

2011 Southwest Region (Nampa) Fisheries Management Report

RIVERS AND STREAMS INVESTIGATIONS

DISTRIBUTION OF REDBAND AND BULL TROUT IN THE SOUTH FORK BOISE AND PAYETTE RIVER DRAINAGES

ABSTRACT

Tributaries in the South Fork Boise River (below Anderson Ranch Reservoir) and Squaw Creek (Payette River) were surveyed to collect information on the distribution of redband trout *Oncorhynchus mykiss gairdneri* and bull trout *Salvelinus confluentus*. In the South Fork Boise River drainage, 10 sites were surveyed across 4 tributaries. Redband trout were present at all sites, except Little Rattlesnake Creek, where no salmonids were sampled. Multiple-pass depletion estimates were made at three sites, and redband density ranged from 5.7 – 12.6 fish/100 m². Size distribution of redband trout in Cottonwood Creek and Rattlesnake Creek suggests these are resident redband trout populations. Redband trout collected in Trail Creek was mainly age-0 fry, suggesting use by a fluvial spawning population. Bull trout were captured in Rattlesnake Creek and Cottonwood Creek, but were in very low densities.

As part of a cooperative effort with the US Forest Service to collect information on redband trout and bull trout distribution, 24 stream sites across 8 streams were sampled in the in the upper Squaw Creek drainage of the Payette River. Redband trout were found in each stream except for Gabe's Creek, where only bull trout were found (at the lower site). No salmonids were found at seven sites. Depletion estimates were made at 16 sites, and redband trout density was highly variable (3.2 – 50.4 fish/100m²). Of the 1,083 redband trout captured, 77% were over 100 mm in length. Based on size distributions, most of these streams appear to have resident populations of small redband trout, with bull trout in some locations. A total of 79 bull trout were caught across three streams: Gabe's, Renwick, and Third Fork Squaw creeks. Third Fork Squaw Creek had the highest bull trout densities of the streams surveyed (15.1 fish/100m²), while only one bull trout was collected in Renwick Creek. Densities of redband trout appear to be similar or higher than previous samples at the most comparable locations.

Authors:

Martin Koenig
Regional Fishery Biologist

Art Butts
Regional Fishery Biologist

INTRODUCTION

The South Fork Boise River (SFBR) below Anderson Ranch Dam is a nationally renowned tailwater trout fishery and was the first river section in Southwest Idaho to be managed under “Quality Trout” regulations. This fishery is supported by a population of wild rainbow trout *Oncorhynchus mykiss* and mountain whitefish *Prosopium williamsoni*. Migratory bull trout *Salvelinus confluentus* are present at very low densities, and native nongame fish include largescale suckers *Catostomus macrocheilus*, northern pikeminnow *Ptychocheilus oregonensis* and sculpin *Cottus* sp. Rainbow trout populations in the SFBR have been monitored above Danskin Bridge every three years since 1994 (Butts et al. 2011). Results suggest that rainbow trout populations in the SFBR have been relatively stable, but the relative paucity of trout in the 200 to 400 mm length range upstream of Danskin Bridge has puzzled biologists. A population survey in the canyon section downstream of Danskin Bridge in 2008 showed that rainbow trout between 250-400 mm were present in higher proportions than what was observed in the monitored section above (Kozfkay et al. 2010). The SFBR wild trout population is thought to mainly be supported through main-stem spawning of fish with little recruitment from tributaries, as migration barriers are known to be present on most tributaries with spawning habitat (Moore et al. 1979).

Recently, interest has increased in tributaries to the SFBR below Anderson Ranch Dam. Specifically, biologists wish to determine whether the tributaries currently have fish populations, contain spawning habitat, and whether tributary spawning and recruitment could be enhanced by removing migration barriers. Currently, little information on fish populations within these tributaries is available. Moore et al. (1979) characterized the majority of the SFBR tributaries below Anderson Ranch and evaluated the presence of spawning trout and spawning habitat. However, changes in land use practices, road construction and maintenance, and climate over the past 30 years have likely altered conditions in these streams. In 2008, a number of SFBR tributaries were sampled by the United States Forest Service (USFS) for a genetic study on rainbow and redband trout, but little or no population information was collected. More recently, IDFG personnel sampled several sites in Dixie, Granite, Pierce, Rock, and Rough creeks in 2010 (Kozfkay et al. 2010), with additional surveys in Bock, Cayuse, Cow, and Mennecke creeks in 2011 (Butts et al. 2013). We conducted additional sampling in 2012 on Trail, Rattlesnake, Little Rattlesnake and Cottonwood creeks to evaluate their potential as a source of juvenile fish to the SFBR. Data describing the trout communities in tributaries to the SFBR will help guide management, conservation, and restoration efforts in the future.

In addition to sampling in the SFBR drainage, surveys were also conducted in Upper Squaw Creek (Payette River). These surveys were part of a cooperative effort with the USFS to collect information on the distribution of redband and bull trout in portions of the Payette River. Surveys were intended to sample a larger extent of stream habitat in portions of Squaw Creek thought to contain redband and bull trout populations. This area contains grazing allotments on federally-administered lands, and additional distribution data for USFS sensitive fish species will help inform land management decisions in the drainage.

METHODS

Four tributaries to the South Fork Boise River were sampled in 2012 to evaluate presence, distribution and abundance of redband trout and bull trout. Ten sites were sampled

across Rattlesnake, Little Rattlesnake, Cottonwood, and Trail creeks (Table 30). Sites on Trail Creek were selected from a 1:100,000 hydrography layer through the Environmental Protection Agency's Environmental Monitoring and Assessment Program (see Stevens and Olsen 2004). All other sites were selected from previously sampled IDFG and USFS survey sites. Sampling occurred from September 11 to September 18, 2012, except for Trail Creek, which was surveyed on November 7, 2012. Sampling occurred from September 11 to September 18, 2012

Seven streams in the Upper Squaw Creek drainage were selected based on the distribution of federal grazing allotments, as well as locations historically sampled by IDFG or USFS. Sites were mainly short (100 m) multiple-pass depletion reaches, but additional longer single-pass (1000 m) reaches were added to collect presence/absence information over larger spatial scales (Table 31). All sampling in the Squaw Creek drainage occurred between August 15 and September 5, 2012.

Fish sampling

We used a combination of single-pass and multi-pass electrofishing sites to determine the abundance of salmonids using a backpack electrofishing unit (Smith-Root Model 15-D) with pulsed DC. Nongame fish and amphibian species were also recorded if observed. Fish were identified, enumerated, measured to the nearest millimeter (total length, TL) and gram, and released downstream of the study sites. For multiple pass reaches, block nets were installed at the upper and lower ends of the sites to prevent fish from leaving or entering a study site during the survey. Study sites were generally 100 m in length. Sections of stream where vegetation was too thick to sample effectively were not included in the sample site. In some locations, longer single pass reaches (1000 m) were used to assess long sections of stream to sample greater area (Table R1, Table R2). Fish abundance and associated confidence intervals at depletion sites were estimated with the Maximum-likelihood function in the MicroFish software package (Van Deventer 2006; Van Deventer and Platts 1989). When all trout were captured on the first pass, we estimated abundance to be the total catch. Because electrofishing is characteristically size selective (Sullivan 1956; Reynolds 1996), trout were separated into two length groups (<100 mm TL and ≥ 100 mm TL) and abundance estimates were calculated individually for each size group. Depletion estimates were only attempted for salmonids and were not applied to nongame fish or amphibian species.

Habitat Sampling

Various habitat measurements were recorded at ten equally spaced transects within the sample site. Stream width was measured at each transect and depth (m) was measured at $\frac{1}{4}$, $\frac{1}{2}$, and $\frac{3}{4}$ distance across the channel. The sum of these depth measurements was divided by four to account for zero depths at the stream margins for trapezoidal channels (Platts et al. 1983; Arendt 1999). Wetted stream width (m) was calculated from the average of all transect measurements. In most cases stream temperature ($^{\circ}\text{C}$) and conductivity ($\mu\text{S}/\text{cm}$) were measured at the bottom of a site with a calibrated hand-held meter accurate to $\pm 2\%$. Various other habitat measurements such as percent substrate composition, percent shading, and bank stability were measured but the results are not reported here.

RESULTS

South Fork Boise River

In the South Fork Boise River drainage, we surveyed 10 sites across 4 tributaries (Table 30). Redband trout were present in at all sites, except Little Rattlesnake Creek, where no salmonids were sampled. A total of 340 redband trout were collected, with 198 of them being less than 100 mm in total length. Multiple-pass depletion estimates were made at three sites, and redband trout density ranged from 5.7 – 12.6 fish/100 m². At these sites, capture probability for redband trout was high (0.84 or greater) at all sites (Table 30). Most locations were sampled with single pass electrofishing, so no density estimates were calculated for these samples. Cottonwood Creek and Rattlesnake Creek appear to contain resident populations of redband trout over 100 mm in length, while Trail Creek mainly contained redband trout less than 100 mm (Figure 41). Bull trout were captured in Rattlesnake Creek and Cottonwood Creek, but only in very low numbers (Table R1). Only three bull trout were captured during these surveys. One large adult bull trout (TL = 492 mm) was collected in Rattlesnake Creek, likely a fluvial fish from the South Fork Boise River or Arrowrock Reservoir. Tailed frogs were found present at one site in Rattlesnake Creek (Table 30).

Upper Squaw Creek

In the upper Squaw Creek drainage of the Payette River, 24 sites were sampled across eight streams. Redband trout were found in each stream except for Gabe's Creek, where only bull trout were found (at the lower site). No salmonids were found at seven sites (Table 31). Depletion estimates were made at 16 sites, and redband trout density varied considerably across sites (3.2 – 50.4 fish/100m²). Of the 1,083 redband trout captured, 77% were over 100 mm in length. No salmonids were captured at 7 of the sampling sites (Table 31). Often, these sites were the furthest upstream in the drainages sampled (Figure 40). No redband trout were found in Gabe's Creek, but bull trout were found present at the lower site near confluence with Third Fork Squaw Creek (Figure 40). A total of 79 bull trout were caught across three streams: Gabe's, Renwick, and Third Fork Squaw creeks. Third Fork Squaw Creek had the highest densities of bull trout of the streams surveyed (15.1 fish/100m²), while only one bull trout was collected in Renwick Creek (Table 31). Tailed frogs were documented in Antelope, Rammage, Second Fork Squaw, Third Fork Squaw, and Gabe's creeks (Table 31).

A coordinated long-term monitoring effort has not been organized for the upper Squaw Creek drainage. However, fish surveys have been conducted in this drainage since at least 1993 for a variety of different projects (Figure 41). While direct comparisons across years are not available for specific sites, some sites were close enough in location and format to compare redband densities to 2012 data. We examined previously collected data and tabulated closely located sites. Only sites with multiple-pass electrofishing data were included, as single-pass data were not comparable. Only four locations were close enough with similar surveys to be compared (Table 32). For these four locations, densities of redband rainbow increased in most areas compared to 2004 surveys, except for one area (sites 06Wilson1 and #5) in Third Fork Squaw Creek, where densities remained similar (Table 32). Densities increased consistently in both size groups for streams where previous surveys had been conducted. Compared to previous surveys, bull trout remained rare at these sites, and no density estimates were possible because of limited sample sizes.

DISCUSSION

Size distribution of redband trout in Cottonwood Creek and Rattlesnake Creek suggests these are resident populations (Figure 41). Redband trout collected in Trail Creek were mainly age-0 fry, suggesting use by a fluvial spawning population (Figure 41). These data are very similar to other nearby tributaries. Previous sampling in 2011 of showed very similar size distributions in Bock, Mennecke, Cayuse and Cow creeks, all dominated by age-0 redband trout (Butts et al. 2013). Size distributions in these creeks show very few age-1 or older fish. This suggests either very poor overwinter survival of age-0 fish, or emigration to the main stem South Fork Boise River. If these creeks sustain enough water through the winter, they may be important spawning tributaries and could contribute to redband trout recruitment in the South Fork Boise River. Before any of the streams are further considered for habitat improvements, seasonal flow in these streams should be investigated to determine if these tributaries can provide annual spawning habitat.

Our sampling in the upper Squaw Creek drainage documented a mix of redband trout and bull trout. The Rammage Creek drainage appears to mainly be occupied by redband trout, as no bull trout were documented during our surveys. Third Fork Squaw Creek appears to contain a mixture of resident redband trout and a well-established bull trout population. Gabes Creek also contained bull trout, but were only present at the site near its confluence with Third Fork Squaw Creek. Bull trout were also present in Renwick Creek, but in very low density, as only one fish was captured (Table 31). Based on size distributions, most of these streams appear to have resident populations of small redband trout, with bull trout in some locations (Figure 42).

Some comparisons to previous samples in 1994 and 2004 were available. While these sites were not exact replicate locations, they were in close enough proximity to give general information on redband trout abundance and distribution over time. Densities of redband trout appear to be similar or higher than previous samples at the most comparable locations (Table 32).

Table 30. Estimated abundance and density (fish/100 m²) of redband trout and bull trout by length group at 2012 monitoring sites in the South Fork Boise drainage sampled in 2012. Depletion estimates and density were not generated for single-pass electrofishing sites.

Stream	Section	Species	Lat	Lon	Passes	length	Site	< 100 mm				> 100 mm				Total		Comment	Amphibians
								n	Estimate	95% CI	C. P.	n	Estimate	95% CI	C. P.	Estimate	fish/100 m ²		
Cottonwood Cr.	95CWint1	RBT	43.63339446	-115.8243885	2	105		0	0	-	-	23	23	± 1	0.89	23	7.0		
Cottonwood Cr.	CTW_054	RBT	43.67088271	-115.8258454	1	106		0	-	-	-	12	-	-	-	-	-		
		BLT						0	-	-	-	1	-	-	-	-	-		
Cottonwood Cr.	IDFG1	RBT	43.63954024	-115.8306429	2	100		0	0	-	-	23	23	± 1	0.92	23	5.7		
L. Rattlesnake Cr.	LRC01	N/A	43.58983541	-115.6982287	1	-		0	-	-	-	0	-	-	-	-	-	No fish	
Rattlesnake Cr.	92RSINT5	RBT	43.57322091	-115.68269	1	105		1	-	-	-	10	-	-	-	-	-		
Rattlesnake Cr.	RMR13	RBT	43.59193662	-115.5952229	2	100		2	2	± 0	1	54	55	± 3	0.84	57	12.6		Tailed frog
		BLT						0	-	-	-	1	-	-	-	-	-		
Rattlesnake Cr.	RS1658	RBT	43.59920107	-115.5746115	1	100		1	-	-	-	10	-	-	-	1	-		
Rattlesnake Cr.	XRS1753	RBT	43.60766214	-115.5706271	1	90		0	-	-	-	4	-	-	-	-	-		
		BLT						0	-	-	-	1	-	-	-	-	-		
Trail Cr.	TC01	RBT	43.44010209	-115.62504	1	102		166	-	-	-	4	-	-	-	-	-		
Trail Cr.	TC02	RBT	43.43686721	-115.6358713	1	110		28	-	-	-	2	-	-	-	-	-		

Table 31. Estimated abundance and density (fish/100 m²) of redband trout and bull trout by length group at 2012 monitoring sites in the Upper Squaw Creek (Payette River) drainage sampled in 2012. Depletion estimates and density were not generated for single-pass electrofishing sites.

Stream	Section	Species	Lat	Lon	Passes	length	Site				< 100 mm				> 100 mm				Total		Comment	Amphibians
							n	Estimate	95% CI	C. P.	n	Estimate	95% CI	C. P.	n	Estimate	95% CI	C. P.	Estimate	fish/100 m ²		
Antelope Cr.	02Ant12	N/A	44.38551332	-116.1861769	1	105	0	-	-	-	0	-	-	-	0	-	-	-	-	-	No fish	
Antelope Cr.	94Anto	RBT	44.37509601	-116.1973407	3	107	14	14	± 2	0.67	44	45	± 3	0.67	59	26.9						Tailed frog
Gabes Cr.	UNKNGB1	RBT	44.43359128	-116.2038625	2	110	1	1	± 0	1	21	21	± 1	0.91	22	6.2						Tailed frog
		BLT					2	2	± 0	1	7	7	± 0	1	22	6.2						
Gabes Cr.	UNKNGB2	N/A	44.43562321	-116.1769104	1	-	0	-	-	-	0	-	-	-	0	-	-	-	-	-	No fish	
Rammage Cr.	06Ramm4	RBT	44.41158393	-116.1848113	3	104	1	1	± 0	1	13	13	± 2	0.65	14	3.2						Tailed frog
Rammage Cr.	2dFQ=srt-E	N/A	44.42093544	-116.2075196	1	1000	0	-	-	-	0	-	-	-	0	-	-	-	-	-	No fish	
Rammage Cr.	RMGMEAD1	RBT	44.41467672	-116.2034633	2	113	34	35	± 4	0.79	132	140	± 10	0.75	175	32.9						Tailed frog
Rammage Cr.	RMG-srt-B	N/A	44.41631608	-116.1945858	1	1000	0	-	-	-	0	-	-	-	0	-	-	-	-	-	No fish	
Rammage Cr., 1st Trib	95SFRM5	RBT	44.40601934	-116.2075371	3	102	11	11	± 1	0.73	26	27	± 4	0.62	38	31.3						Tailed frog
Rammage Cr., 2nd Trib	11RAM22	RBT	44.4192926	-116.1989304	2	102	30	39	± 21	0.51	54	58	± 8	0.72	97	28.5						Tailed frog
Renwyck Cr.	06Renwyck	RBT	44.37885192	-116.1634396	2	103	2	2	-	1	40	42	± 5	0.76	44	12.7						
Renwyck Cr.	10REN42	N/A	44.38365463	-116.1578538	1	105	0	-	-	-	0	-	-	-	0	-	-	-	-	-	No fish	Tailed frog
Renwyck Cr.	94RENO	RBT	44.36831474	-116.1946079	2	105	9	9	± 2	0.82	41	42	± 4	0.81	51	10.9						Tailed frog
Renwyck Cr.	Rnwk2	RBT	44.37646932	-116.1795871	2	103	14	16	± 8	0.61	34	36	± 6	0.74	52	13.0						
Renwyck Cr.	RNWKSrt1	BLT	44.37358993	-116.1884756	1	1000	0	-	-	-	1	-	-	-	1	-	-	-	-	-	No RBT	
Second Fork Squaw Cr.	02SFSQ50	RBT	44.36335795	-116.1991567	2	102	22	22	± 2	0.85	90	91	± 3	0.87	113	23.7						Tailed frog
Second Fork Squaw Cr.	02SFSQ60	RBT	44.37528865	-116.1979754	3	101	26	56	± 98	0.19	31	32	± 4	0.63	88	50.4						
Second Fork Squaw Cr.	94SFS9	RBT	44.37007533	-116.1977758	2	103	22	22	± 1	0.92	74	74	± 2	0.91	96	37.0						Tailed frog
Third Fork Squaw Cr.	00TFS76	N/A	44.44306232	-116.1973558	1	108	0	-	-	-	0	-	-	-	0	-	-	-	-	-	No fish	Tailed frog
Third Fork Squaw Cr.	06Wilson1	RBT	44.43723935	-116.2034242	2	100	11	11	± 3	0.79	49	49	± 1	0.93	60	16.9						Tailed frog
		BLT					6	6	± 1	0.86	7	7	-	1	13	3.7						
Third Fork Squaw Cr.	06Wilson3	RBT	44.43957358	-116.2026413	2	104	8	8	± 2	0.80	23	23	± 2	0.85	31	8.6						Tailed frog
		BLT					14	14	± 1	0.93	40	40	± 1	0.98	54	15.1						
Third Fork Squaw Cr.	2dFKsrtB	N/A	44.42249545	-116.2125221	1	1000	0	-	-	-	0	-	-	-	0	-	-	-	-	-	No fish	
Third Fork Squaw Cr.	IDFGSQ1	RBT	44.42410675	-116.2112969	2	106	21	23	± 7	0.68	104	109	± 6	0.80	132	31.4						
		BLT					0	-	-	-	1	-	-	-	-	-	-	-	-	-		
Third Fork Squaw Cr.	TFS70	RBT	44.43228064	-116.2046429	2	102	5	5	± 3	0.71	76	77	± 3	0.85	82	21.0						
		BLT					1	-	-	-	-	1	-	-	2	-						

Table 32. Estimated abundance and density (fish/100 m²) of redband trout and bull trout by length group at four similar locations in the upper Squaw Creek (Payette River) drainage compared to previous surveys.

Year	Drainage	Stream	Section	Species	Lat	Lon	Passes	Site length	< 100 mm				> 100 mm				Total	
									n	Estimate	95% CI	C. P.	n	Estimate	95% CI	C. P.	Estimate	fish/100 m ²
2012	Payette R.	Third Fork Squaw Cr.	06Wilson1	RBT	44.43723935	-116.2034242	3	100	11	11	± 3	0.79	49	49	± 1	0.93	60	16.9
				BLT					6	6	± 1	0.86	7	7	-	1.00	13	3.7
1994	Payette R.	Third Fork Squaw Cr.	#5	RBT	44.43589064	-116.2036073	3	61.2	24	28	±10	0.46	47	48	±3	0.74	76	19.1
				BLT					0	-	-	-	1	-	-	-	-	-
2012	Payette R.	Third Fork Squaw Cr.	IDFGSQ1	RBT	44.42410675	-116.2112969	2	106	21	23	± 7	0.68	104	109	± 6	0.80	132	31.4
				BLT					0	-	-	-	1	-	-	-	-	-
2004	Payette R.	Third Fork Squaw Cr.	Lowest (overdraw)	RBT	44.4233546	-116.2119628	3	75	30	32	± 5	0.58	61	67	± 9	0.55	99	15.5
2012	Payette R.	Second Fork Squaw Cr.	02SFSQ50	RBT	44.36335795	-116.1991567	2	102	22	22	± 2	0.85	90	91	± 3	0.87	113	23.7
2004	Payette R.	Second Fork Squaw Cr.	Overdraw	RBT	44.3639142	-116.1987955	3	80	19	20	± 4	0.88	35	37	± 5	0.80	57	12.2
2012	Payette R.	Renwyck Cr.	Rnwk2	RBT	44.37646932	-116.1795871	2	103	14	16	± 8	0.61	34	36	± 6	0.74	52	13.0
2004	Payette R.	Renwyck Cr.	Renwick #1	RBT	44.37626323	-116.1798842	2	110	1	1	-	-	9	9	± 1	0.90	10	2.9
				BLT					0	-	-	-	1	-	-	-	-	-

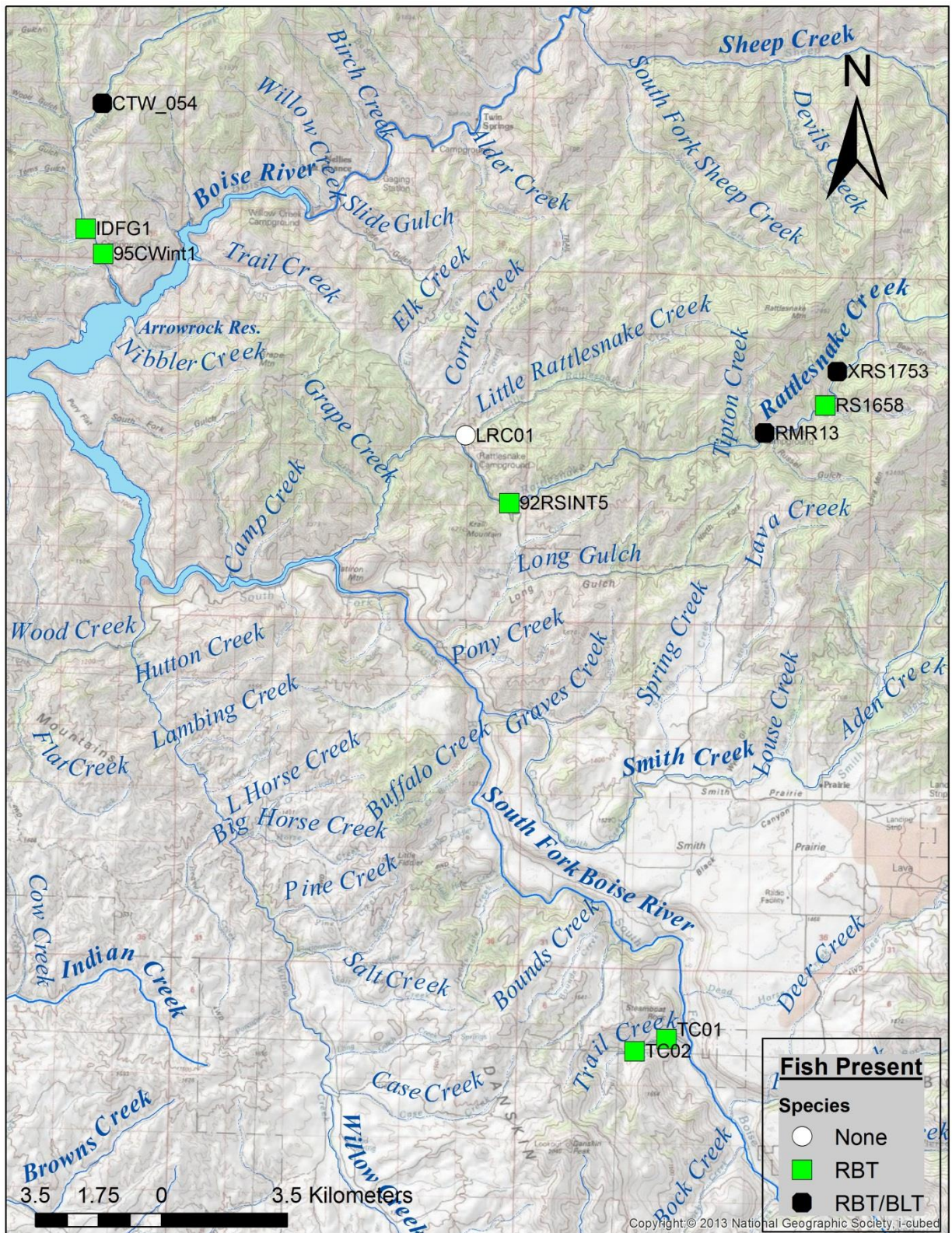


Figure 39. Stream survey sites in the South Fork Boise River sampled during 2012 to collect distribution and abundance data for reband trout and bull trout.

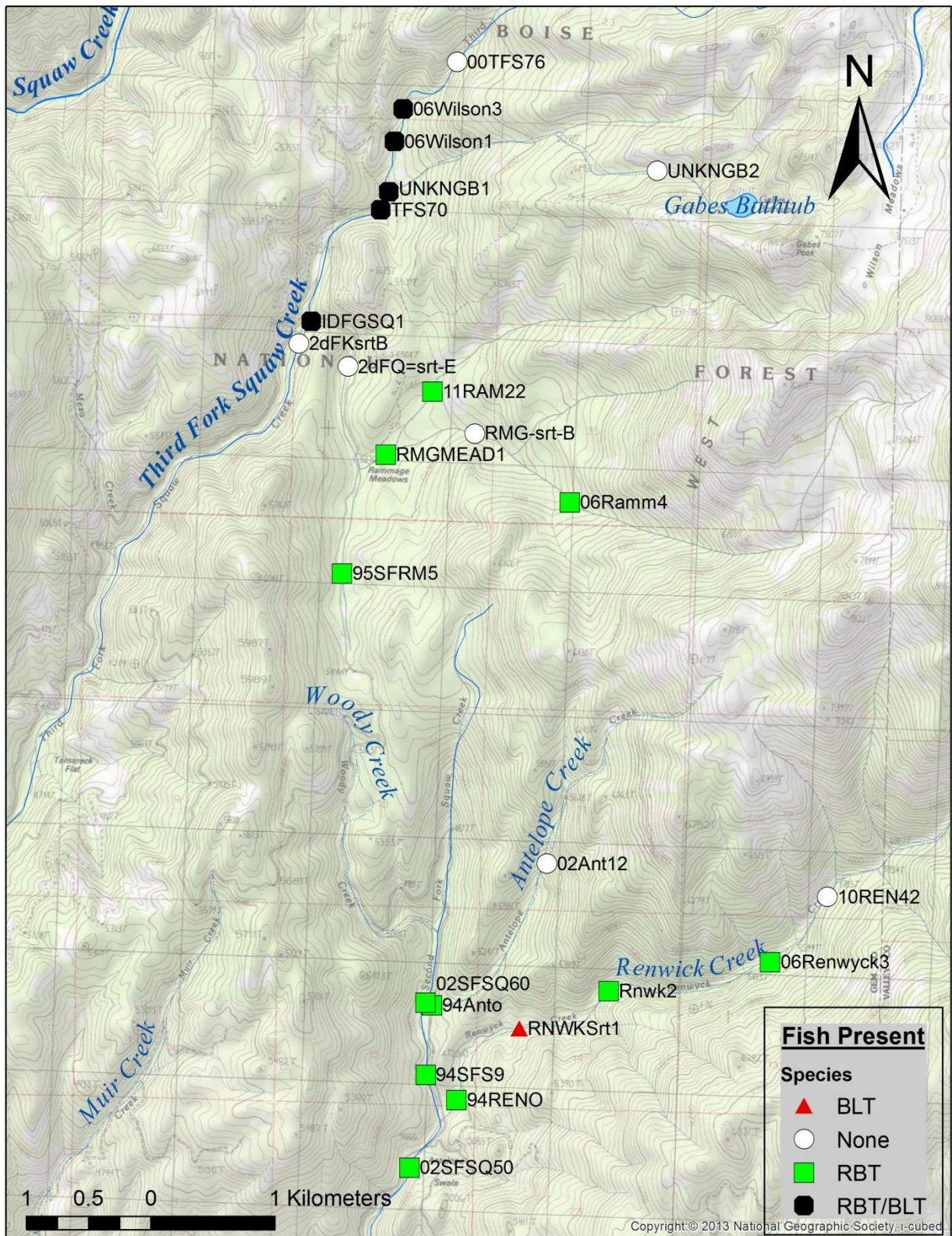


Figure 40. Stream survey locations in upper Squaw Creek (Payette River drainage) sampled during 2012 to collect distribution and abundance data for redband trout and bull trout.

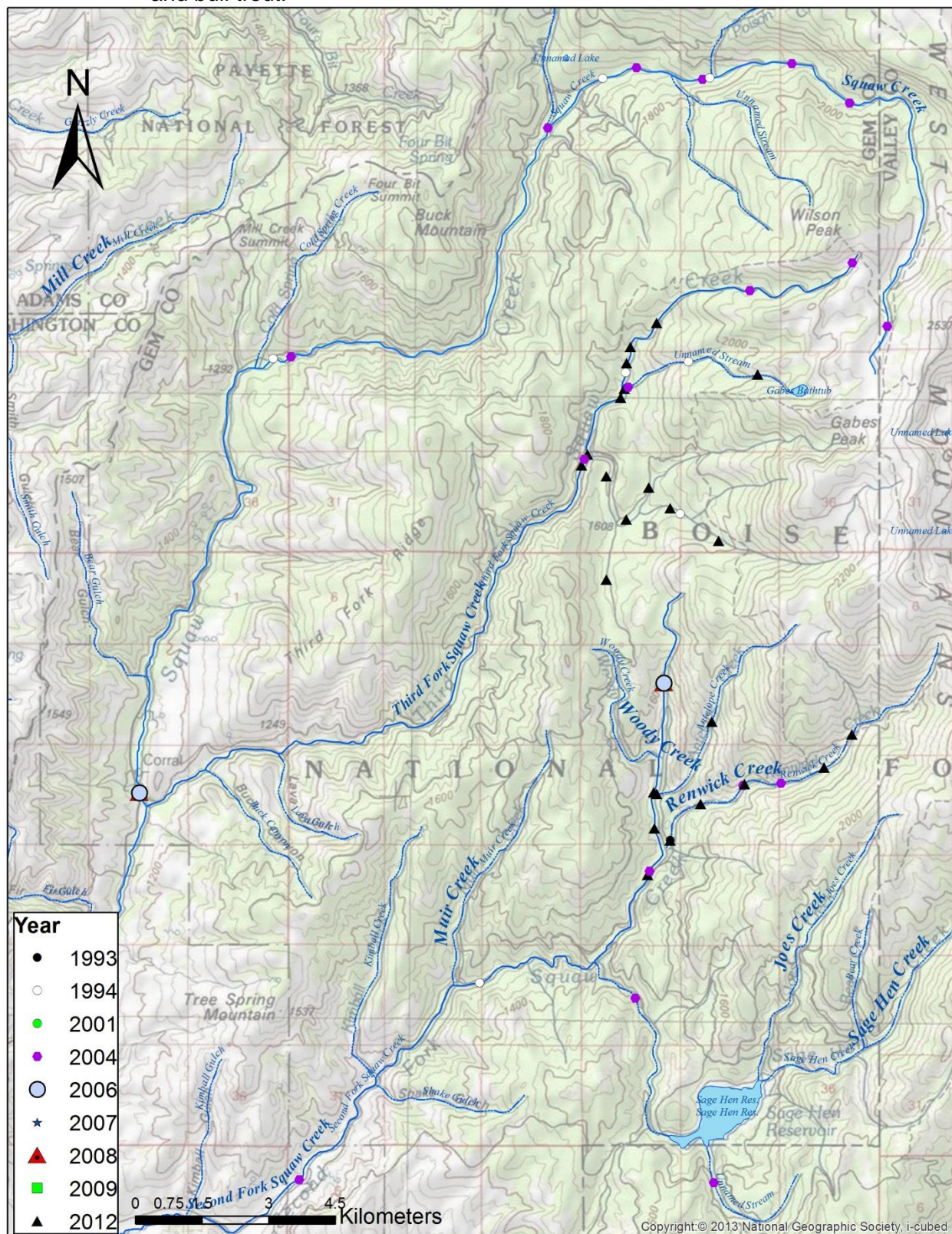
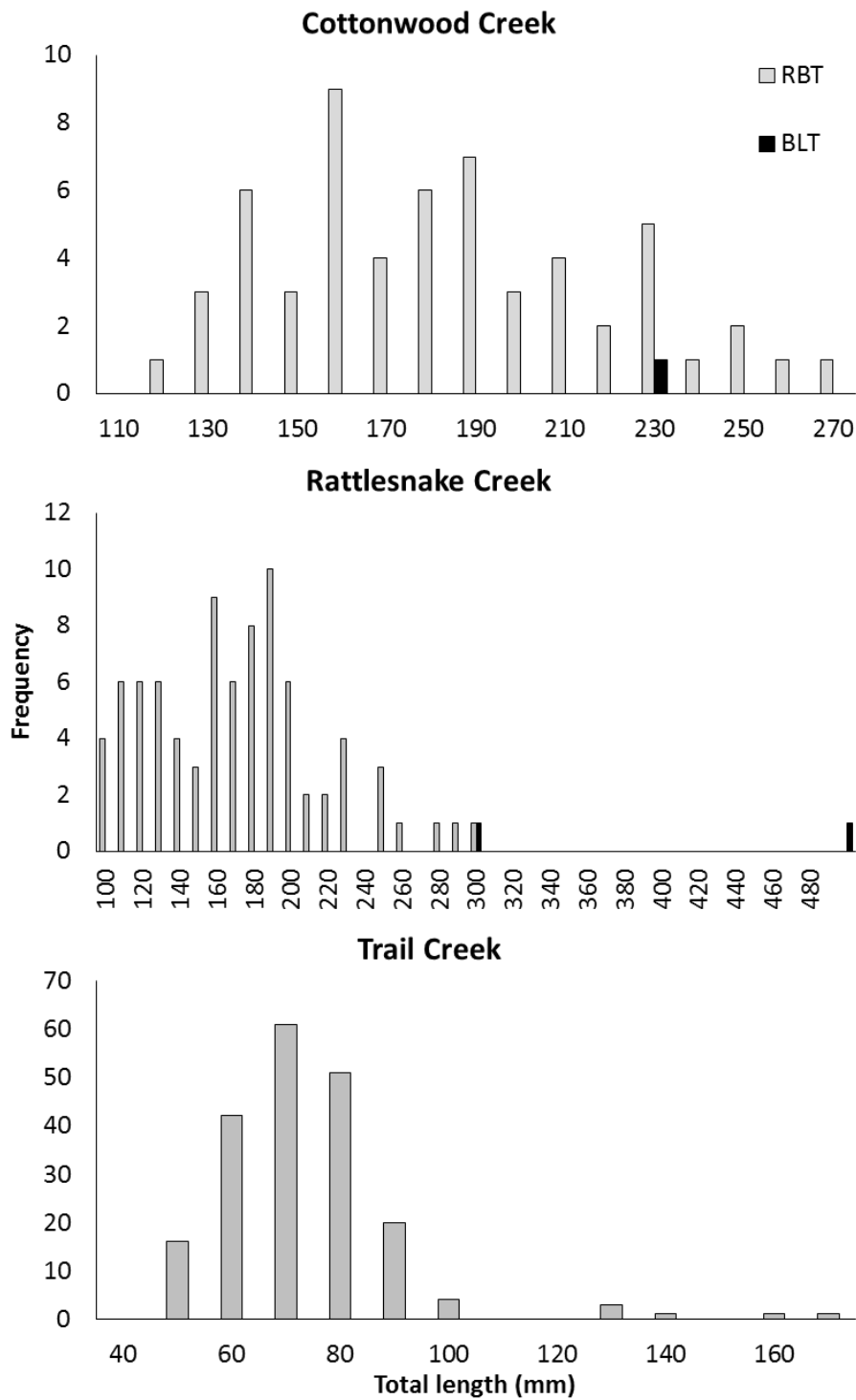


Figure 41. Distribution of survey locations in upper Squaw Creek (Payette River drainage) sampled since 1993 to collect distribution and abundance data for redband trout and bull trout.



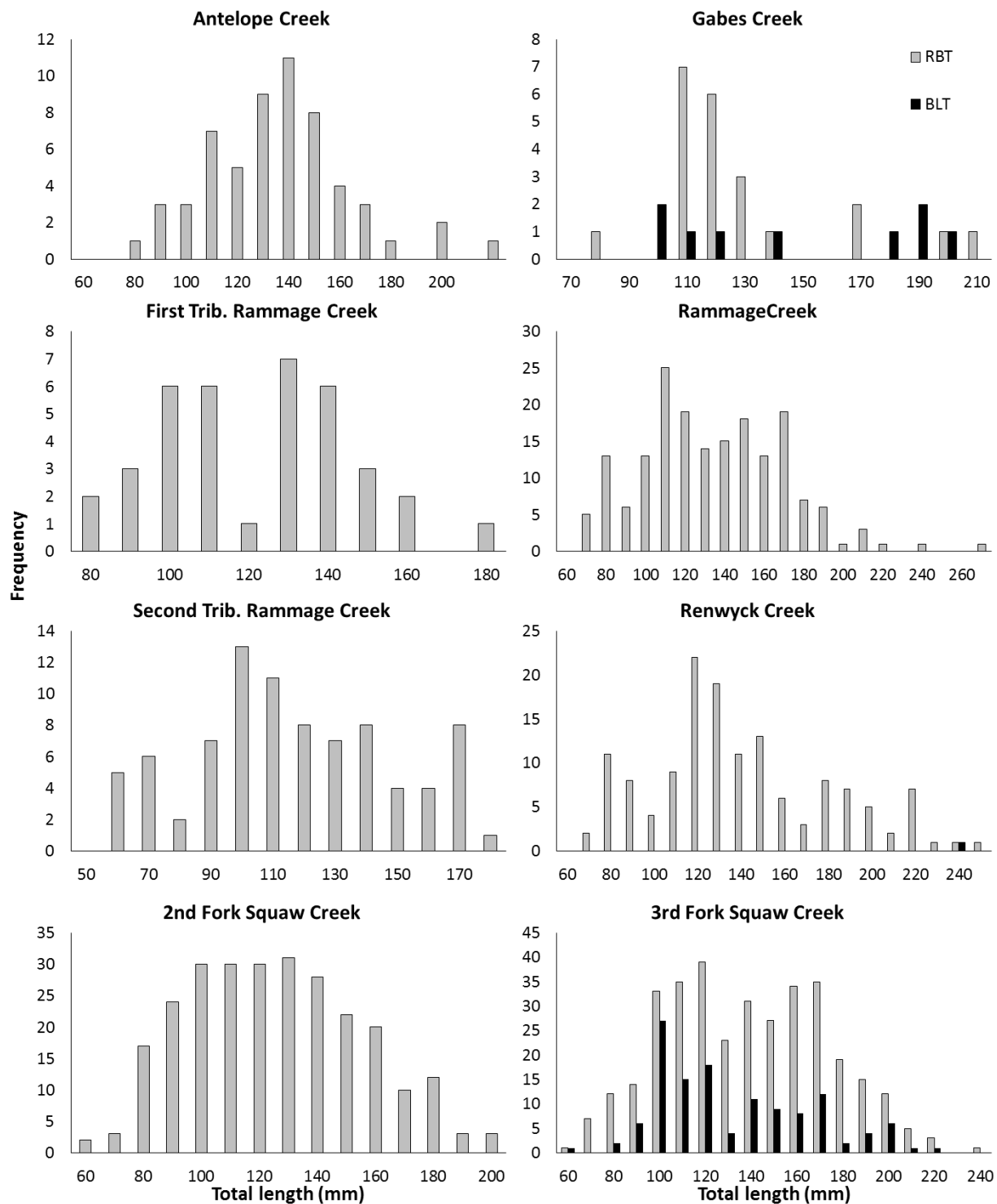


Figure 43. Length frequency distribution of redband trout (gray bars) and bull trout (black bars) sampled from tributaries in the upper Squaw Creek drainage (Payette River) in 2012.