



Bull Trout population monitoring in the Oregon portion of the mid-Columbia recovery unit

Progress Report: 2020 - 2021



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On the cover: *Culverts in Forest Road 3920 near the mouth of Little Sheep Creek (photo by Paul Sankovich).*

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Executive Summary:

The Bull Trout recovery plan calls for the use of a threats assessment tool for evaluating the threats to the species in recovery units for 5-year status reviews and potential delisting. To some extent, those threats evaluations and status assessments will be dependent on demographic and ecological information related to characteristics of a “recovered” recovery unit. Demographic and ecological data for most Bull Trout populations in the Oregon portion of the mid-Columbia recovery unit have not been collected consistently or extensively. A monitoring strategy for Bull Trout populations in the mid-Columbia recovery unit was recently developed (Howell et al. 2018). Our aim is to implement parts of that strategy by undertaking such activities as PIT tagging juvenile Bull Trout in rearing areas to take advantage of data generation provided by existing PIT tag detection sites downstream (e.g., in the Imnaha River), conducting electrofishing surveys to confirm results obtained from eDNA sampling efforts (presence/absence and distribution), and conducting electrofishing, snorkeling, and spawning ground surveys in streams supporting Bull Trout that are surveyed annually (abundance or relative abundance and distribution), or have not been surveyed in many years. In addition, we will participate in cooperative investigations (with the Oregon Department of Fish and Wildlife [ODFW] and PacifiCorp) expanding on past work conducted in the Wallowa River drainage upstream from Wallowa Lake involving the genetic and demographic characteristics of Bull Trout, Brook Trout, and Bull Trout x Brook Trout hybrids.

In 2020 and 2021, we conducted electrofishing surveys in 20 streams in northeast Oregon (Appendix Tables 1 and 2; Appendix Figures 1 – 18). Sampling reaches were typically spaced 1 km apart within potential Bull Trout spawning and early rearing areas identified through various modeling efforts (e.g., Isaak et al. 2015); however, in streams where we failed to collect Bull Trout, but in which Bull Trout eDNA had previously been detected, we subsequently electrofished at the midpoints between sites to increase sampling intensity. While conducting the surveys, we measured the wetted stream width at the beginning, middle, and end of each reach and enumerated and estimated the fork length (FL) of the fish that were captured. Most of the sampling reaches were 50 m. To assist with an Oregon Department of Fish and Wildlife (ODFW) research project aimed at developing a model to predict Bull Trout occupancy (M. Meeuwig, ODFW, personal communication), we electrofished six 250-m (five contiguous 50-m) sampling reaches in the Catherine Creek drainage.

In Little Sheep Creek and its tributary Cabin Creek (Appendix Figure 19), we electrofished to capture and PIT tag Bull Trout in August 2021. We PIT tagged the Bull Trout to obtain a mark-recapture estimate of the number of individuals ≥ 120 mm FL (i.e., to obtain an estimate of the adult population size) and to determine whether the population includes any migratory individuals and if two culverts aligned side-by-side near mouth of Little Sheep Creek form a fish passage barrier. We collected and marked Bull Trout throughout their entire distribution in Little Sheep and Cabin creeks (Appendix Figure 19). Captured Bull Trout were anesthetized with tricaine methanesulfonate (MS-222) and measured for fork length. We injected a PIT tag (8.5 mm long) into the dorsal sinus of those that were ≥ 120 mm. After the fish had recovered from the anaesthetic, they were released near their capture site. The marking event occurred from 16 -

18 August. On 24-26 August, we again electrofished the study reaches in Little Sheep and Cabin creeks to collect Bull Trout and measure and enumerate marked and unmarked individuals.

In three streams in which Bull Trout eDNA previously had been detected at multiple sites—Chicken and East Fork Indian creeks and the Grande Ronde River—we failed to collect any Bull Trout during the initial electrofishing survey (one 50-m sampling reach every 1 km). When we subsequently electrofished at the midpoints between sampling reaches, we captured seven Bull Trout in a single reach in East Fork Indian Creek, but again failed to capture any Bull Trout in Chicken Creek and the Grande Ronde River. Fork lengths of the Bull Trout in East Fork Indian Creek ranged from 70 to 120 mm, indicating multiple age classes, and, presumably a population, were present. We confirmed through electrofishing that Onion, Granite, and Boundary creeks, in which Bull Trout eDNA had previously been detected, did, in fact, support Bull Trout (Appendix Table 1 and 2; Appendix Figures 1 – 18). In streams where Bull Trout were present, densities ranged from 0.002 to 0.072 fish/m² (Appendix Tables 1 and 2). Brook Trout were captured in Onion, Crane, and Hurricane creeks and the Grande Ronde River. Their densities ranged from 0.005 to 0.027 fish/m² (Appendix Tables 1 and 2). An apparent Bull Trout x Brook Trout hybrid was captured in Hurricane Creek. Hybrids were not observed in the other streams supporting both Bull Trout and Brook Trout.

We PIT tagged and released 176 Bull Trout ranging in fork length from 124 to 235 mm in Little Sheep and Cabin creeks. We captured, but did not PIT tag, one individual that was greater than 300 mm FL, indicating it might have been a migratory adult. During the recapture event, 130 Bull Trout ≥ 120 mm FL were captured, 50 of which were recaptures. Thus, we estimated (simple Petersen estimate) 457 ± 50 Bull Trout ≥ 120 mm FL were present in Little Sheep and Cabin creeks. Whereas Bull Trout were relatively abundant and distributed widely in Little Sheep and Cabin creeks in 2021, they were found in only three of the lowermost GRTS sites ($n = 17$) sampled in those streams in 2010 (Hudson et al. 2014). Hudson et al. speculated recent fires might have degraded the habitat in the upper portions of Little Sheep and Cabin creeks and affected the distribution of Bull Trout. If that was the case, it appears the habitat has recovered sufficiently to support Bull Trout.

References:

- Howell, P., P. Sankovich, S. Gunckel, and C. Allen. 2018. A demographic monitoring strategy for Bull Trout core areas in northeastern Oregon and portions of southeastern Washington.
- Hudson, J. M., B. P. Silver, J. R. Cook, and T. A. Whitesel. 2017. Effective population size, connectivity, and occupancy of Bull Trout: tools to assist in recovery, 2005- 2013 Synthesis Report. U. S. Fish and Wildlife Service, Columbia River Fish and Wildlife Conservation Office, Vancouver, WA. 56 pp.
- Isaak, D. J., M. K. Young, D. E. Nagel, D. L. Horan, and M. C. Groce. 2015. The cold-water climate shield: delineating refugia for preserving salmonid fishes through the 21st century. *Global Change Biology* 21:1 -13.

Appendix Table 1. Number, estimated mean fork length (FL), and density of Bull Trout (BuT), and number and density of Brook Trout (BT), juvenile steelhead (STHD), and Bull Trout x Brook Trout hybrids in electrofishing survey sites in northeast Oregon streams in 2020.

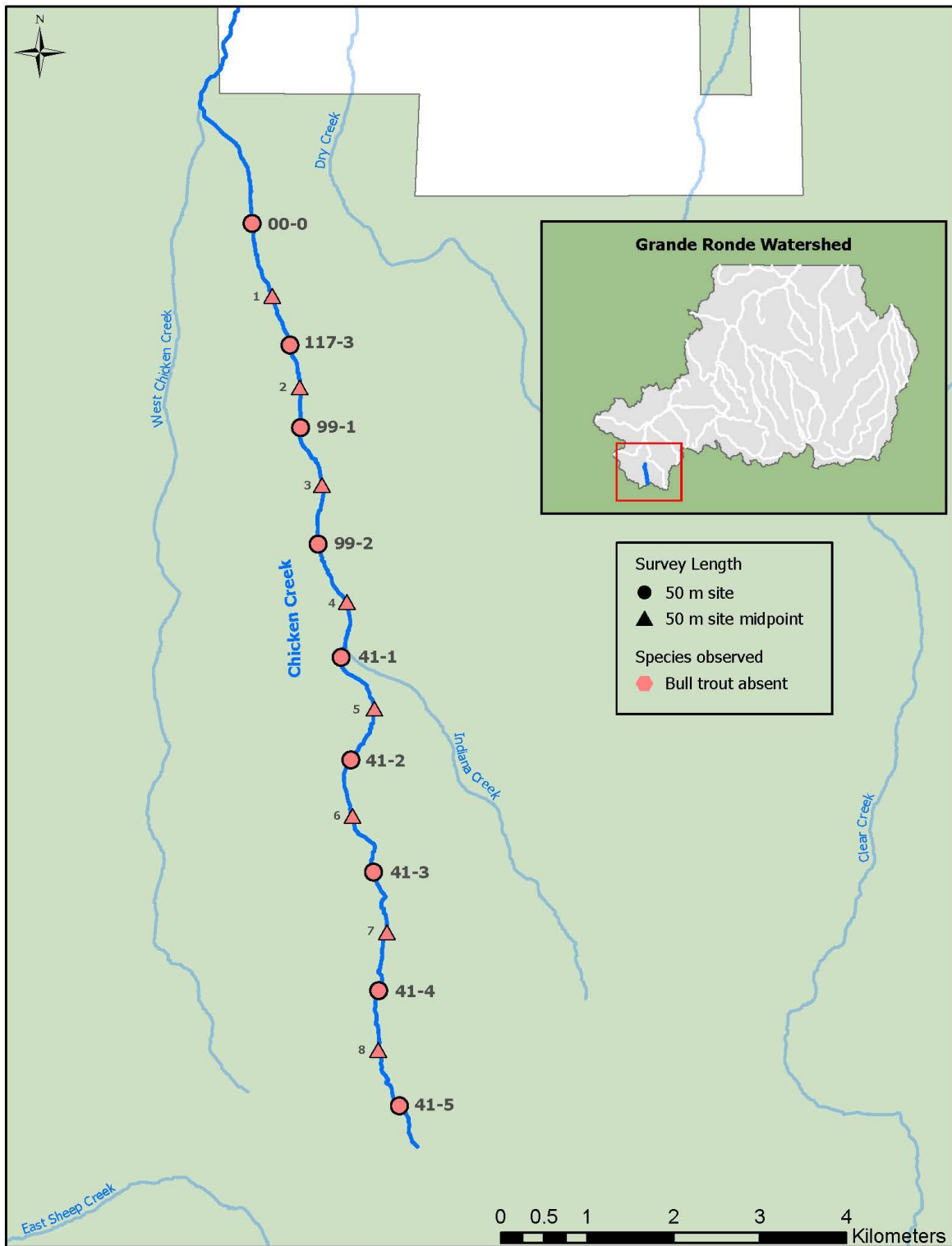
Stream	Date	Site number	Coordinates (WGS 84)		Reach length (m)	Number of BuT	Mean FL (range)	Density BuT/m ²	Number of BT	Density BT/m ²	Number of STHD	Density STHD/m ²	Number of hybrids	Density hybrids/m ²
			Easting	Northing										
Chicken Creek	8/5/2020	00-0	390117	4989970	50	0		0.000	0	0.000	3	0.030	0.000	0.000
Chicken Creek	8/5/2020	117-3	390378	4988970	50	0		0.000	0	0.000	5	0.023	0.000	0.000
Chicken Creek	8/5/2020	99-1	390476	4988297	50	0		0.000	0	0.000	4	0.015	0.000	0.000
Chicken Creek	8/5/2020	99-2	390605	4987344	50	0		0.000	0	0.000	2	0.009	0.000	0.000
Chicken Creek	8/5/2020	41-1	390754	4986420	50	0		0.000	0	0.000	3	0.018	0.000	0.000
Chicken Creek	8/5/2020	41-2	390814	4985581	50	0		0.000	0	0.000	3	0.018	0.000	0.000
Chicken Creek	8/5/2020	41-3	391009	4984658	50	0		0.000	0	0.000	4	0.022	0.000	0.000
Chicken Creek	8/5/2020	41-4	391030	4983693	50	0		0.000	0	0.000	2	0.024	0.000	0.000
Chicken Creek	8/5/2020	41-5	391169	4982732	50	0		0.000	0	0.000	4	0.034	0.000	0.000
Chicken Creek	8/17/2020	1	390267	4989385	50	0		0.000	0	0.000	6	0.045	0.000	0.000
Chicken Creek	8/17/2020	2	390471	4988633	50	0		0.000	0	0.000	11	0.083	0.000	0.000
Chicken Creek	8/17/2020	3	390654	4987834	50	0		0.000	0	0.000	5	0.033	0.000	0.000
Chicken Creek	8/17/2020	4	390852	4986880	50	0		0.000	0	0.000	8	0.060	0.000	0.000
Chicken Creek	8/18/2020	5	391041	4986000	50	0		0.000	0	0.000	5	0.043	0.000	0.000
Chicken Creek	8/18/2020	6	391835	4985152	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Chicken Creek	8/18/2020	7	391104	4984175	50	0		0.000	0	0.000	6	0.120	0.000	0.000
Chicken Creek	8/18/2020	8	391025	4983215	50	0		0.000	0	0.000	4	0.048	0.000	0.000
South Fork Catherine Creek	8/6/2020	1	449336	4996513	50	0		0.000	0	0.000	3	0.007	0.000	0.000
South Fork Catherine Creek	8/6/2020	2	450048	4995875	50	0		0.000	0	0.000	2	0.004	0.000	0.000
South Fork Catherine Creek	8/6/2020	3	450678	4995410	50	0		0.000	0	0.000	3	0.005	0.000	0.000
South Fork Catherine Creek	8/6/2020	4	451260	4994606	50	0		0.000	0	0.000	8	0.022	0.000	0.000
South Fork Catherine Creek	8/6/2020	5	452185	4994273	50	1	100	0.002	0	0.000	11	0.025	0.000	0.000
South Fork Catherine Creek	8/6/2020	6	453062	4994591	50	3	187 (175 - 200)	0.008	0	0.000	7	0.018	0.000	0.000
South Fork Catherine Creek	8/6/2020	7	454048	4994825	50	2	138 (125 - 150)	0.005	0	0.000	3	0.008	0.000	0.000
South Fork Catherine Creek	8/6/2020	8	454954	4994589	50	3	117 (75 - 175)	0.008	0	0.000	13	0.035	0.000	0.000
South Fork Catherine Creek	8/11/2020	9	455807	4994901	250	1	100	0.004	0	0.000	1	0.004	0.000	0.000
South Fork Catherine Creek	8/12/2020	10	456743	4995132	250	6	115 (75 - 125)	0.021	0	0.000	4	0.014	0.000	0.000
South Fork Catherine Creek	8/10/2020	11	457616	4995007	50	4	132 (75 - 200)	0.022	0	0.000	0	0.000	0.000	0.000
South Fork Catherine Creek	8/14/2020	12	458545	4995321	50	0		0.000	0	0.000	0	0.000	0.000	0.000
South Fork Catherine Creek	8/14/2020	13	459538	4995500	50	0		0.000	0	0.000	0	0.000	0.000	0.000
North Fork Catherine Creek	8/21/2020	1	449146	4996555	50	0		0.000	0	0.000	1	0.003	0.000	0.000
North Fork Catherine Creek	8/21/2020	2	449879	4997143	50	0		0.000	0	0.000	3	0.007	0.000	0.000
North Fork Catherine Creek	8/21/2020	3	450606	4997861	50	0		0.000	0	0.000	1	0.003	0.000	0.000
North Fork Catherine Creek	8/21/2020	4	451070	4998735	50	0		0.000	0	0.000	0	0.000	0.000	0.000
North Fork Catherine Creek	8/21/2020	5	451371	4999652	50	0		0.000	0	0.000	1	0.002	0.000	0.000
North Fork Catherine Creek	8/21/2020	6	451805	5000422	50	0		0.000	0	0.000	3	0.009	0.000	0.000

North Fork Catherine Creek	8/21/2020	7	452224	5001365	50	1	100	0.004	0	0.000	3	0.011	0.000	0.000
North Fork Catherine Creek	8/21/2020	8	452722	5002166	50	3	175 (125 - 175)	0.007	0	0.000	1	0.002	0.000	0.000
North Fork Catherine Creek	8/24/2020	9	452484	5003026	250	6	188 (150 - 225)	0.022	0	0.000	7	0.025	0.000	0.000
North Fork Catherine Creek	8/25/2020	10	452354	5003999	250	12	165 (150 - 200)	0.038	0	0.000	7	0.022	0.000	0.000
North Fork Catherine Creek	9/1/2020	11	452151	5004974	50	9	156 (75 - 250)	0.023	0	0.000	1	0.003	0.000	0.000
North Fork Catherine Creek	9/2/2020	12	451922	5005925	50	12	139 (75 - 200)	0.040	0	0.000	0	0.000	0.000	0.000
North Fork Catherine Creek	9/2/2020	13	451686	5006819	50	6	179 (150 - 200)	0.024	0	0.000	6	0.024	0.000	0.000
North Fork Catherine Creek	9/3/2020	14	451915	5007465	50	2	150 (125 - 175)	0.009	0	0.000	3	0.013	0.000	0.000
North Fork Catherine Creek	9/3/2020	15	452446	5008047	50	3	150 (125 - 175)	0.011	0	0.000	0	0.000	0.000	0.000
North Fork Catherine Creek	9/3/2020	16	453235	5008540	50	4	153 (100 - 175)	0.015	0	0.000	1	0.004	0.000	0.000
North Fork Catherine Creek	9/8/2020	17	454187	5008467	50	0		0.000	0	0.000	0	0.000	0.000	0.000
North Fork Catherine Creek	9/8/2020	18	454907	5007811	50	0		0.000	0	0.000	0	0.000	0.000	0.000
North Fork Catherine Creek	9/8/2020	19	454667	5006878	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Clear Creek	9/14/2020	19-3	382483	4932126	50	0		0.000	0	0.000	5	0.027	0.000	0.000
Clear Creek	9/14/2020	19-4	382070	4931246	50	0		0.000	0	0.000	9	0.060	0.000	0.000
Clear Creek	9/14/2020	5-1	382192	4929902	50	0		0.000	0	0.000	1	0.009	0.000	0.000
Clear Creek	9/14/2020	5-2	382241	4928935	50	0		0.000	0	0.000	1	0.006	0.000	0.000
Clear Creek	9/14/2020	5-3	382342	4928041	50	0		0.000	0	0.000	2	0.012	0.000	0.000
Clear Creek	9/14/2020	5-4	382866	4927203	50	1	200	0.015	0	0.000	4	0.060	0.000	0.000
Clear Creek	9/14/2020	5-5	383414	4926380	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Clear Creek	9/14/2020	1-1	383712	4925613	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Clear Creek	9/14/2020	1-2	383806	4924657	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Clear Creek	9/14/2020	1-3	384162	4923863	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Clear Creek	9/14/2020	1-4	384955	4923653	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Clear Creek	9/14/2020	1-5	385804	4923452	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Onion Creek	9/15/2020	342-1	389512	4974128	50	0		0.000	0	0.000	7	0.140	0.000	0.000
Onion Creek	9/15/2020	342-2	389894	4973343	50	0		0.000	3	0.045	0	0.000	0.000	0.000
Onion Creek	9/15/2020	325-1	389758	4972780	50	0		0.000	6	0.240	0	0.000	0.000	0.000
Onion Creek	9/15/2020	325-2	390478	4972491	50	1	150	0.024	0	0.000	0	0.000	0.000	0.000
Onion Creek	9/15/2020	294-2	392499	4971963	50	1	100	0.020	7	0.140	0	0.000	0.000	0.000
Onion Creek	9/15/2020	294-1	391663	4972407	50	0		0.000	5	0.100	0	0.000	0.000	0.000
Granite Creek	9/16/2020	244-1	389511	4967375	50	1	175	0.040	0	0.000	5	0.200	0.000	0.000
Granite Creek	9/16/2020	244-2	390337	4967752	50	1	80	0.024	0	0.000	3	0.072	0.000	0.000
Granite Creek	9/17/2020	239-4	389008	4966573	50	0		0.000	0	0.000	4	0.080	0.000	0.000
Granite Creek	9/17/2020	236-1	391520	4968039	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Crane Creek	9/15/2020	266-1	389194	4970821	50	0		0.000	8	0.240	0	0.000	0.000	0.000
Crane Creek	9/15/2020	266-2	390006	4970440	50	0		0.000	15	0.600	0	0.000	0.000	0.000
Crane Creek	9/15/2020	266-3	390836	4970034	50	0		0.000	9	0.180	0	0.000	0.000	0.000
Crane Creek	9/16/2020	266-4	391721	4969739	50	0		0.000	11	0.189	0	0.000	0.000	0.000
Crane Creek	9/16/2020	253-1	393065	4969559	50	0		0.000	2	0.040	0	0.000	0.000	0.000

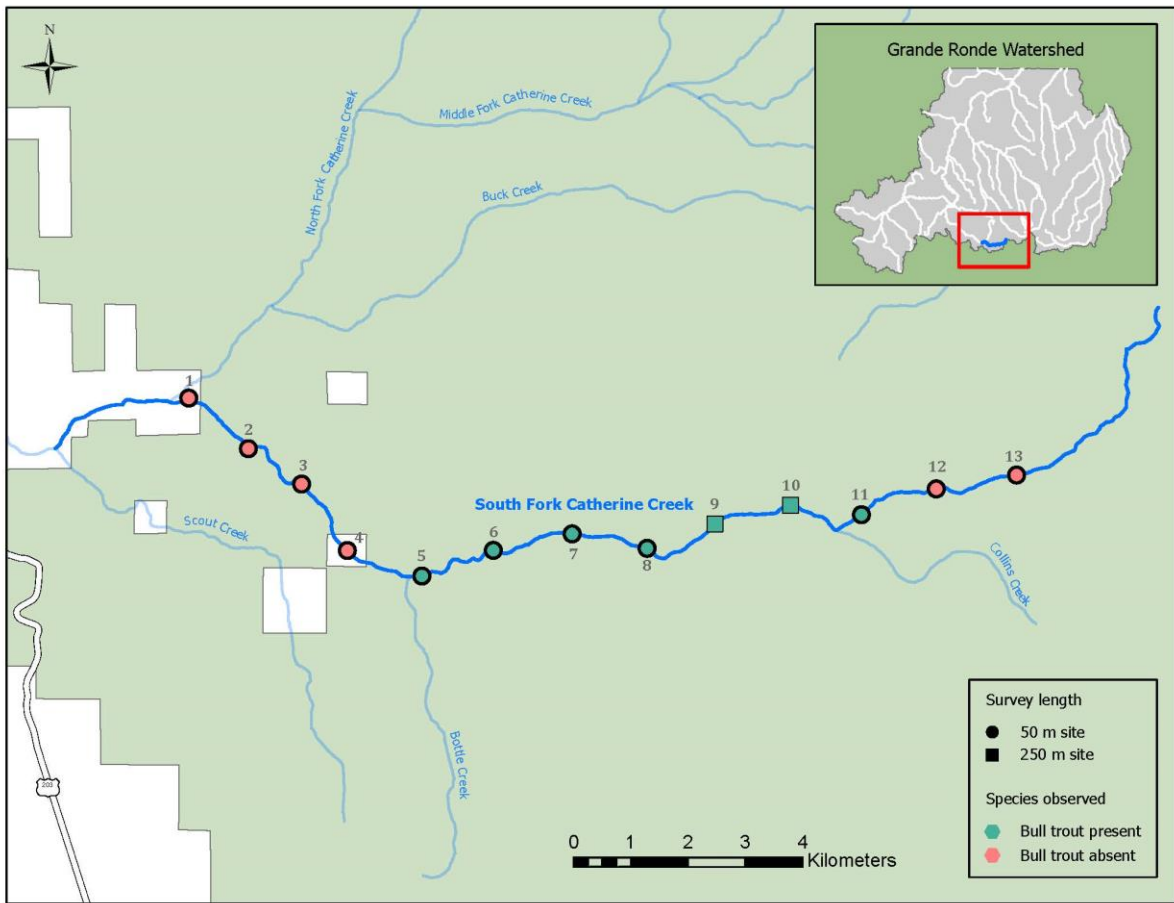
Crane Creek	9/16/2020	253-2	393994	4969288	50	0		0.000	3	0.180	0	0.000	0.000	0.000
Corral Creek	9/18/2020	193-3	390976	4932455	50	0		0.000	0	0.000	4	0.040	0.000	0.000
Corral Creek	9/18/2020	193-4	391744	4962994	50	0		0.000	0	0.000	2	0.080	0.000	0.000
Deep Creek	9/18/2020	102-1	393437	4959415	50	0		0.000	0	0.000	6	0.103	0.000	0.000
Deep Creek	9/18/2020	102-2	393903	4960284	50	0		0.000	0	0.000	9	0.180	0.000	0.000
Boundary Creek	9/18/2020	155-1	391290	4960302	50	1	125	0.015	0	0.000	0	0.000	0.000	0.000
Boundary Creek	9/18/2020	155-2	391431	4961257	50	1	150	0.010	0	0.000	5	0.050	0.000	0.000
Boundary Creek	9/18/2020	155-3	392099	4961964	50	0		0.000	0	0.000	3	0.026	0.000	0.000
Boundary Creek	9/18/2020	155-4	392899	4962526	50	2	138 (125 - 150)	0.020	0	0.000	1	0.010	0.000	0.000
East Fork Boundary Creek	9/18/2020	178-1	393921	4962807	50	1	75	0.008	0	0.000	1	0.008	0.000	0.000
Middle Fork Catherine Creek	8/31/2020	1	451493	5000040	50	3	135 (75 - 180)	0.014	0	0.000	5	0.023	0.000	0.000
Middle Fork Catherine Creek	8/31/2020	2	452477	4999819	250	8	125 (75 - 175)	0.028	0	0.000	3	0.011	0.000	0.000
Middle Fork Catherine Creek	8/31/2020	3	453462	5000007	250	6	150 (75 -200)	0.027	0	0.000	7	0.031	0.000	0.000
Middle Fork Catherine Creek	8/31/2020	4	454476	4999963	50	3	135 (75 - 180)	0.011	0	0.000	3	0.011	0.000	0.000
Middle Fork Catherine Creek	8/31/2020	5	455439	5000261	50	3	127 (65 - 175)	0.021	0	0.000	2	0.014	0.000	0.000
Middle Fork Catherine Creek	9/4/2020	6	456210	4999627	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Middle Fork Catherine Creek	9/4/2020	7	457197	4999475	50	0		0.000	0	0.000	0	0.000	0.000	0.000
unnamed creek	8/31/2020	16	455697	5000190	50	4	138 (125 - 150)	0.016	0	0.000	0	0.000	0.000	0.000
unnamed creek	9/11/2020	17	456638	5000124	50	3	102 (100 - 105)	0.030	0	0.000	0	0.000	0.000	0.000
unnamed creek	9/11/2020	18	457473	5000607	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Spring Creek	8/31/2020	9	454930	5000184	50	6	150 (125 - 165)	0.072	0	0.000	0	0.000	0.000	0.000
Spring Creek	8/31/2020	10	455161	5001040	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Spring Creek	9/22/2020	11	455188	5001957	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Squaw Creek	8/31/2020	12	455347	5000334	50	3	150 (125 - 175)	0.013	0	0.000	0	0.000	0.000	0.000
Squaw Creek	8/31/2020	13	456256	5000703	50	3	128 (75 - 160)	0.011	0	0.000	0	0.000	0.000	0.000
Squaw Creek	9/22/2020	14	456715	5001512	50	3	77 (75 - 80)	0.030	0	0.000	0	0.000	0.000	0.000
Squaw Creek	9/22/2020	15	456743	5002394	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Mottet Creek	9/23/2020	1105-1	425884	5076061	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Mottet Creek	9/23/2020	1105-2	425720	5077002	50	0		0.000	0	0.000	3	0.033	0.000	0.000
Mottet Creek	9/23/2020	1105-3	425661	5077927	50	0		0.000	0	0.000	2	0.024	0.000	0.000
Mottet Creek	9/23/2020	1105-4	425678	5078840	50	0		0.000	0	0.000	4	0.060	0.000	0.000
Mottet Creek	9/23/2020	1096-11	426198	5074621	50	0		0.000	0	0.000	5	0.038	0.000	0.000
Mottet Creek	9/23/2020	1096-10	426885	5073958	50	0		0.000	0	0.000	4	0.037	0.000	0.000
Mottet Creek	9/23/2020	1096-9	426594	5073061	50	0		0.000	0	0.000	9	0.054	0.000	0.000
Mottet Creek	9/23/2020	1096-8	426675	5072135	50	0		0.000	0	0.000	13	0.087	0.000	0.000
Mottet Creek	9/23/2020	1096-7	426728	5071201	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Mottet Creek	9/23/2020	1096-6	426806	5070230	50	0		0.000	0	0.000	0	0.000	0.000	0.000
Mottet Creek	9/23/2020	1096-5	427475	5069681	50	0		0.000	0	0.000	8	0.044	0.000	0.000

Appendix Table 2. Number, estimated mean fork length (FL), and density of Bull Trout (BuT), and number and density of Brook Trout (BT), juvenile steelhead (STHD), and Bull Trout x Brook Trout hybrids in electrofishing survey sites in northeast Oregon streams in 2021.

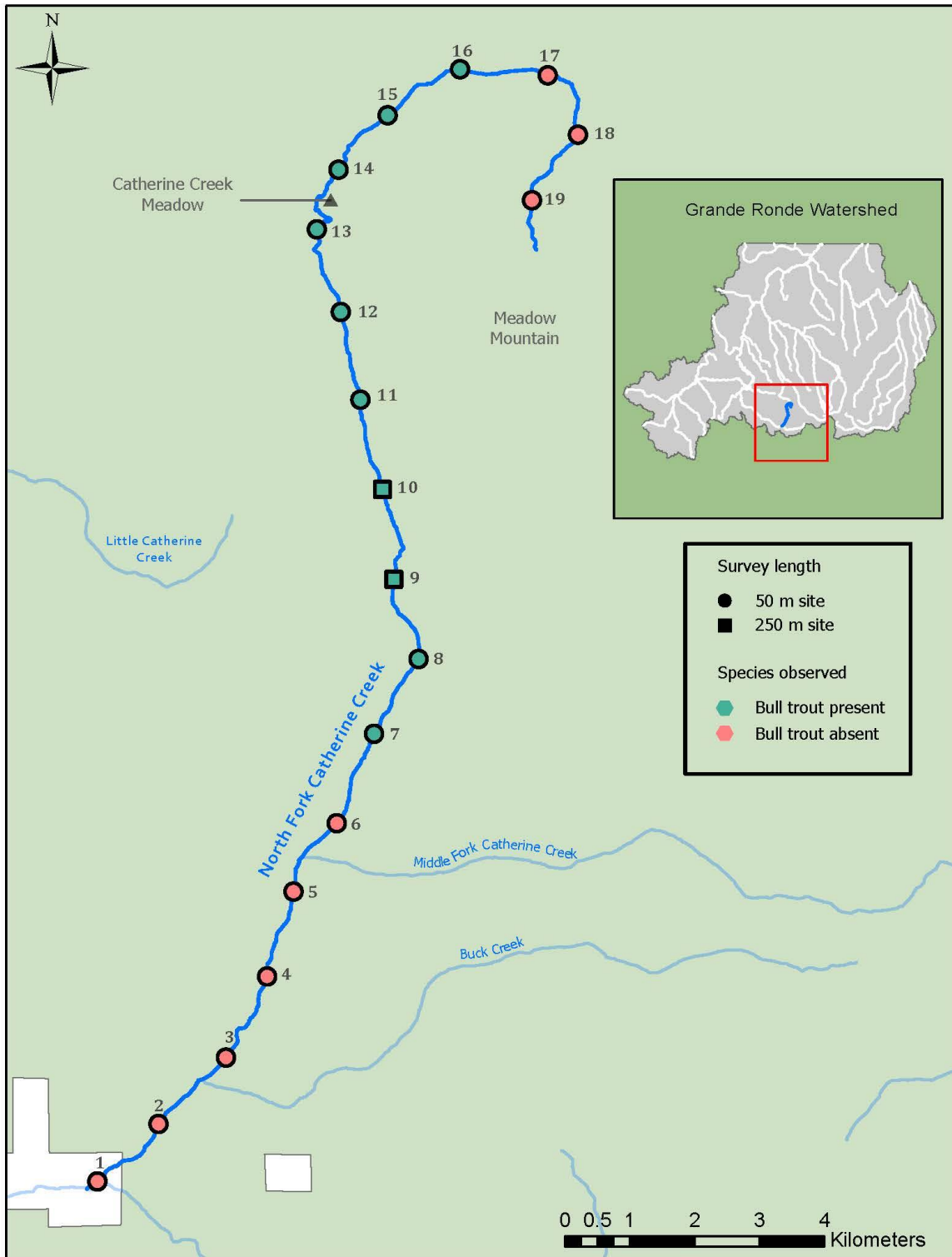
Stream	Date	Site number	Coordinates (WGS 84)		Reach length (m)	Number of BuT	Mean FL (range)	Density BuT/m ²	Number of BT	Density BT/m ²	Number of STHD	Density STHD/m ²	Number of hybrids	Density hybrids/m ²
			Easting	Northing										
Hurricane Creek	7/13/2021	1	476049	5017613	50	1	130	0.002	0	0	0	0	0	0
Hurricane Creek	7/13/2021	2	475961	5017094	50	0	0	0	0	0	0	0	1	0.0012
Hurricane Creek	7/13/2021	5	475844	5016022	50	0	0	0	0	0	0	0	0	0
Hurricane Creek	7/13/2021	4	475900	5016650	50	0	0	0	2	0.004	0	0	0	0
Hurricane Creek	7/13/2021	6	476033	5015326	50	0	0	0	0	0	0	0	0	0
Hurricane Creek	7/14/2021	9	475925	5013973	50	0	0	0	0	0	0	0	0	0
Hurricane Creek	7/14/2021	8	475920	5014340	50	0	0	0	0	0	0	0	0	0
Hurricane Creek	7/14/2021	7	475952	5014650	50	1	180	0.002	0	0	0	0	0	0
Indian Creek	7/16/2021	549-2	440915	5025222	50	0	0	0	0	0	3	0.009	0	0
East Fork Indian Creek	7/16/2021	520-1	441393	5024156	50	0	0	0	0	0	5	0.027	0	0
East Fork Indian Creek	8/10/2021	520-1 B	441997	5024077	50	0	0	0	0	0	2	0.013	0	0
East Fork Indian Creek	7/16/2021	520-2	442179	5023695	50	0	0	0	0	0	1	0.006	0	0
East Fork Indian Creek	8/10/2021	520-2 B	442421	5023091	50	0	0	0	0	0	0	0	0	0
East Fork Indian Creek	7/22/2021	495-3	444422	5021530	50	0	0	0	0	0	0	0	0	0
East Fork Indian Creek	7/22/2021	495-2	444223	5022028	50	0	0	0	0	0	0	0	0	0
East Fork Indian Creek	7/22/2021	520-3	442572	5022841	50	0	0	0	0	0	0	0	0	0
East Fork Indian Creek	8/10/2021	520-3 B	442802	5022405	50	7	94 (70-120)	0.047	0	0	0	0	0	0
Grande Ronde River	7/26/2021	87-1	399586	4988548	50	0	0	0	0	0	4	0.02	0	0
Grande Ronde River	8/11/2021	87-1 B	399590	4988459	50	0	0	0	1	0.005	2	0.009	0	0
Grande Ronde River	7/26/2021	78-1	399581	4988209	50	0	0	0	0	0	0	0	0	0
Grande Ronde River	8/11/2021	78-1 B	399536	4987929	50	0	0	0	3	0.011	1	0.004	0	0
Grande Ronde River	7/26/2021	70-1	399491	4987587	50	0	0	0	10	0.027	0	0	0	0
Grande Ronde River	8/11/2021	70-1 B	399573	4987280	50	0	0	0	5	0.02	2	0.008	0	0
Grande Ronde River	7/27/2021	59-1	399564	4986718	50	0	0	0	1	0.005	1	0.005	0	0
Grande Ronde River	8/11/2021	59-1 B	399461	4986422	50	0	0	0	2	0.01	1	0.005	0	0
Grande Ronde River	7/27/2021	56-1	399503	4985785	50	0	0	0	3	0.015	0	0	0	0



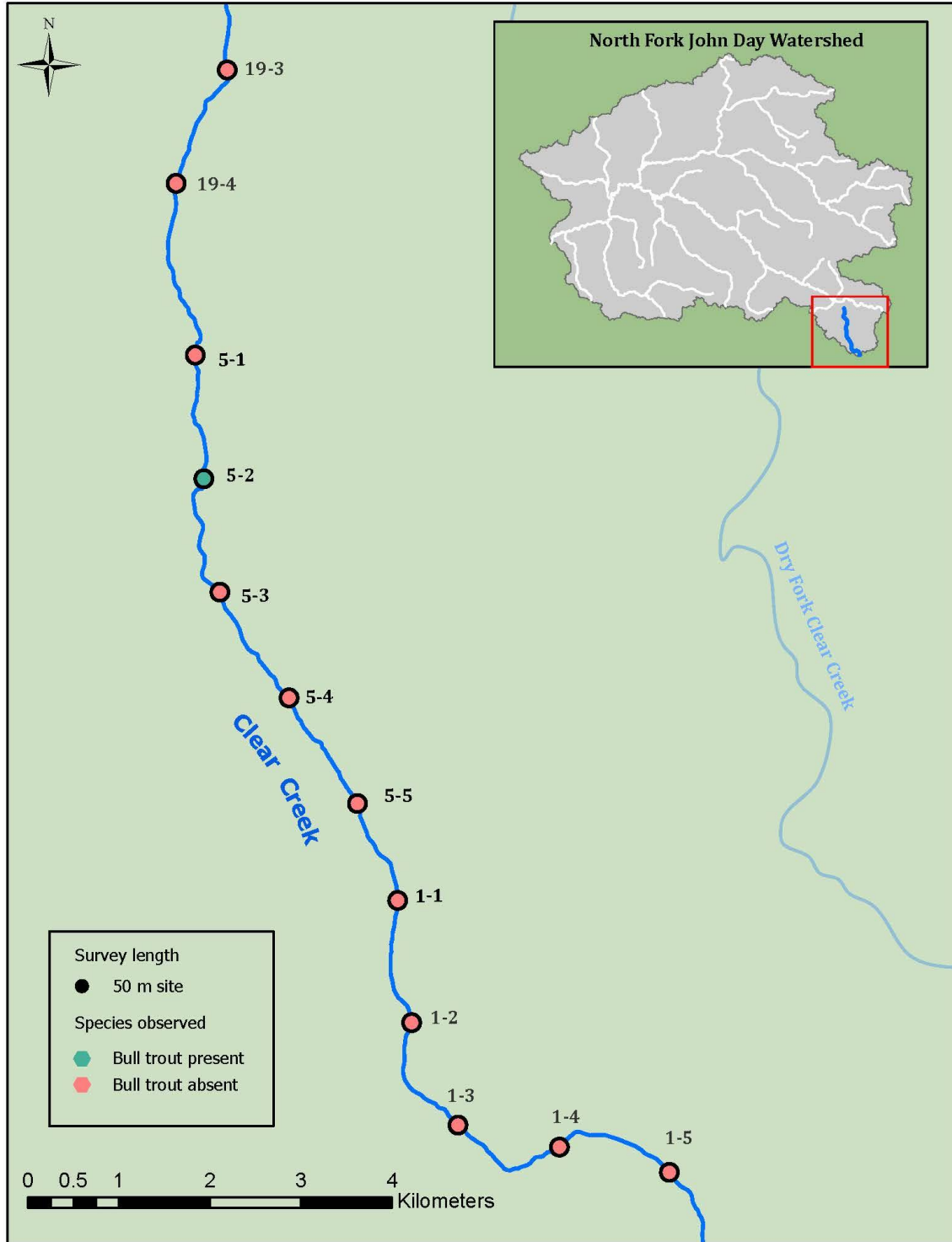
Appendix Figure 1. Results from an electrofishing survey in Chicken Creek in 2020.



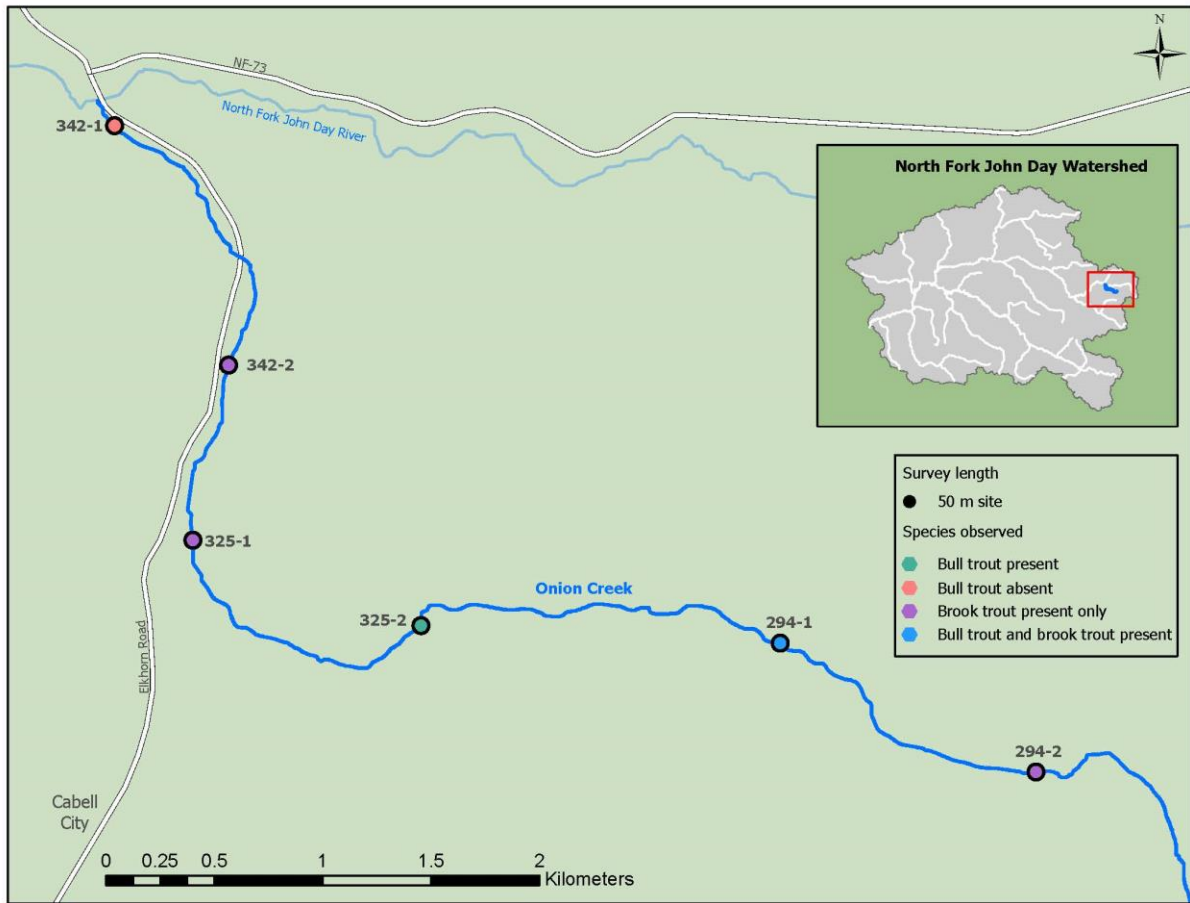
Appendix Figure 2. Results from an electrofishing survey in South Fork Catherine Creek in 2020.



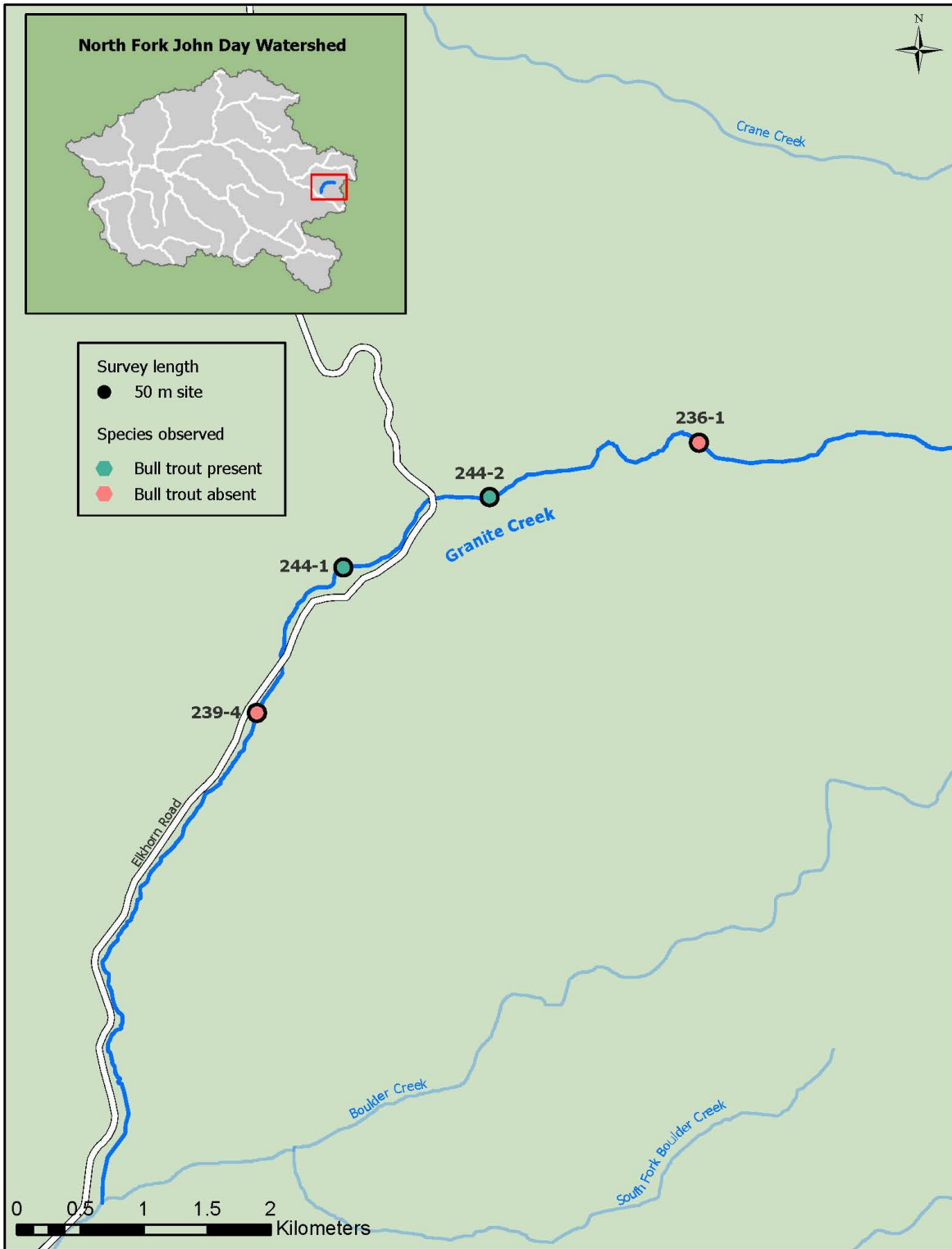
Appendix Figure 3. Results from an electrofishing survey in North Fork Catherine Creek in 2020.



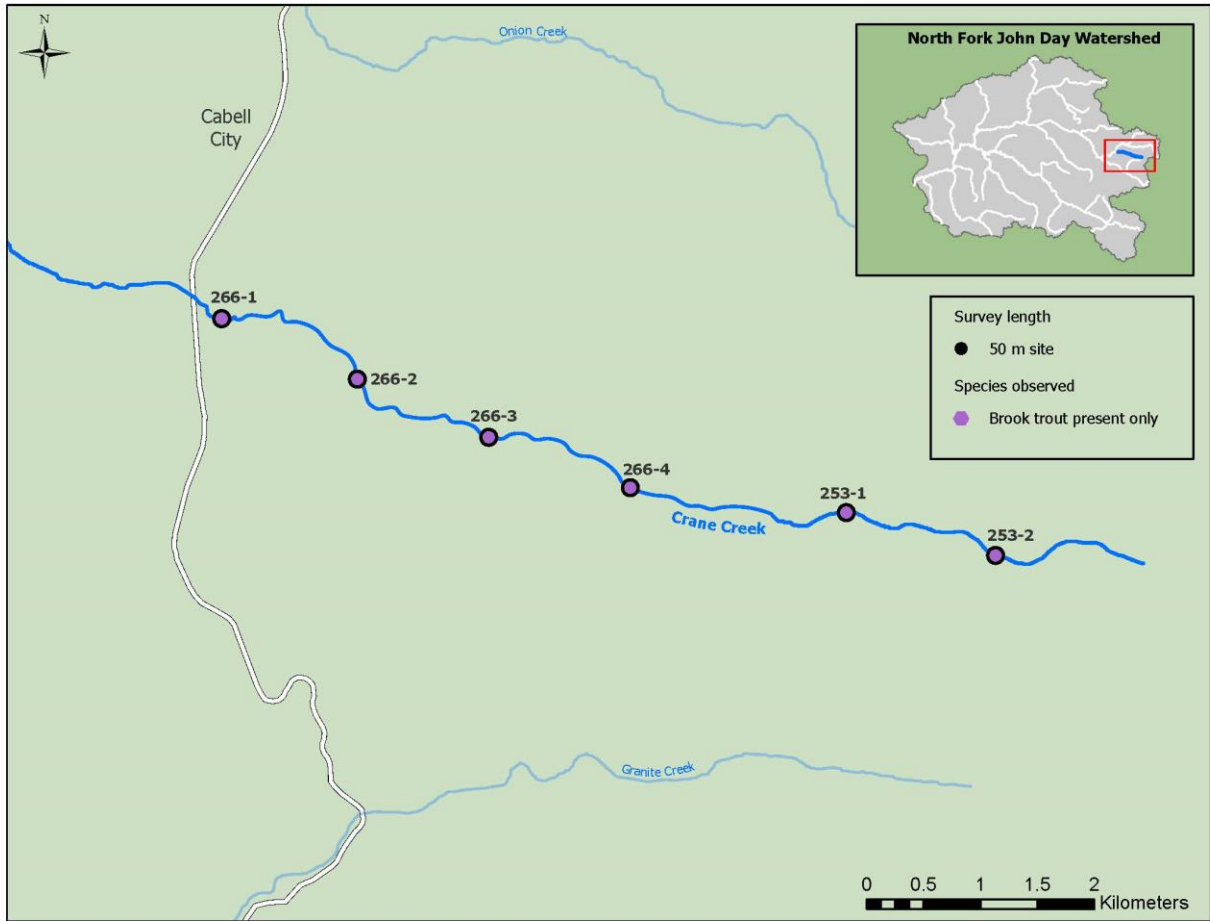
Appendix Figure 4. Results from an electrofishing survey in Clear Creek in 2020.



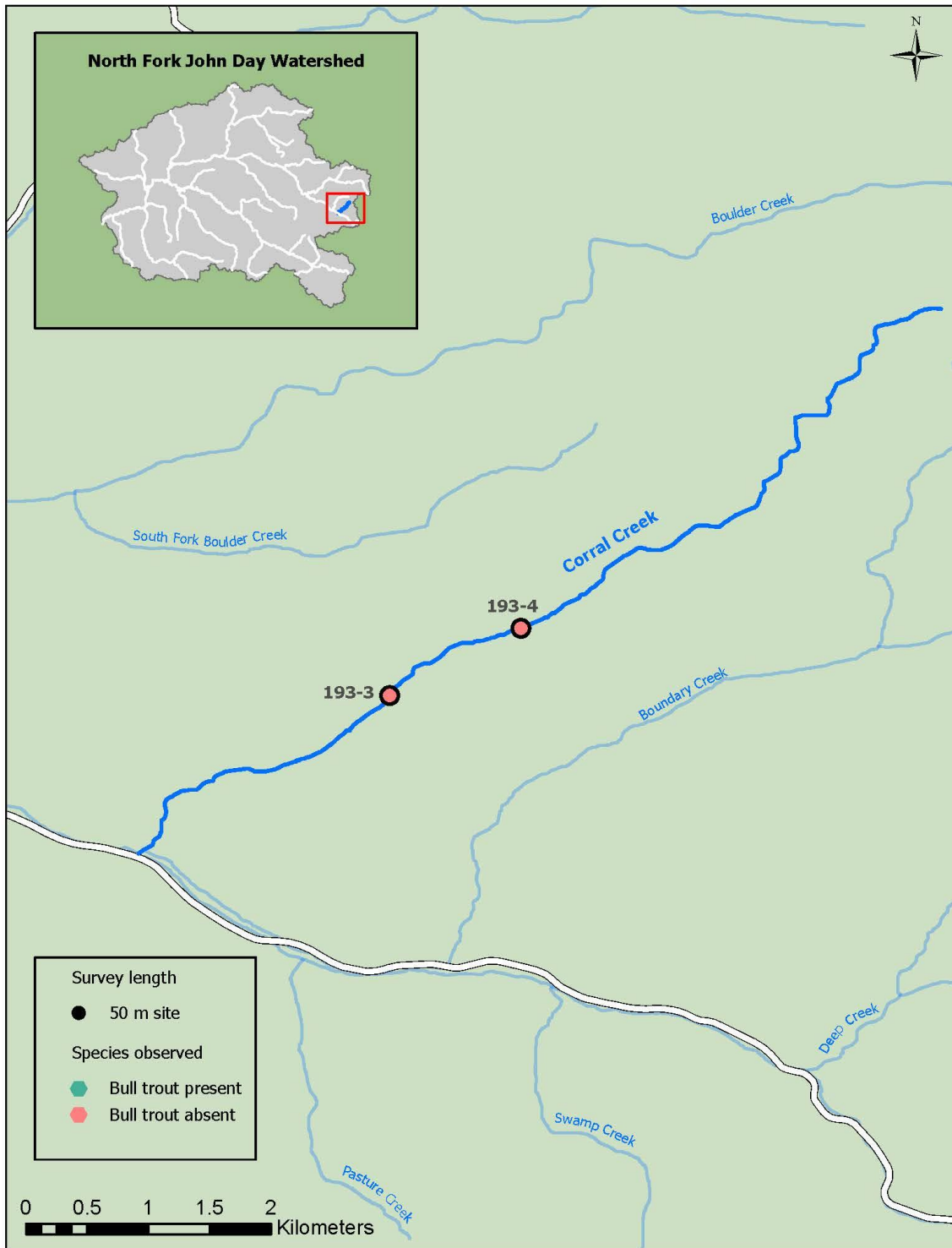
Appendix Figure 5. Results from an electrofishing survey in Onion Creek in 2020.



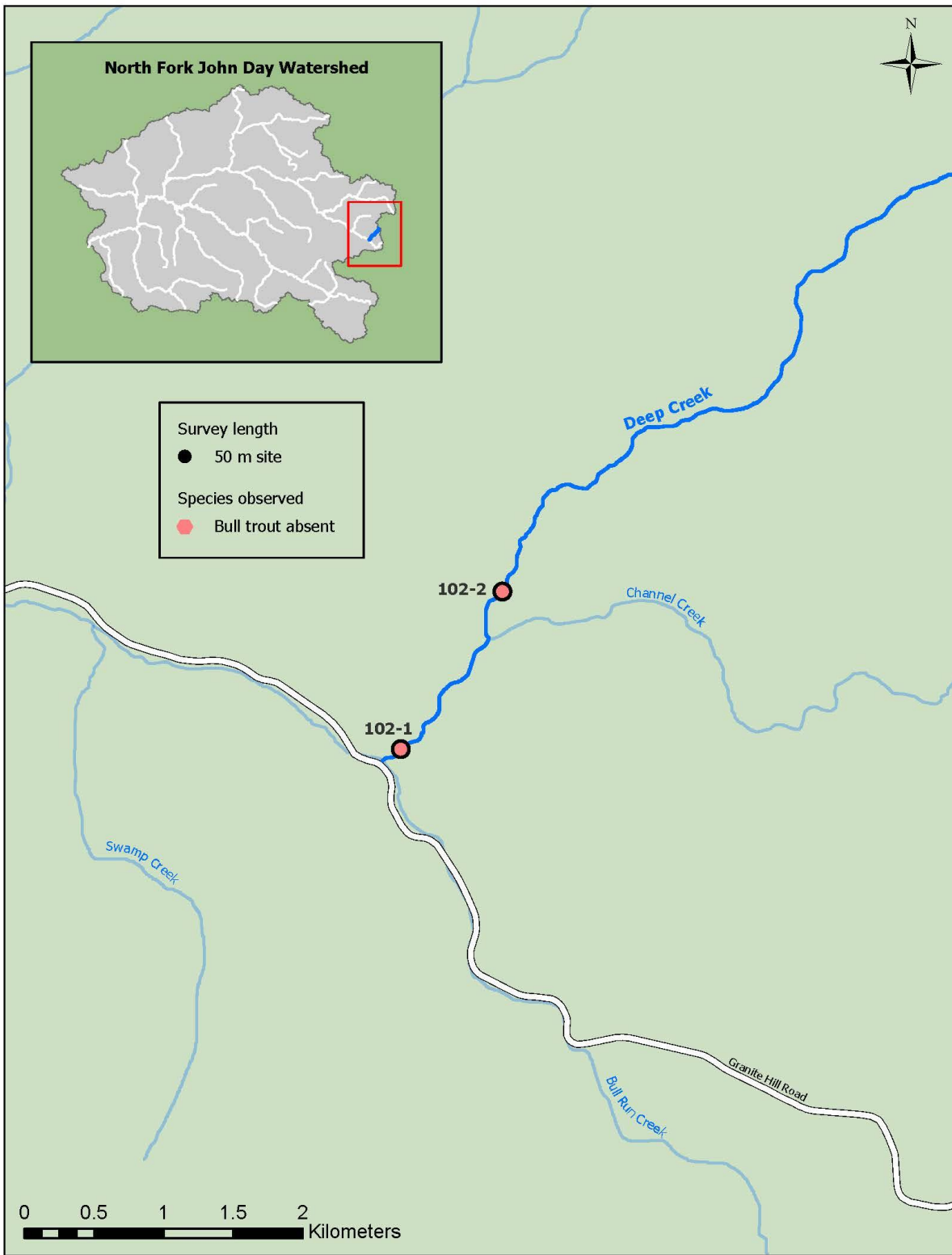
Appendix Figure 6. Results from an electrofishing survey in Granite Creek in 2020.



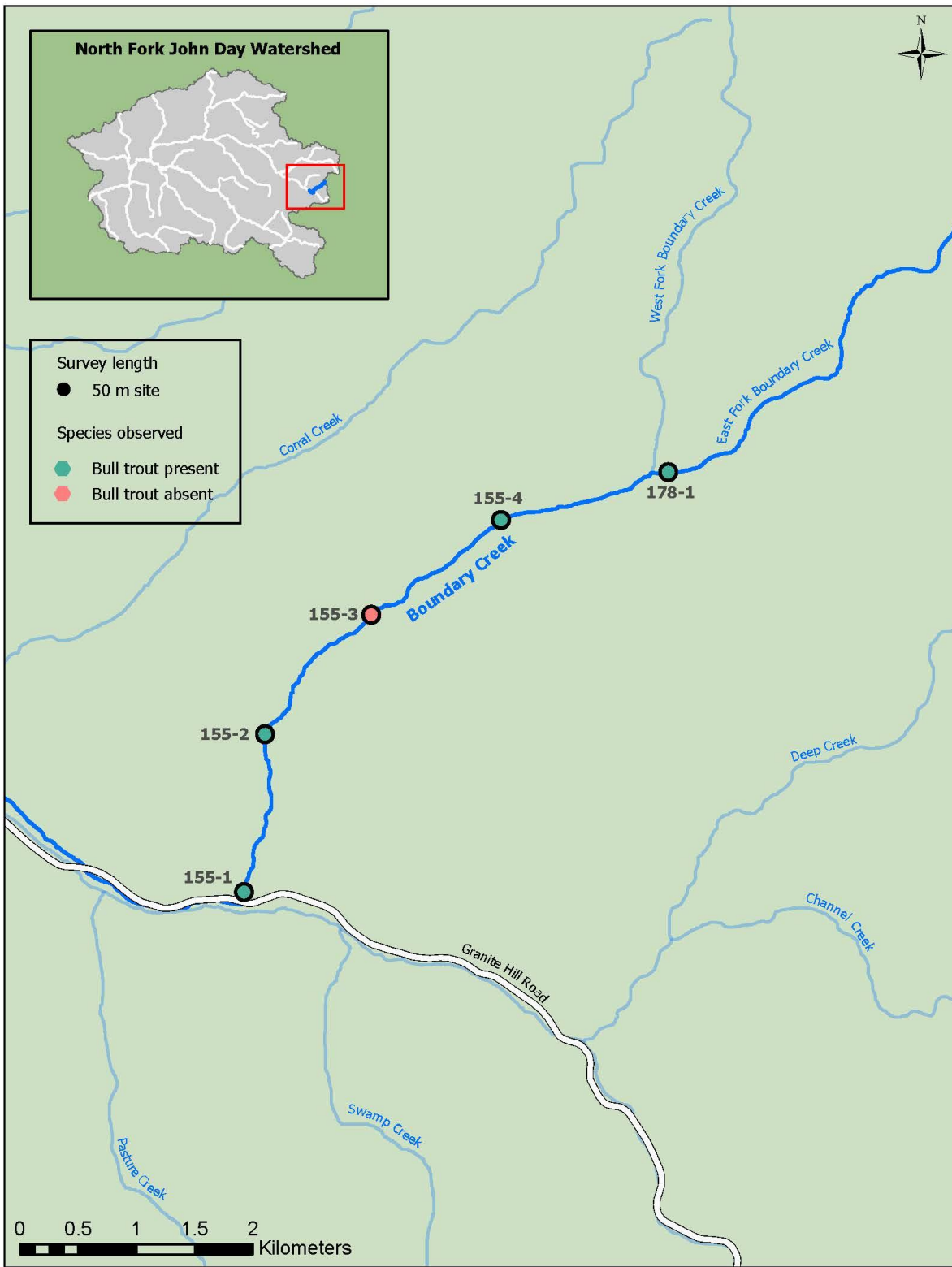
Appendix Figure 7. Results from an electrofishing survey in Crane Creek in 2020.



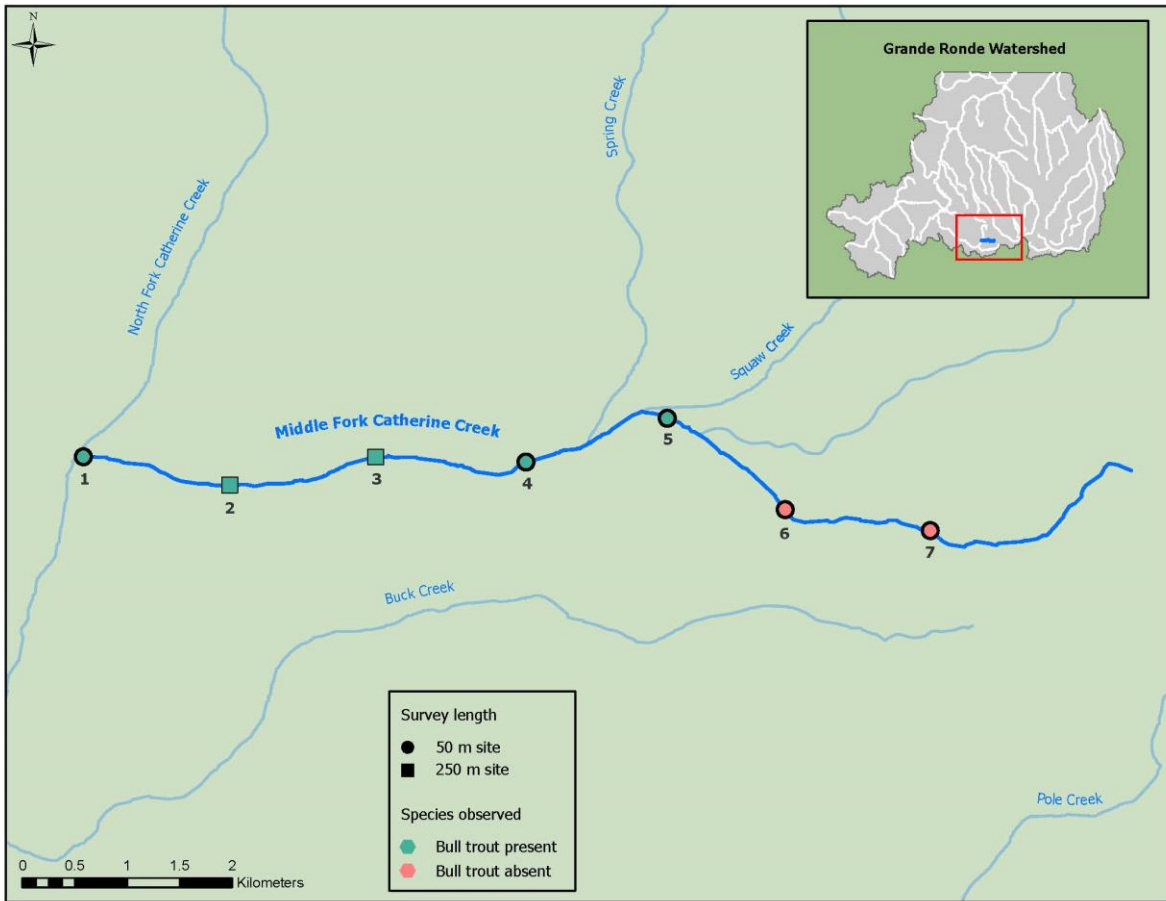
Appendix Figure 8. Results from an electrofishing survey in Corral Creek in 2020.



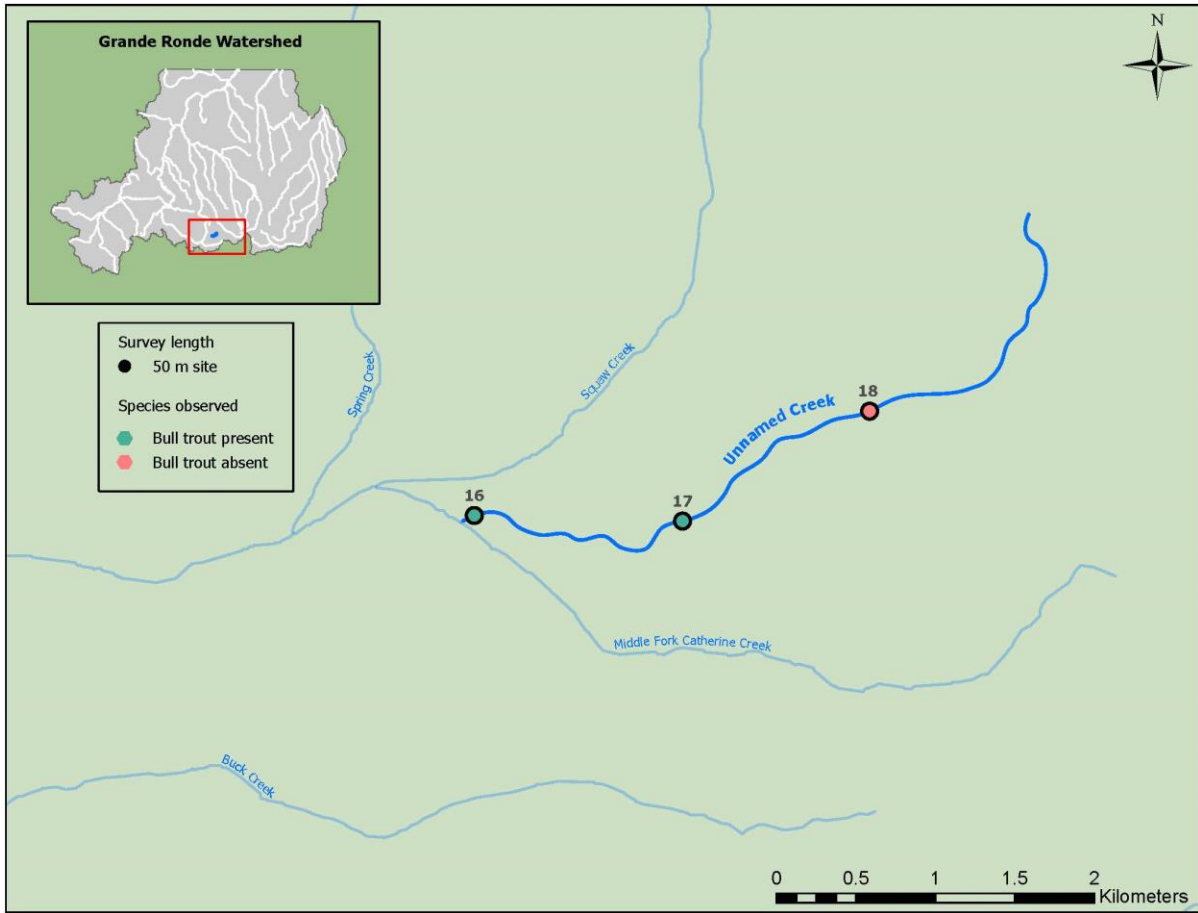
Appendix Figure 9. Results from an electrofishing survey in Deep Creek in 2020.



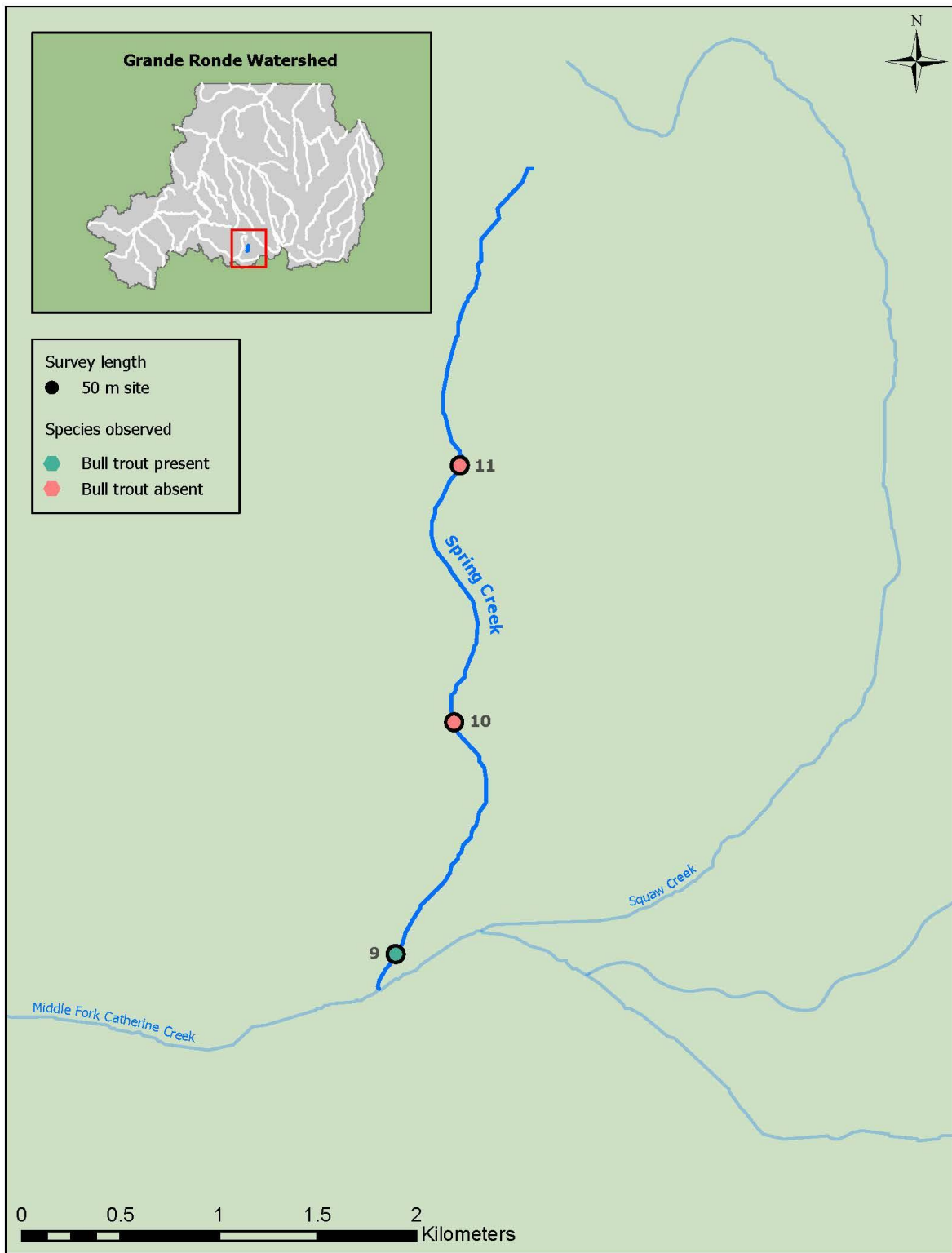
Appendix Figure 10. Results from an electrofishing survey in Boundary Creek in 2020.



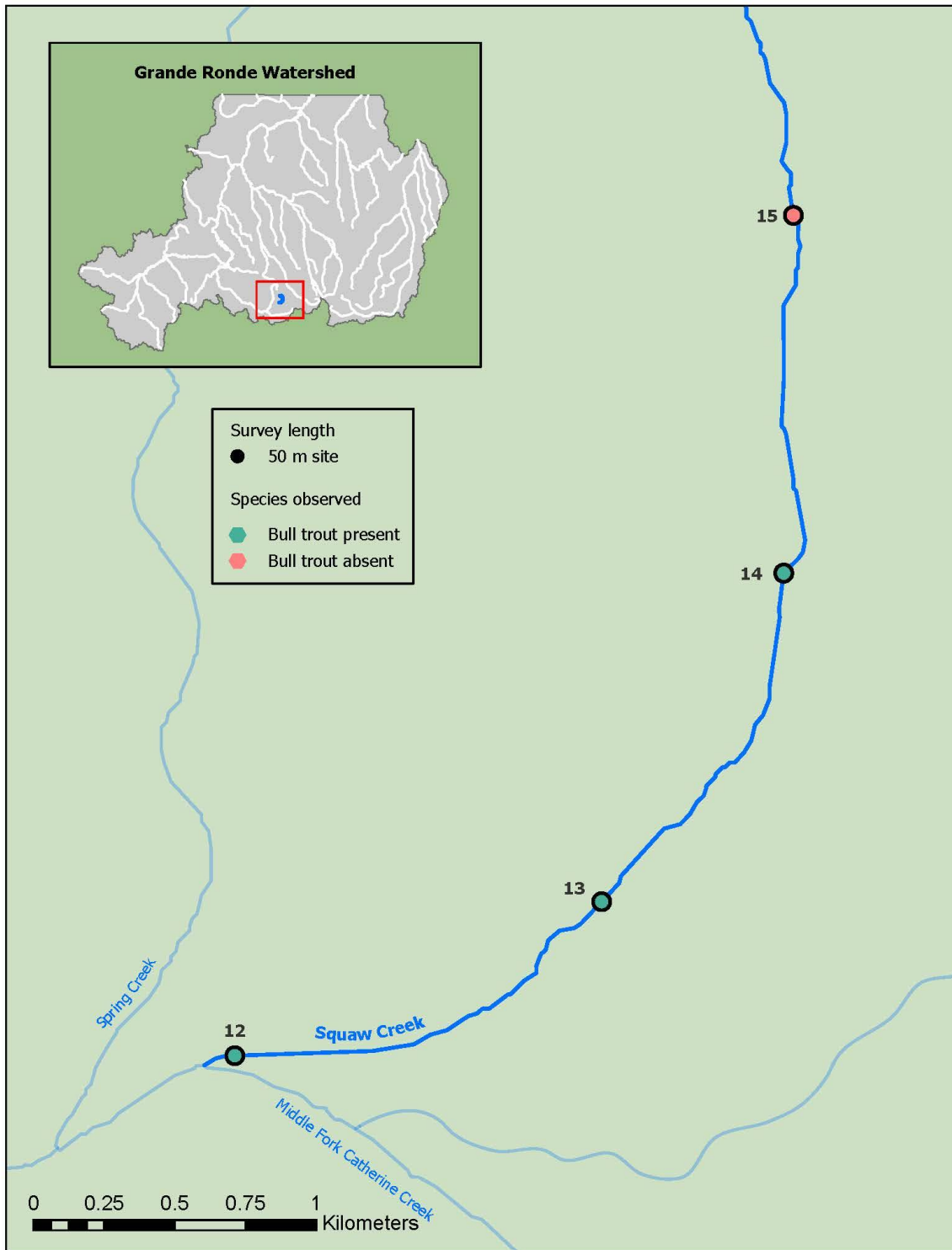
Appendix Figure 11. Results from an electrofishing survey in Middle Fork Catherine Creek in 2020.



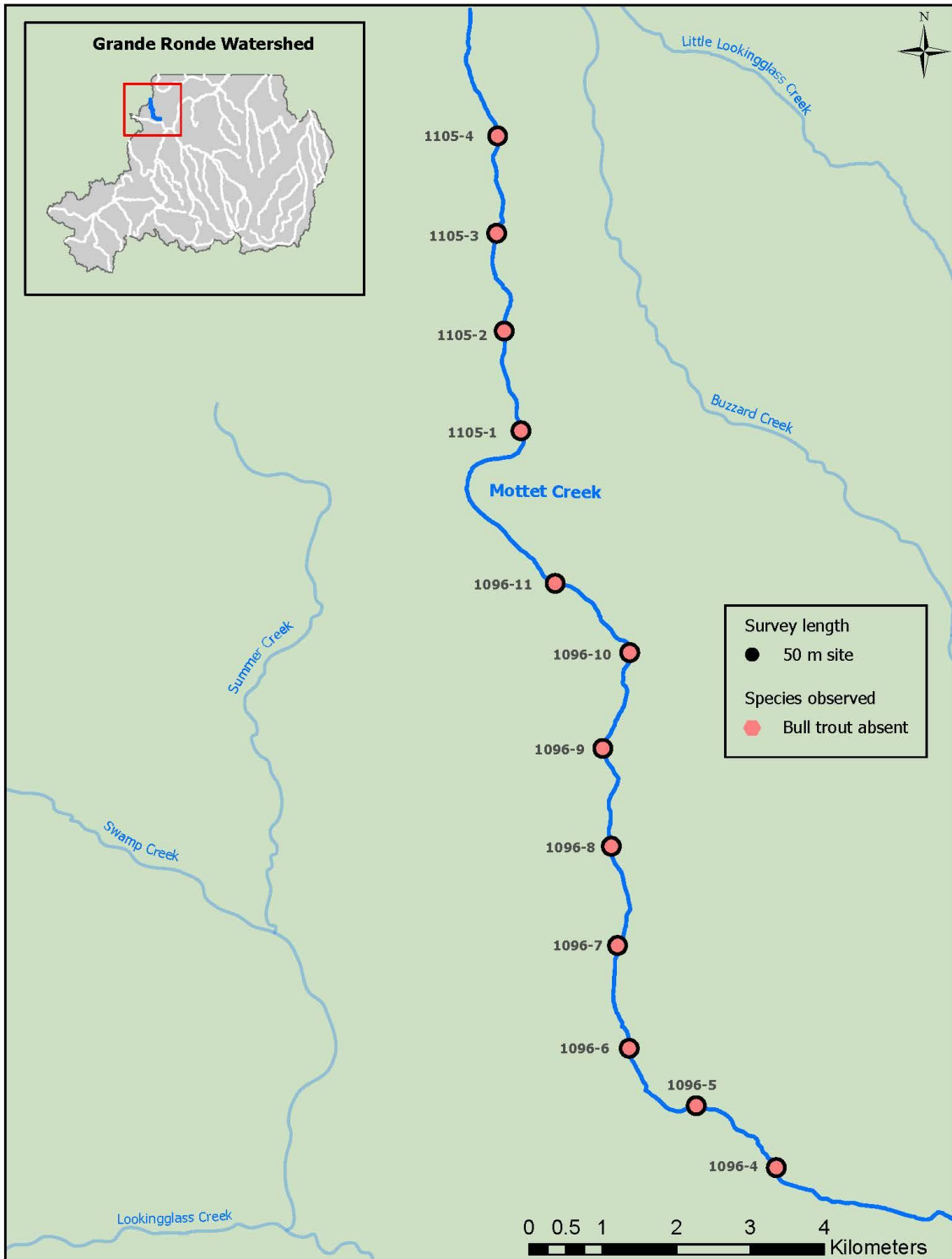
Appendix Figure 12. Results from an electrofishing survey in an unnamed tributary to Middle Fork Catherine Creek in 2020.



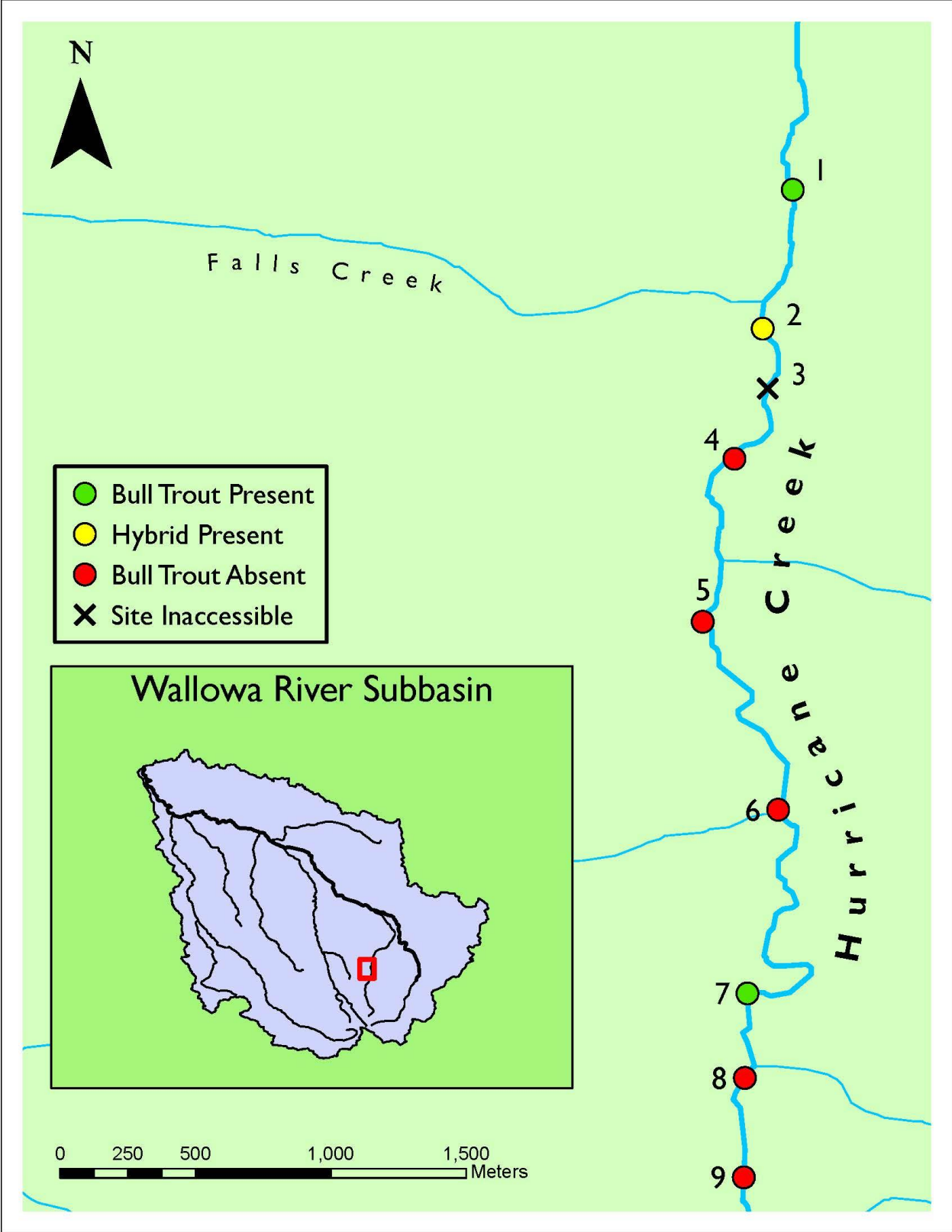
Appendix Figure 13. Results from an electrofishing survey in Spring Creek in 2020.



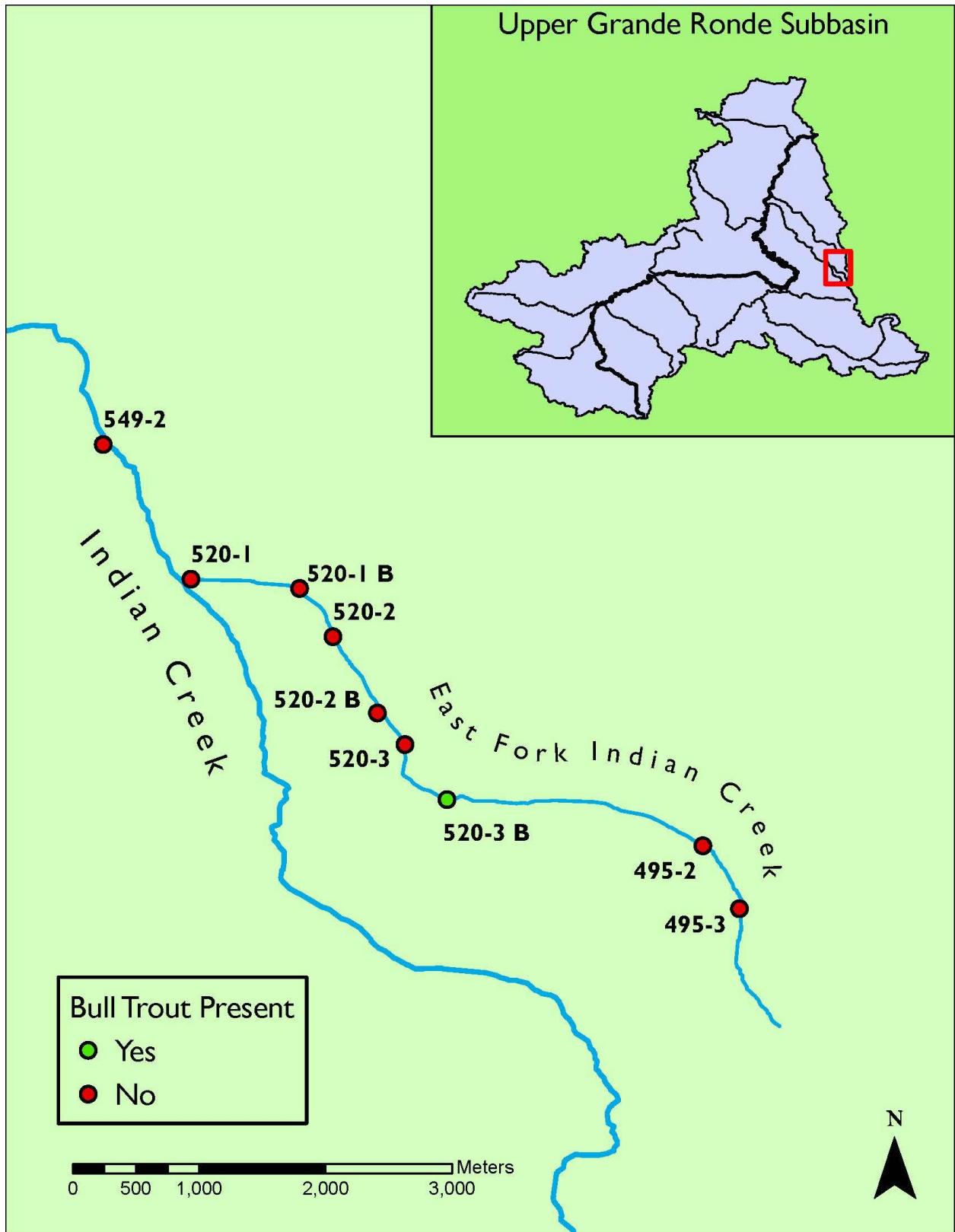
Appendix Figure 14. Results from an electrofishing survey in Squaw Creek in 2020.



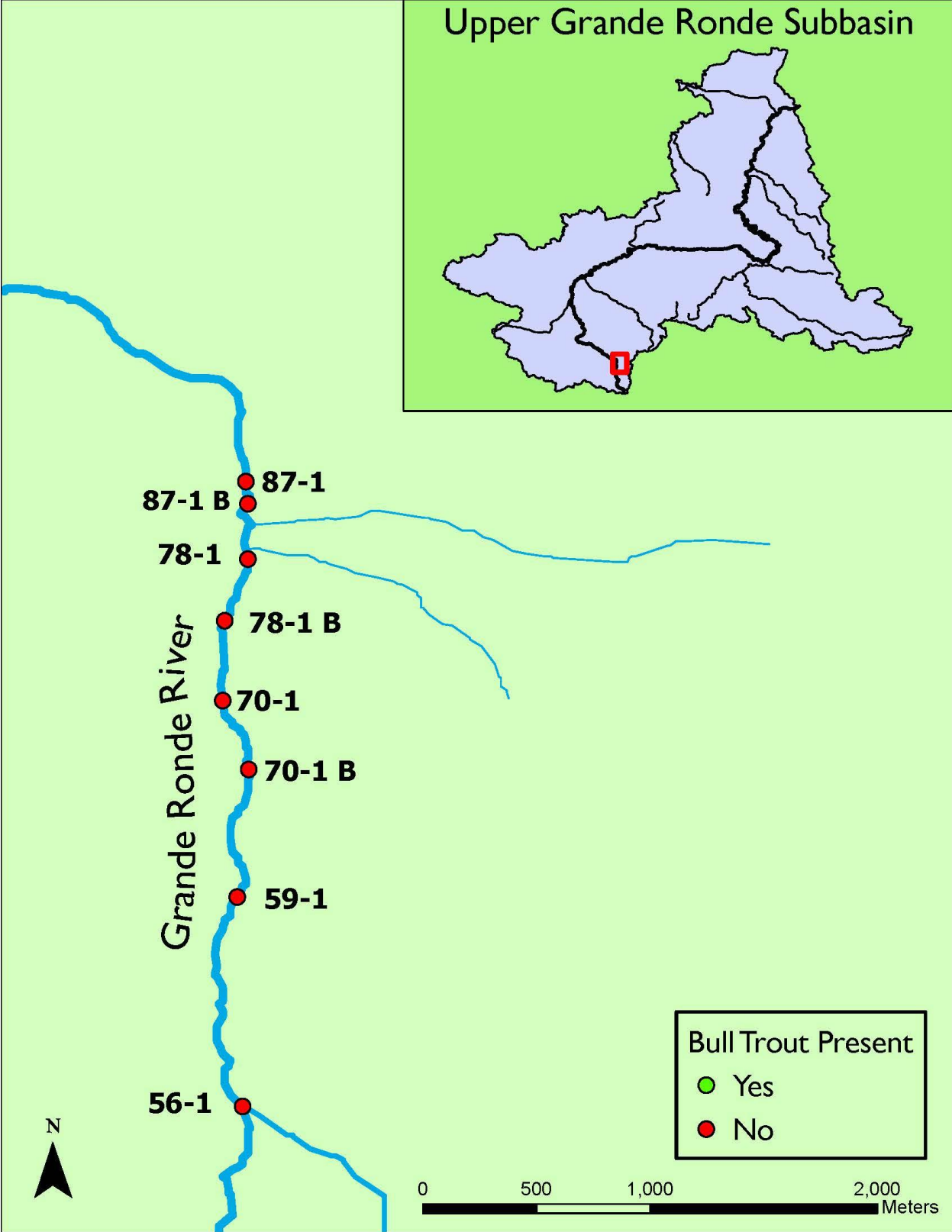
Appendix Figure 15. Results from an electrofishing survey in Mottet Creek in 2020.



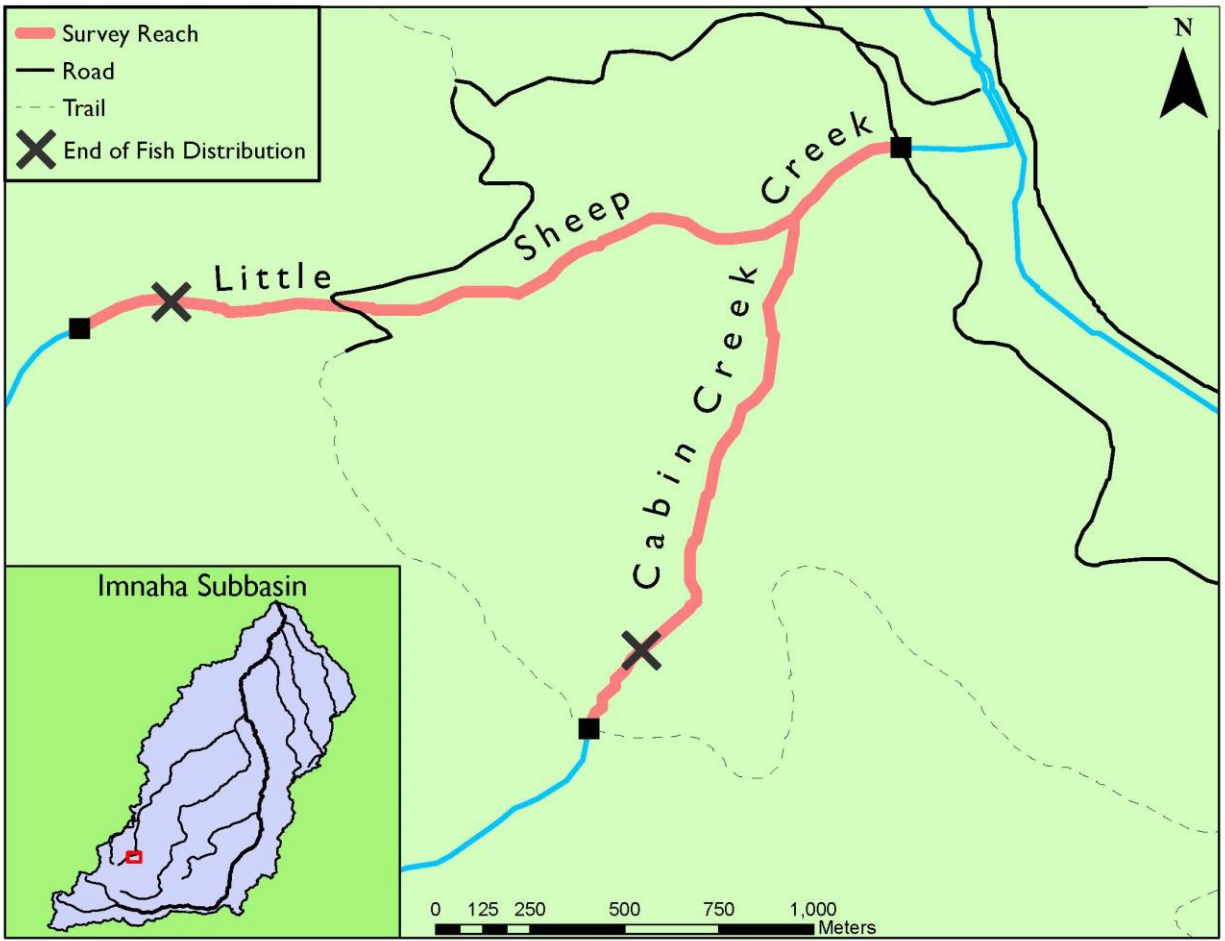
Appendix Figure 16. Results from an electrofishing survey in Hurricane Creek in 2021.



Appendix Figure 17. Results from an electrofishing survey in Indian and East Fork Indian creeks in 2021.



Appendix Figure 18. Results from an electrofishing survey in the Grande Ronde River in 2021.



Appendix Figure 19. Survey reaches in Little Sheep and Cabin creeks in August 2021.

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