) was the highest recorded. Rainbow trout densities were higher than average on the Middle Fork but lower than average on the South Fork and North Fork. Klamath small-scale sucker densities were lower than average on all three Forks. Unique observations for the year included two adult chum salmon (*Oncorhynchus keta*) and one American mink (*Neovison vison*), all on the South Fork.

Introduction

Successful comprehension 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 a great deal of commitment of time and effort --- and is rare. Through collaborative effort and continued volunteer support, a 30-year data set of adult salmonids in the Smith River basin has been collected from 1988 to 2018. This report describes the results of the survey efforts conducted on the South Fork, Middle Fork and North Fork Smith River on August 11, 2018. Additionally, we summarize the cumulative 30-year data set and report on how 2018 species densities compare to the average of the long-term data set.

Background

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. In 2016 and 2017 the California Department of Fish and Wildlife designated a total of approximately 100 miles of South Fork Smith River and multiple tributaries from the confluence with Goose Creek upstream to the Island Lake Trail as Wild and Heritage Trout Waters (CDFW 2018). The river has exceptional water quality and clarity providing an ideal setting to learn to identify, observe and count adult salmonids.

The Smith River Alliance conducts an annual volunteer fish census 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 dating back to 1982, providing annual population density trends and distribution of adult salmonids. Due to the strong 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 consultants performed the surveys. From 1992 to 1999, the USFS conducted surveys annually until 1999. Since 2000, the Smith River Alliance has led the organization, hosting, training, and reporting for these surveys. Currently survey efforts on the South Fork Smith River is 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 11, 2018 and how these counts compare to those from past years survey efforts.

Study Area

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 from 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 wider area extending into tributaries and upstream to Harrington Creek on the South Fork and up to Baldface Creek on the North 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 (*Oncorhynchus mykiss*), steelhead half-pounders, spring Chinook salmon (*Oncorhynchus tshawytscha*), and rainbow trout (*Oncorhynchus 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 (*Oncorhynchus nerka*) and chum salmon (*Oncorhynchus keta*) are also recorded, though these species are rare in the Smith River basin (Walkley and Garwood 2017).

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. Training held on August 10th, 2018 taught volunteers to employ skills to reduce the probability of double counting fish as well as how to safely navigate hazards associated with survey activity. Each survey crew was assigned a lead in charge of data recording and reporting while ensuring accurate and safe navigation through 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. Surveying members are taught 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. All surveys are conducted between 9:30 and 5:00 pm during the optimal lighting conditions.

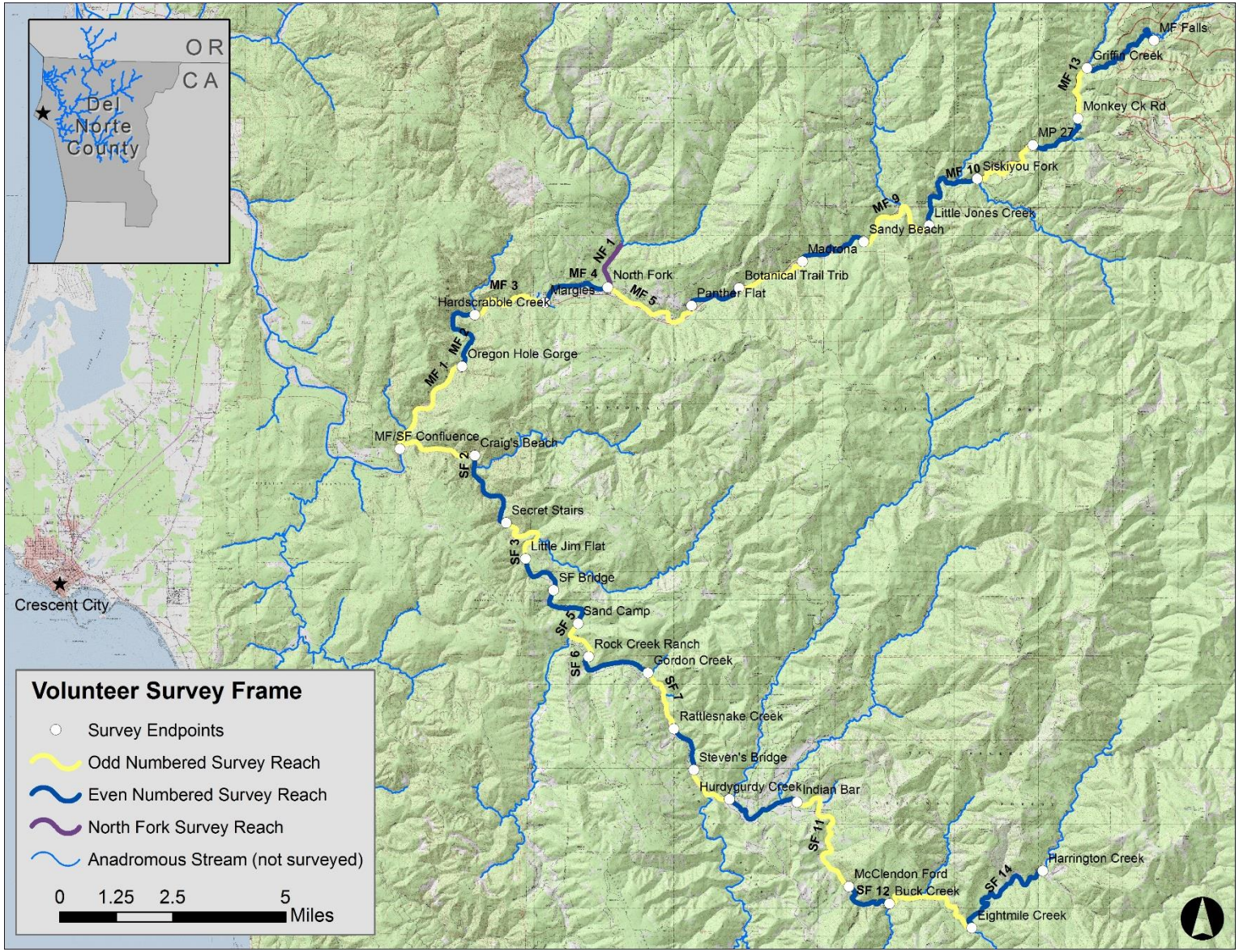

Figure 1. Stream reaches available to be surveyed during volunteer adult salmonid summer snorkel surveys in the Smith River basin, Del Norte County, CA.

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

2018 Results

With the help of 80 volunteers, 75 of which conducted the surveys, 24 reaches were surveyed on August 11, 2018. The USGS gauge near Smith River (11532500) recorded a preliminary daily mean flow of 280 cubic feet per second (cfs) (USGS 2018); lower than the average daily flow of 355 cfs during past fish counts. Surveys covered 41.68 miles of stream, approximately 11 miles more than the average miles surveyed in the 30-year data set (Figure 2). The South Fork was surveyed from Buck Creek to the confluence with the Middle Fork covering 21.61 miles (Table 1). The Middle Fork was surveyed from Monkey Creek Road to Hardscrabble Creek covering 18.98 miles (Table 2). The North Fork was surveyed from Stony Creek to the confluence with the Middle Fork covering 1.09 miles (Table 2). A total of 2418 coastal cutthroat trout, eight summer steelhead trout, 78 steelhead half-pounders, four spring Chinook salmon, 116 rainbow trout, and 2 Klamath small-scale suckers were observed across all surveys (Table 2). Additionally, 2 adult chum salmon were detected in the South Fork Smith River.

Cumulative Long-term Results

As with the majority of previous years, this year’s total count of coastal cutthroat trout (CCT) per mile was higher on average throughout the South Fork than the Middle Fork or North Fork (Figure 3). However, CCT densities on the North Fork have been greater than or similar to densities in the South Fork and Middle Fork in past years (i.e.,1995, 1997, 2006) (Figure 3). In recent years, fewer stream miles have been surveyed on the North Fork compared to these years with recorded high densities, which may contribute to the lower documented densities. The total density of cutthroat was 2.47, 1.61, and 1.07 times greater on the South Fork, Middle Fork, and North Fork, respectively, than the average of all previous years. This year’s density of total CCT is the highest density observed on the South Fork and Middle Fork in the 30-year data set (Figure 4, Figure 5). The total density of CCT on the North Fork ranks third highest of the 9 years of surveys on the North Fork (Figure 6). There was a higher density of small CCT per mile than large cutthroat per mile on all three Forks (Figure 4, Figure 5, Figure 6).

A total of 8 summer steelhead trout were observed across all three Forks. This density is below the average of past years surveys (Figure 7). In contrast, a total of 78 half-pounders were detected across all three Forks, a higher density than in any past survey year (Figure 8). A total of 116 Rainbow trout were detected in the South and Middle Forks, none were observed in the North Fork. The rainbow trout

densities were higher than average on the Middle Fork but lower than average on the South Fork and North Fork (Figure 9). A total of 4 spring Chinook salmon were observed, all on the South Fork. The spring Chinook salmon densities were lower than average on all three forks (Figure 10). A total of 2 Klamath small-scale suckers were observed, one on the South Fork and one on the Middle Fork. The resulting densities were also lower than average on all three forks (Figure 11).

In 2014 there were high numbers of dead coastal giant salamanders (*Dicamptodon tenebrosus*) observed though fewer have been observed since and only one was observed on the South Fork this year. One live coastal giant salamander was observed on the South Fork and one in the Middle Fork. Two aquatic garter snakes (*Thamnophis atratus*) were recorded on the South Fork and eleven on the Middle Fork. A single American mink (*Neovison vison*) was observed on reach 7 in the South Fork between Gordon Creek and Rattlesnake Creek. All of these species are cryptic predators and are difficult to detect with our survey protocol so observations are incidental. Last, adult and juvenile Foothill yellow-legged frogs (*Rana boylii*) were observed on the South Fork, Middle Fork, and the North Fork.

Table 1. Complete counts of fish observed across the South Fork (SF) Smith River during the volunteer fish count on August 11, 2018.

Reach	Top	Bottom	Length (miles)	Cutthroat <12"	Cutthroat >12"	Spring Chinook	Summer Steelhead	Half Pounder	Rainbow Trout	Sucker	Crew Lead	Crew #
SF 1	Craig's Beach	Middle Fork	1.88	23	13	0	0	7	0	0	N. Van Vleet	3
SF 2	Secret Stairs	Craig's Beach	2.04	45	23	0	0	0	0	0	T. Gillespie	3
SF 3	Little Jim Flat	Secret Stairs	1.74	149	100	0	1	1	0	0	T. Ward	3
SF 4A	SF Bridge	Little Jim Flat	1.25	81	10	0	0	0	0	0	J. Hollis	4
SF 4B	Sand Camp	SF Bridge	1.41	79	51	0	0	10	0	0	A. Broido	3
SF 5	Rock Creek Ranch	Sand Camp	1.08	140	44	0	1	6	10	0	J. Held	4
SF 6	Gordon Creek	Rock Creek Ranch	1.78	67	72	0	0	6	0	0	W. Boucher	2
SF 7	Rattlesnake Creek	Gordon Creek	1.49	129	28	1	0	15	0	0	E. Sinkhorn	3
SF 8	Steven's Bridge	Rattlesnake Creek	1.12	40	48	0	0	1	1	0	A. McBroom	3
SF 9	Hurdygurdy Creek	Steven's Bridge	1.21	76	26	0	1	1	6	0	S. Gough	3
SF 10	Indian Bar	Hurdygurdy Creek	1.94	116	42	0	1	0	4	0	J. Deibner-Hanson	3
SF 11	McClendon Ford	Indian Bar	3.35	81	59	3	1	16	2	0	T. Dettmar	3
SF 12	Buck Creek	McClendon Ford	1.32	102	54	0	0	2	5	1	J. Borum	3
		South Fork Totals	**21.61**	**1128**	**570**	**4**	**5**	**65**	**28**	**1**		

Table 2. Complete counts of fish observed across the Middle Fork (MF) Smith River and North Fork (NF) Smith River. Total counts includes combined of all observations across the South Fork, Middle Fork, and North Fork during the volunteer fish count on August 11, 2018.

Reach	Top	Bottom	Length (miles)	Cutthroat <12"	Cutthroat >12"	Spring Chinook	Summer Steelhead	Half Pounder	Rainbow Trout	Sucker	Crew Lead	Crew#
MF 3	Margies	Hardscrabble	1.92	33	31	0	0	2	17	0	S. Kannry	4
MF 4	North Fork	Margies	1.62	55	47	0	0	0	1	0	M. Halloran	3
MF 5	Panther Flat	North Fork	2.47	71	28	0	0	2	3	0	E. Cooper	4
MF 6	Botanical Trailhead Rd	Panther Flat	1.32	21	17	0	0	2	17	0	A. Piscitelli	4
MF 7	Madrona	Botanical Trailhead Rd	1.67	24	19	0	1	0	14	0	V. Golding	3
MF 8	Sandy Beach	Madrona	1.75	52	10	0	0	4	25	0	C. Loomis	3
MF 9	Little Jones Creek	Sandy Beach	2.44	69	28	0	0	0	0	1	C. Nilsen	2
MF 10	Siskiyou Fk	Little Jones Creek	2.28	53	41	0	0	2	0	0	P. Kohl	3
MF 11	MP 27	Siskiyou Fk	1.96	13	28	0	1	6	3	0	J. Ortega	3
MF 12	Monkey Creek Rd	MP 27	1.54	15	44	0	1	0	8	0	A. Fleming	3
		Middle Fork Totals	**18.98**	**406**	**293**	**0**	**3**	**18**	**88**	**1**		
NF 1	Stony Creek	MF Confluence	1.09	14	7	0	0	1	0	0	J. Abrams	3
		Total NF Miles	**1.09**	**14**	**7**	**0**	**0**	**1**	**0**	**0**		
		Total counts		**1548**	**870**	**4**	**8**	**84**	**116**	**2**		

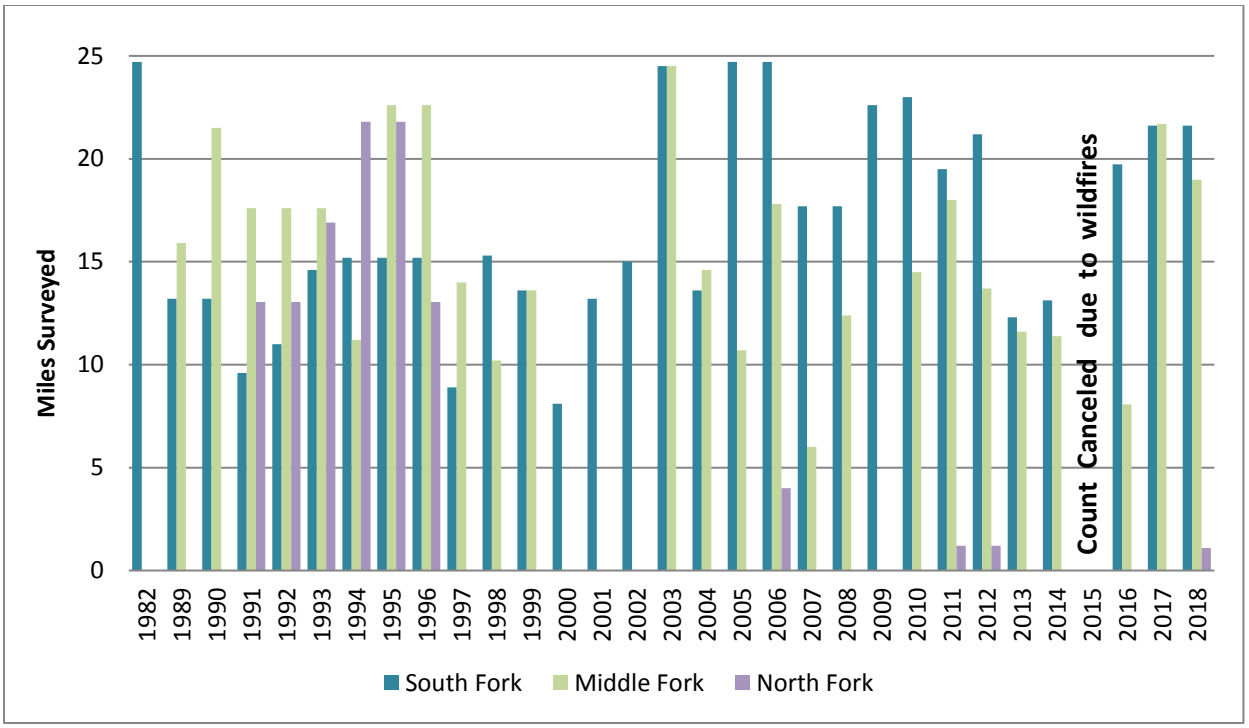

Figure 2. Number of stream miles surveyed each year fish counts have been conducted from 1982 to 2018 on the South Fork, Middle Fork, and North Fork Smith River. Surveys were not conducted on all forks every survey year, refer to Appendix A, B, and C for survey effort.

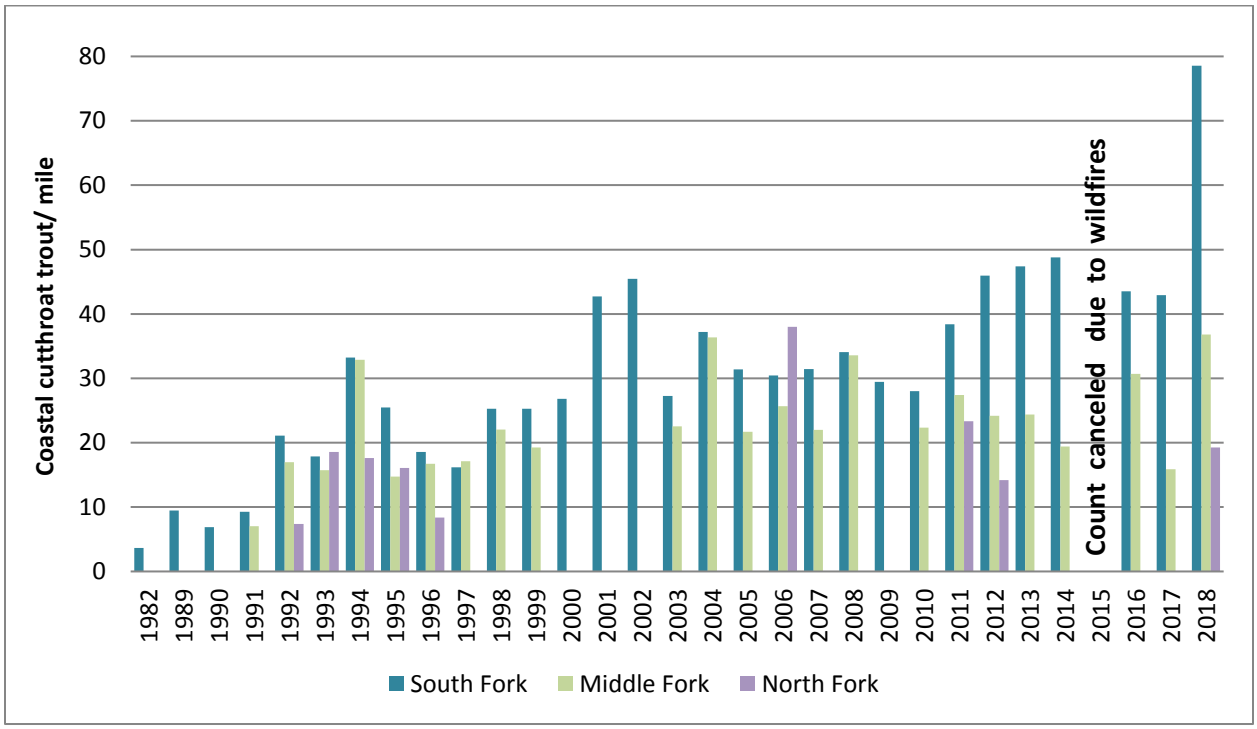

Figure 3. Density of total Coastal Cutthroat Trout counted per mile based on miles of river surveyed in the South Fork, Middle Fork, and North Fork Smith River from 1982 to 2018. Surveys were not conducted on all forks every survey year, refer to Appendix A, B, and C for survey effort.

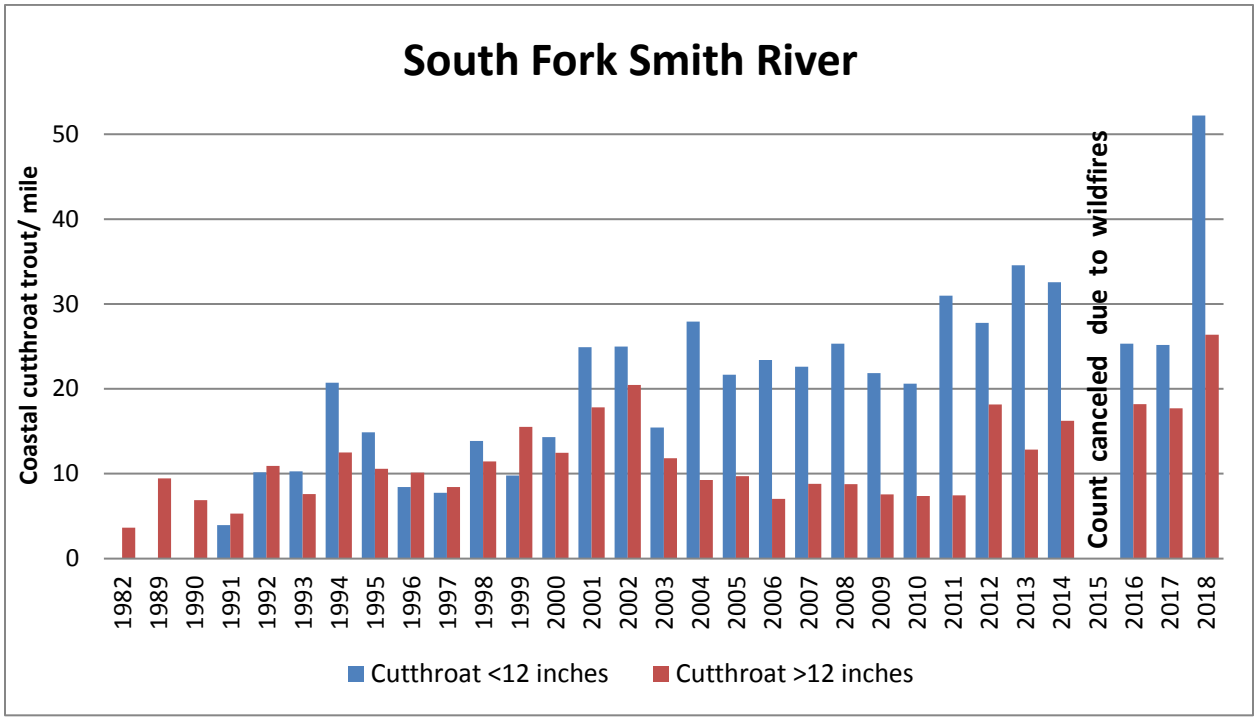

Figure 4. Density of small (<12”) and large (>12”) Coastal Cutthroat Trout based on counts per mile of river surveyed on the South Fork Smith River from 1982 to 2018.

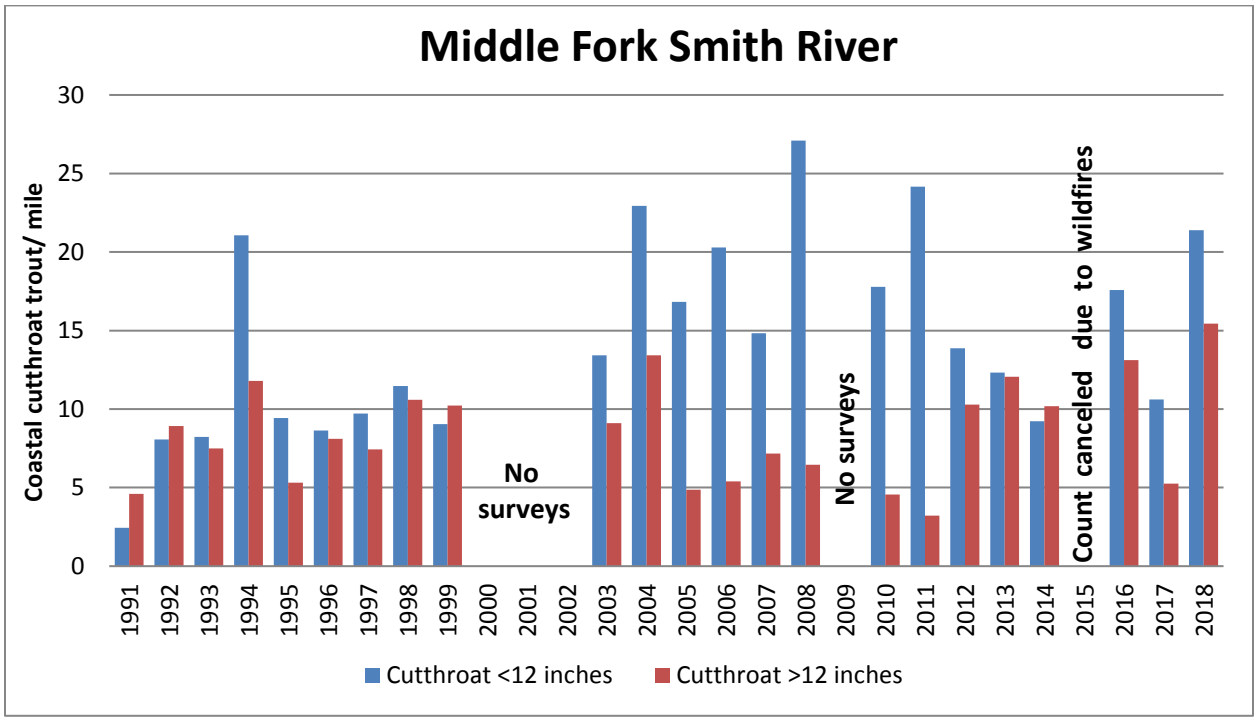

Figure 5. Density of small (<12”) and large (>12”) Coastal Cutthroat Trout based on counts per mile of river surveyed on the Middle Fork Smith River from 1991 to 2018.

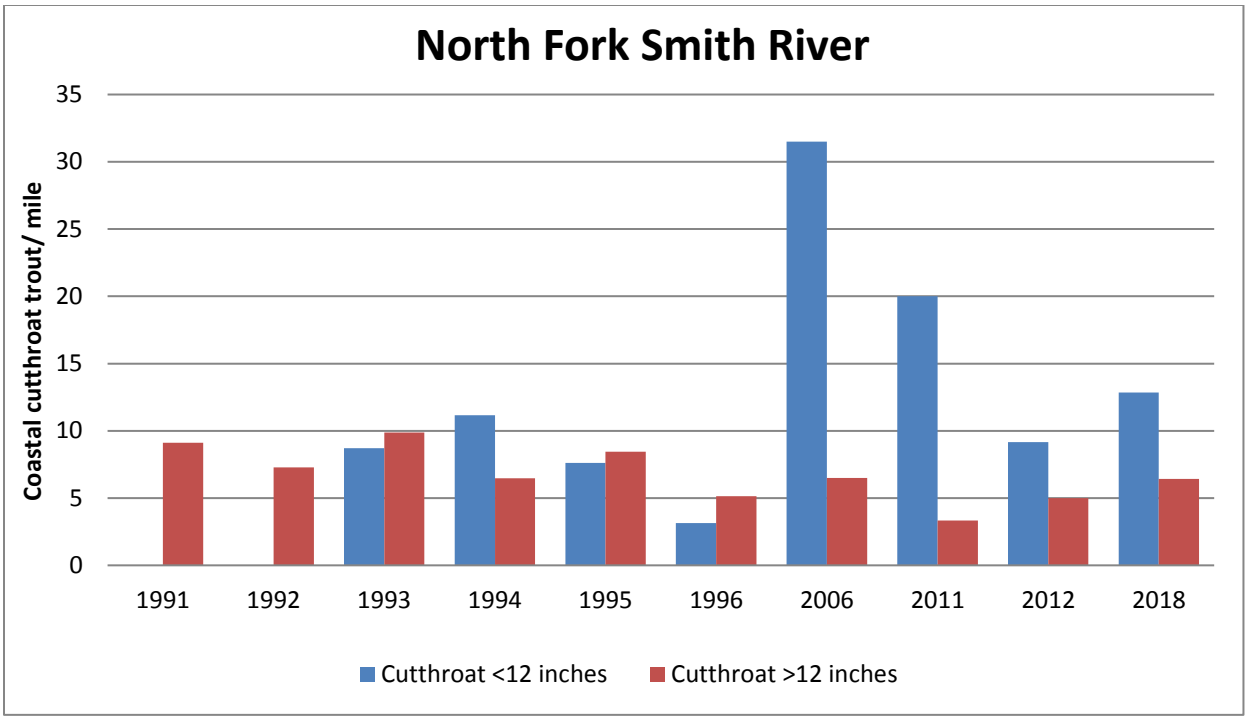

Figure 6. Density of small (<12”) and large (>12”) Coastal Cutthroat Trout based on counts per mile of river surveyed on the North Fork Smith River from 1992 to 2018 during nine years of surveys.

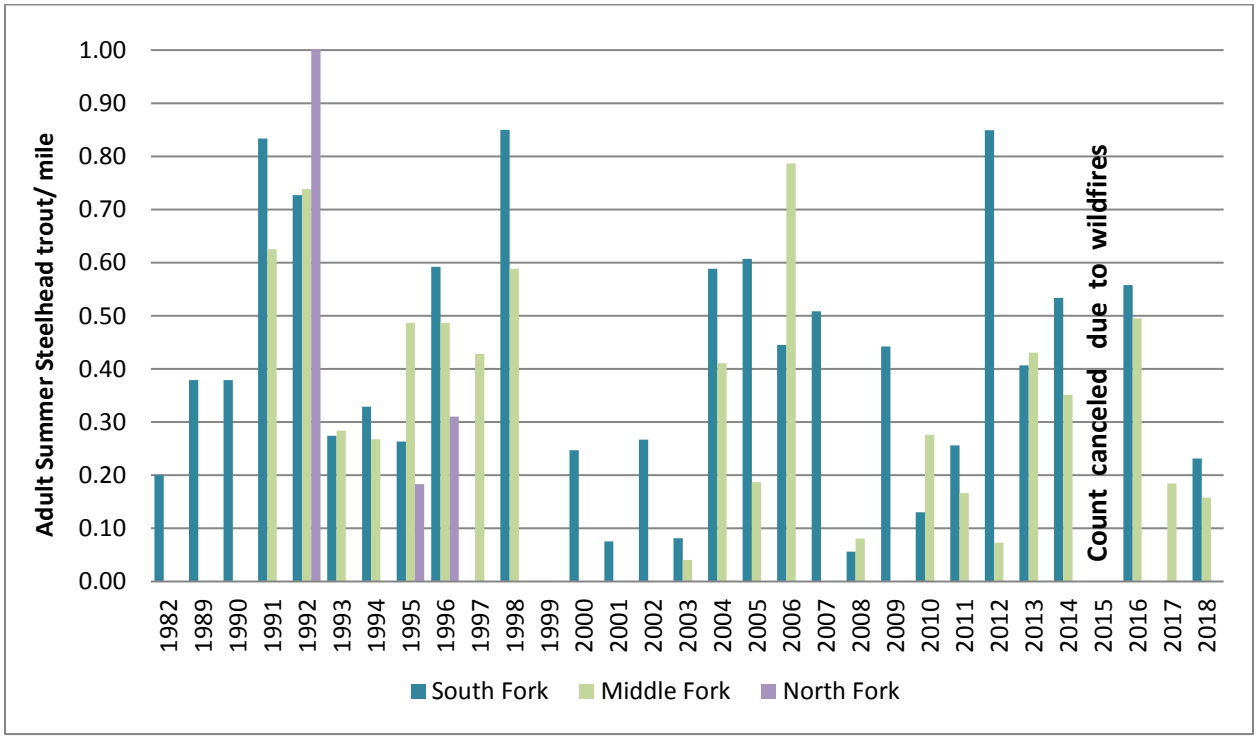

Figure 7. Density of adult Summer Steelhead trout (>16”) based on total counts per mile surveyed along the South Fork, Middle Fork and North Fork of the Smith River during surveys conducted from 1982 to 2018. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

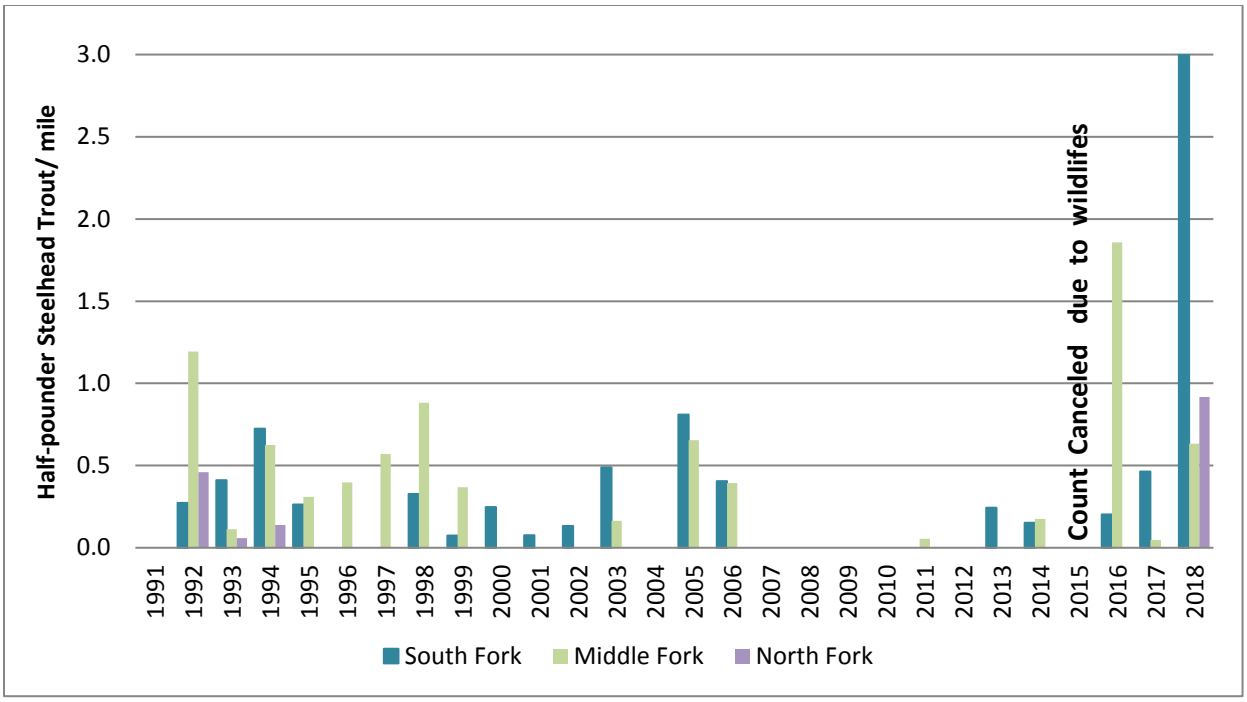

Figure 8. Density of Half-pounder Steelhead trout (12”- 16”) based on total counts per mile surveyed along the South Fork, Middle Fork, and North Fork of the Smith River during surveys conducted from 1982 to 2018. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

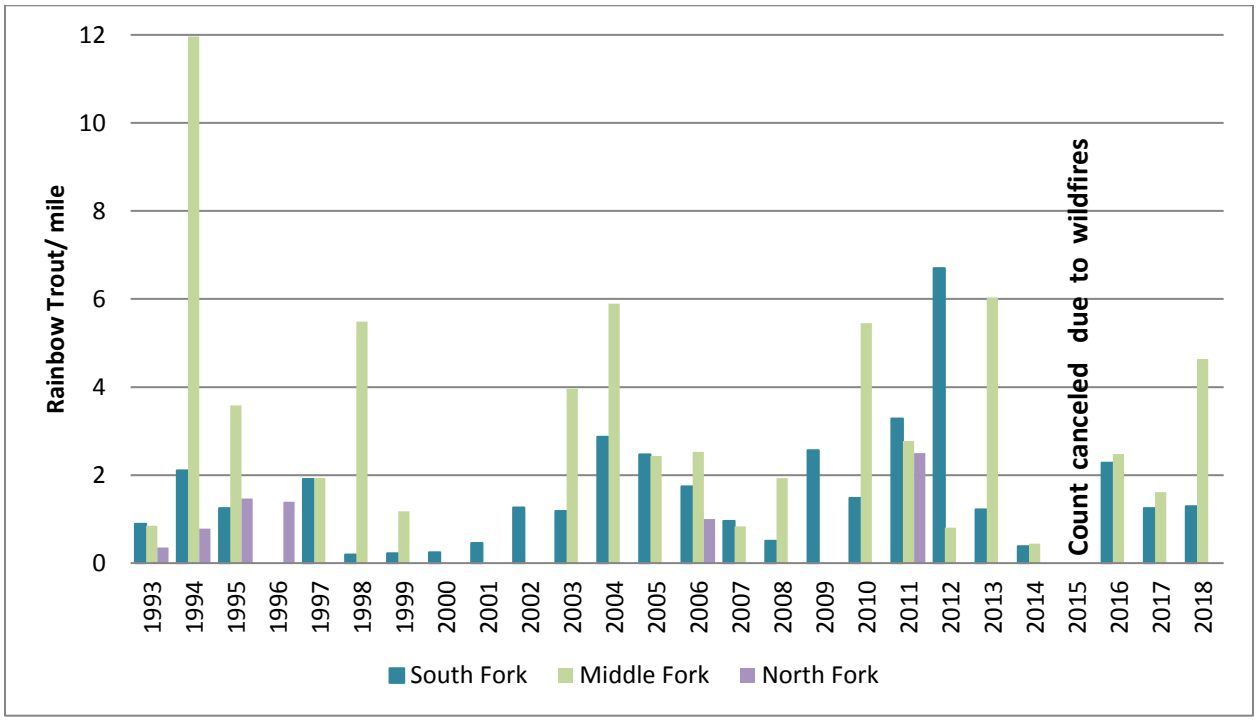

Figure 9. Density of adult Rainbow Trout (>10”) based on total counts per mile surveyed along the South Fork, Middle Fork, and North Fork of the Smith River during surveys conducted from 1989 to 2018. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

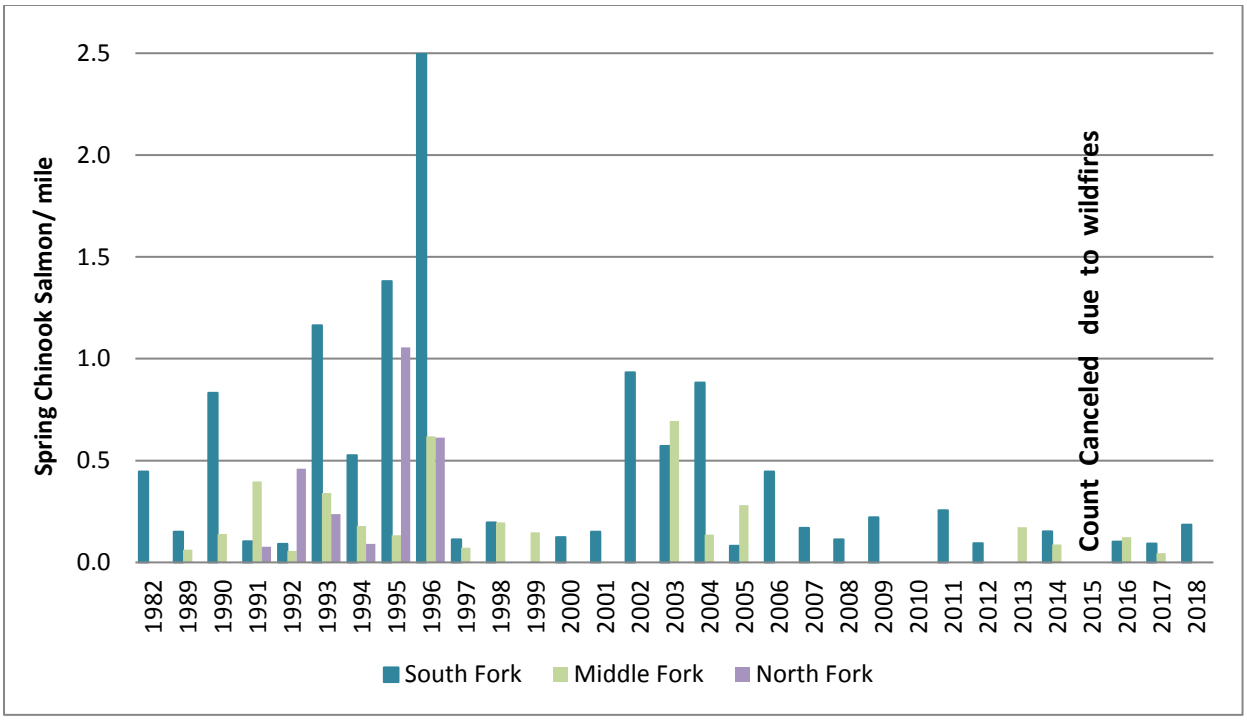

Figure 10. Density of adult Spring Chinook Salmon based on total counts per mile surveyed along the South Fork, Middle Fork and North Fork of the Smith River during surveys conducted from 1982 to 2018. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

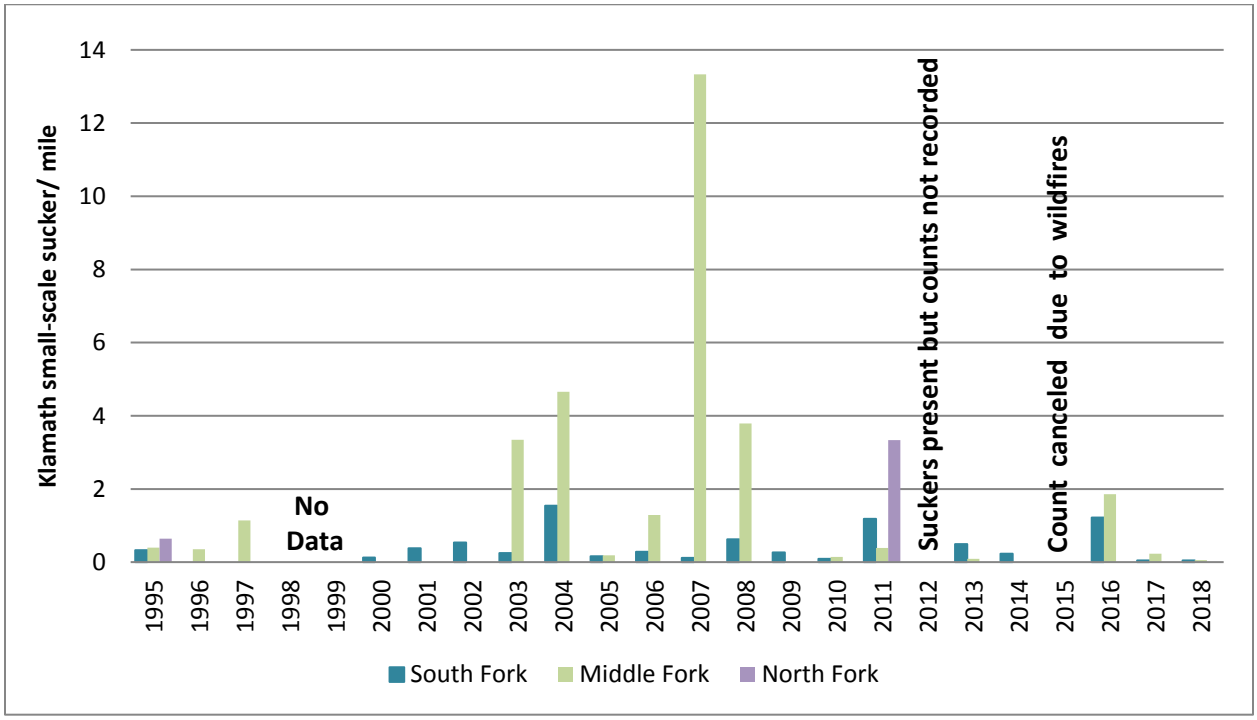

Figure 11. Density of Klamath small-scale suckers (> 6") based on total counts per mile surveyed along the South Fork, Middle Fork, and North Fork of the Smith River during surveys conducted from 1995 to 2018 when observations of suckers were recorded. Surveys were not conducted on all forks every survey year, refer to Appendixes A, B, and C.

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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

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

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