

Riparian bird occupancy in a mountain watershed in the Colorado Mineral Belt appears resilient to climate-change driven increases in metals and rare earth elements in water and aquatic macroinvertebrates, Watson and McKnight

Supplementary files

Table S1. Trace metal concentrations in water, CCU, pH, and specific conductance at all study sites. DL denotes a concentration below the ICP-MS detection limit. Shading differentiates the study sites, some of which were sampled on two different days. Data were collected in July 2017.

Sample Name	pH	Specific conductance (µS)	Hardness (mg/L as CaCO ₃)	Al (µg/L)	Cd (µg/L)	Cu (µg/L)	Fe (µg/L)	Mn (µg/L)	Ni (µg/L)	Pb (µg/L)	Zn (µg/L)	CCU
D1 7/17	7.66	41.9	17.6	6.99	DL	2.46	76.4	5.12	0.607	0.014	6.90	0.335
D1 7/24	7.69	47.0	19.8	5.41	0.013	0.252	97.0	8.56	0.428	0.021	5.68	0.182
D2 7/17	7.92	46.8	20.7	6.57	DL	1.78	95.6	5.93	0.505	0.018	3.68	0.275
D3 7/17	7.94	57.4	24.3	6.48	DL	0.802	100	5.53	0.579	0.018	5.48	0.219
D3 7/24	8.05	63.4	26.9	8.85	0.007	0.167	124	7.08	0.687	0.014	2.09	0.174
D4 7/17	7.97	62.5	27.1	9.69	DL	1.32	112	6.42	0.802	0.053	10.5	0.319
D4 7/24	8.05	69.5	29.8	6.82	0.012	0.391	124	8.00	0.803	0.053	3.48	0.204
D5 7/17	8.01	63.6	27.3	8.41	0.010	0.611	114	60.2	0.719	0.096	3.59	0.229
US1 7/20	3.13	190	32.7	3177	0.757	6.07	2329	395	15.1	0.508	164	8.98
US1 7/26	3.16	212	36.5	3487	0.831	5.68	2508	461	16.9	0.596	182	9.76
US3 7/20	3.19	195	34.0	3944	1.06	19.3	1870	567	16.6	0.505	245	11.5
US3 7/26	3.23	214	33.8	3880	1.05	17.2	1706	514	17.0	0.607	247	11.0
US4 7/20	3.20	271	52.3	7295	5.25	32.9	1696	1814	31.2	0.932	1007	25.9
US4 7/26	3.05	287	55.9	7803	5.55	31.9	1775	1875	33.0	1.14	1026	26.9
LS1 7/17	4.89	127	39.6	927	2.33	13.4	519	737	13.6	0.391	414	7.78
LS1 7/24	4.93	142	43.0	1222	2.61	14.2	498	877	15.5	0.480	477	8.95
LS3 7/17	4.99	128	39.9	804	2.05	11.3	467	633	11.9	0.376	399	7.09
LS5 7/24	7.36	148	53.0	78.9	2.09	2.21	207	665	10.3	0.073	463	5.73
P1 7/20	4.38	217	69.4	2934	6.89	68.7	592	1837	20.1	4.73	1558	27.3
P1 7/26	4.31	230	74.4	3398	7.26	74.8	682	1926	21.5	5.64	1698	29.9
P2 7/20	5.24	170	58.8	647	4.28	41.0	355	1122	12.9	2.79	1001	15.5
P2 7/26	5.24	176	61.7	698	4.35	41.9	368	1129	13.4	3.12	1018	15.8
P4 7/20	5.23	167	56.8	533	4.12	39.3	302	1054	12.2	2.95	1002	15.1
P4 7/26	5.27	174	60.1	625	4.31	41.6	358	1091	12.8	3.41	1055	16.0

Table S2. Rare earth element concentrations (all in µg/L) in water samples for all study sites. DL denotes a concentration below the ICP-MS detection limit. Shading differentiates the study sites, some of which were sampled on two different days. Data were collected in July 2017.

Sample Name	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sc	Sm	Tb	Tm	Y	Yb
D1 7/17	0.028	0.002	DL	0.004	DL	DL	0.038	DL	0.043	0.007	0.466	0.017	DL	DL	0.037	DL
D1 7/24	0.026	0.002	DL	0.006	0.007	DL	0.036	DL	0.042	0.006	0.509	0.015	DL	DL	0.036	DL
D2 7/17	0.031	0.003	DL	0.008	0.011	DL	0.041	DL	0.050	0.008	0.496	0.017	DL	DL	0.042	DL
D3 7/17	0.024	0.006	DL	0.006	DL	DL	0.035	DL	0.042	0.008	0.493	0.021	DL	DL	0.036	DL
D3 7/24	0.028	0.006	0.00	0.009	0.009	DL	0.046	DL	0.044	0.011	0.628	0.021	DL	DL	0.041	DL
D4 7/17	0.024	0.004	DL	0.007	0.007	DL	0.036	DL	0.039	0.007	0.699	0.016	DL	DL	0.041	DL
D4 7/24	0.025	0.004	DL	0.008	DL	DL	0.033	DL	0.034	0.008	0.682	0.019	DL	DL	0.038	DL
D5 7/17	0.023	0.004	DL	0.008	0.009	DL	0.030	DL	0.040	0.006	0.741	0.016	DL	DL	0.041	DL
US1 7/20	1.91	0.410	0.242	0.088	0.452	0.082	0.818	0.021	1.22	0.257	2.09	0.287	0.066	0.025	3.38	0.187
US1 7/26	2.13	0.475	0.290	0.101	0.541	0.097	0.912	0.025	1.39	0.300	2.21	0.325	0.078	0.033	3.86	0.229
US3 7/20	3.13	0.733	0.417	0.142	0.901	0.140	1.18	0.036	2.49	0.482	2.33	0.612	0.128	0.046	5.49	0.310
US3 7/26	3.15	0.771	0.426	0.141	0.911	0.152	1.23	0.037	2.41	0.480	2.25	0.583	0.135	0.050	5.77	0.311
US4 7/20	8.27	1.95	1.03	0.387	2.55	0.370	3.90	0.095	8.26	1.70	2.49	1.80	0.370	0.124	13.1	0.732
US4 7/26	8.62	2.04	1.11	0.419	2.70	0.393	4.11	0.097	8.38	1.76	2.74	1.86	0.372	0.131	14.1	0.771
LS1 7/17	3.14	0.705	0.391	0.148	0.994	0.139	1.55	0.027	3.06	0.634	1.56	0.649	0.131	0.041	4.98	0.277
LS1 7/24	3.77	0.919	0.492	0.184	1.20	0.176	1.89	0.040	3.77	0.781	1.65	0.833	0.168	0.055	6.18	0.350
LS3 7/17	2.70	0.612	0.337	0.128	0.821	0.119	1.35	0.025	2.68	0.536	1.45	0.572	0.116	0.034	4.32	0.224
LS5 7/24	0.523	0.046	0.027	0.018	0.092	0.006	0.40	DL	0.398	0.087	1.41	0.074	0.007	DL	0.501	0.013
P1 7/20	10.5	1.88	0.977	0.475	2.86	0.351	5.95	0.087	10.1	2.18	1.47	2.01	0.385	0.109	11.9	0.638
P1 7/26	12.0	2.09	1.08	0.559	3.24	0.386	6.73	0.100	11.2	2.42	1.58	2.29	0.433	0.123	13.0	0.705
P2 7/20	6.29	1.10	0.562	0.288	1.69	0.203	3.72	0.047	5.91	1.31	1.23	1.17	0.227	0.063	7.08	0.378
P2 7/26	6.77	1.18	0.603	0.308	1.81	0.219	3.86	0.050	6.45	1.38	1.17	1.29	0.236	0.063	7.44	0.389
P4 7/20	6.06	1.02	0.529	0.259	1.58	0.187	3.59	0.046	5.76	1.24	1.15	1.11	0.207	0.056	6.77	0.353
P4 7/26	6.82	1.13	0.584	0.306	1.73	0.213	3.92	0.053	6.31	1.38	1.37	1.24	0.229	0.063	7.43	0.377

Table S1. Mass and sampling effort for benthic macroinvertebrate samples.

Combined Samples	Number of Surber Samples	Total Mass (mg)
D1 7/17 and 7/24	2 on 7/17; 1 on 7/24	52.1
D2 7/17	1	27.0
D3 7/17	1	38.1
D3 7/24	1	34.8
D4 7/17 and 7/24	1 each day	97.6
D5 7/17	1	47.7
US1 7/20 and 7/26	2 on 7/20, 1 on 7/26	19.8
US3 7/20 and 7/26	1 each day	14.9
US4 7/20 and 7/26	1 each day	59.3
LS1 7/17 and 7/24	1 each day	10.7
LS3 7/17	1	5.3
LS5 7/24	1 (no invertebrates)	n/a
P1 7/20 and 7/26	1 each day	33.8
P4 7/20	1 on 7/20; no invertebrates on 7/26	7.9

Table S4. Trace metal concentrations (all in $\mu\text{g} / \text{g}$ dry mass) in benthic macroinvertebrates for all samples. DL denotes a concentration below the ICP-MS detection limit. Data were collected in July 2017.

Sample Name	Al	Cd	Cu	Fe	Mn	Ni	Pb	Zn
D1 combined	2133	2.68	52.2	3167	146	5.00	13.2	250
D2 7/17	2034	0.489	35.9	1835	129	3.53	3.91	138
D3 7/17	4573	1.40	28.8	6962	489	6.63	15.4	171
D3 7/24	2756	1.19	28.7	3943	311	3.88	9.91	131
D4 combined	2430	3.24	24.3	3201	271	3.14	13.3	269
D5 7/17	3600	4.12	35.7	5587	438	5.06	30.4	358
US1 combined	4177	DL	46.0	34916	36.7	3.90	21.4	84.4
US3 combined	8719	DL	83.5	31148	70.6	6.44	41.0	108
US4 combined	6653	0.460	54.7	16737	112	3.81	35.0	162
LS1 combined	8058	1.97	108	5486	1106	11.3	23.3	303
LS3 7/17	10474	1.18	191	3743	154	11.6	20.1	239
P1 combined	747.0	0.233	30.6	1458	130	2.60	3.08	78.2
P4 7/20	3811	0.544	112	3239	157	9.49	13.7	450

Table S5. Rare earth element concentrations (all in $\mu\text{g} / \text{g}$ dry mass) in benthic macroinvertebrates for all samples. DL denotes a concentration below the ICP-MS detection limit. Data were collected in July 2017.

Sample Name	Ce	Dy	Er	Eu	Gd	Ho	La	Lu	Nd	Pr	Sc	Sm	Tb	Tm	Y	Yb
D1 combined	12.3	1.01	0.652	0.306	4.10	0.140	8.43	0.040	7.27	1.93	DL	1.43	0.371	0.043	4.67	0.365
D2 7/17	2.62	0.388	0.261	0.141	1.48	0.054	1.77	0.034	1.87	0.464	5.59	0.484	0.128	DL	1.39	0.188
D3 7/17	10.2	1.22	0.827	0.491	5.66	0.156	6.47	0.077	6.63	1.60	8.38	1.72	0.475	0.061	3.97	0.504
D3 7/24	6.53	0.788	0.545	0.261	3.57	0.102	4.03	0.053	4.25	1.03	6.74	1.01	0.295	0.038	2.61	0.307
D4 combined	4.64	0.563	0.385	0.211	2.45	0.076	2.94	0.037	3.08	0.760	6.62	0.765	0.215	0.030	1.88	0.226
D5 7/17	10.8	1.06	0.748	0.396	5.70	0.123	6.62	0.065	6.89	1.79	5.53	1.60	0.453	0.048	3.07	0.376
US1 combined	5.18	0.507	0.335	0.252	2.45	0.080	2.55	0.080	2.44	0.631	8.10	0.725	0.189	DL	1.67	0.248
US3 combined	10.8	1.09	0.775	0.525	4.97	0.157	4.76	0.101	5.80	1.38	13.2	1.65	0.400	DL	3.30	0.478
US4 combined	14.0	1.27	0.853	0.487	6.53	0.157	6.13	0.076	7.87	1.90	7.96	1.92	0.498	0.065	3.52	0.477
LS1 combined	7.15	1.58	0.959	0.515	4.78	0.265	4.73	0.252	6.24	1.53	16.3	1.75	0.557	0.161	6.05	0.721
LS3 7/17	4.37	1.39	0.928	0.441	3.39	0.260	1.97	0.365	4.79	0.977	17.9	1.43	0.465	0.238	4.99	0.778
P1 combined	1.07	0.131	0.089	0.062	0.601	DL	0.50	0.066	0.65	0.173	3.37	0.181	0.058	0.030	0.381	0.094
P4 7/20	3.51	0.697	0.472	0.266	2.34	DL	1.81	0.200	2.74	0.661	11.3	0.767	0.263	DL	2.28	0.409

Table S6. Moran's I values and the corresponding p value for dissolved trace metals, rare earth elements, CCU, pH, and specific conductance.

Analyte	Moran's I Value	P Value
Tb	-0.119	0.267078
Er	-0.112	0.262369
Ho	-0.150	0.114718
Yb	-0.158	0.086895
Lu	-0.206	0.026859
Tm	-0.218	0.016811
Gd	0.0920	0.011333
Cd (µg/L)	0.101	0.005379
Al (µg/L)	0.0874	0.002977
Dy	0.120	3.96E-04
Y	0.121	3.73E-04
Sm	0.135	1.05E-04
Ni (µg/L)	0.139	6.83E-05
Mn (µg/L)	0.145	4.72E-05
Nd	0.151	2.51E-05
CCU	0.153	2.08E-05
Eu	0.153	1.91E-05
Pr	0.157	1.34E-05
Fe (µg/L)	0.159	9.04E-06
Ce	0.168	4.25E-06
pH	0.188	9.28E-07
Sc	0.191	4.63E-07
La	0.192	2.62E-07
Specific conductance (µS)	0.203	1.19E-07
Cu (µg/L)	0.215	8.81E-09
Zn (µg/L)	0.224	6.46E-09
Pb (µg/L)	0.243	1.05E-10

Table S7. Moran's I values and the corresponding p value for trace metal and rare earth element concentrations in benthic macroinvertebrates.

Analyte	Moran's I Value	P Value
Y	-0.0895	0.928729422
Nd	-0.0905	0.919428261
Ce	-0.0739	0.89437686
La	-0.0953	0.864372941
Pr	-0.0968	0.849342166
Sc	-0.0531	0.653523634
Er	-0.0505	0.639935249
Dy	-0.0490	0.622732511
Sm	-0.0482	0.619692349
Gd	-0.0485	0.619495265
Tb	-0.0482	0.617955779
Zn	-0.0459	0.581707574
Tm	-0.0368	0.468012037
Cd	-0.0257	0.466571689
Yb	-0.0295	0.428513202
Ni	-0.0198	0.354507443
Mn	-0.0344	0.33910356
Eu	-0.0153	0.334129718
Ho	0.00498	0.260768852
Cu	0.01219	0.113297834
Al	0.0403	0.072659115
Lu	0.0475	0.033509945
Pb	0.116	0.00367804
Fe	0.125	0.001009911

Table S8. Summary of the dominant benthic invertebrates in the Snake River watershed and their functional feeding groups

Sites	Date			
	August 1980 & 1981 (McKnight & Feder, 1984)	May & October 1995 (W. H. Clements, unpublished data)	June-August 2006 (Yang, C. MS thesis)	July 2017 This study
Upper Snake	Abundant Stonefly: <i>Zapada haysii</i> (shredder-detritivore) Sparse Chironomids: <i>Diamesa latitarsis</i> , <i>Eukiefferiella Bavarica</i> (collectors-gatherers)	Not sampled	Abundant Stonefly: <i>Zapada haysii</i> , 90%, <i>Podomosta</i> sp.	Abundant Stonefly: <i>Zapada haysii</i>
Deer Creek	Abundant Mayflies: <i>Baetis</i> sp., <i>Cinygmula</i> sp., <i>Epeorus grandis</i> , Stonefly of the family Chloroperlidae. (collectors-gatherers/scrapers)	Abundant Mayflies & caddiflies: <i>Baetis</i> sp., Ephemereididae, Heptageniidae, Rhyacophillidae Sparse Stoneflies: <i>Zapada</i> sp, <i>Sweltza</i> sp., <i>Isoperla</i> sp. and <i>Paraleuctra</i> sp.	Abundant <i>Baetid mayflies</i> (60-90%) Sparse Stoneflies: <i>Zapada</i> sp, <i>Skwala</i> sp., <i>Hesperoperla</i> sp. and <i>Paraleuctra</i> sp.	Abundant <i>Baetid mayflies</i>
Lower Snake	Sparse Stonefly: <i>Zapada haysii</i>	Sparse Stonefly: <i>Zapada</i> sp. Chironomids and caddisflies	Sparse Stonefly: <i>Zapada haysii</i> , <i>Alloperla</i> sp.	Sparse Stonefly: <i>Zapada haysii</i>
Peru Creek	Not sampled	Sparse Chironomids and caddisflies	Not sampled	Sparse Stonefly: <i>Zapada haysii</i>

Table S9. Loadings of dissolved metal and REE concentrations in water samples on PC1 and PC2. Note that metals with any concentrations below the ICP-MS detection limits were not included in the PCA.

Metal	PC1	PC2
Al	0.1737	-0.4285
Cd	0.2517	0.1198
Ce	0.2578	0.0684
Cu	0.2410	0.1950
Dy	0.2576	-0.0367
Er	0.2567	-0.0627
Eu	0.2579	0.0626
Fe	0.0908	-0.5367
La	0.2521	0.1429
Mn	0.2555	-0.0034
Nd	0.2568	0.0865
Ni	0.2253	-0.2933
Pb	0.2117	0.2930
Pr	0.2560	0.1004
Sc	0.1615	-0.4626
Sm	0.2580	0.0475
Y	0.2557	-0.0820
Zn	0.2470	0.1710

Table S10. Loadings of metal and REE concentrations in invertebrate samples on PC1 and PC2. Note that metals with any concentrations below the ICP-MS detection limits were not included in the PCA.

Metal	PC1	PC2
Al	-0.2201	0.2069
Ce	-0.2125	-0.3216
Cu	-0.1351	0.3978
Dy	-0.2846	0.0520
Er	-0.2857	0.0324
Eu	-0.2780	-0.0153
Fe	-0.0435	-0.1388
Gd	-0.2555	-0.2066
La	-0.1948	-0.3174
Lu	-0.1334	0.4282
Mn	-0.1363	0.0935
Nd	-0.2601	-0.1928
Ni	-0.1793	0.3680
Pb	-0.2081	-0.1139
Pr	-0.2458	-0.2308
Sm	-0.2807	-0.1073
Tb	-0.2859	-0.0069
Y	-0.2632	0.0928
Yb	-0.2547	0.2236
Zn	-0.0926	0.1665

Table S11. Abundance histories for the America robin, dark-eyed junco, Lincoln's sparrow, and mountain chickadee. The values refer to the number of birds detected at each site during the specified visit. Values greater than 1 were changed to 1 for use in occupancy modeling. Shading indicates sites where no individuals were detected during any of the three visits (i.e. 000 detection history).

Site	American Robin			Dark-eyed Junco			Lincoln's Sparrow			Mountain Chickadee		
	Visit 1	Visit 2	Visit 3	Visit 1	Visit 2	Visit 3	Visit 1	Visit 2	Visit 3	Visit 1	Visit 2	Visit 3
D1	0	1	1	1	1	0	1	1	2	1	0	2
D2	1	1	1	1	2	0	0	0	1	0	0	2
D3	1	0	0	0	1	1	1	1	2	1	2	2
D4	2	0	1	0	2	0	0	1	2	1	1	0
D5	1	0	0	2	0	0	0	0	0	1	1	0
US1	1	0	1	1	2	1	0	0	1	2	2	0
US2	0	0	1	0	1	1	0	0	0	1	1	0
US3	0	0	0	0	0	0	0	0	0	1	1	0
US4	2	0	0	0	0	1	1	1	1	1	1	0
US5	1	1	2	0	1	0	0	0	0	2	2	1
LS1	0	0	2	0	0	0	0	2	1	2	1	0
LS2	1	0	0	1	0	0	0	1	2	0	0	0
LS3	0	1	0	0	1	1	0	1	2	0	0	0
LS4	0	0	0	2	1	1	0	0	0	1	1	1
LS5	0	0	0	0	0	0	0	0	0	2	1	1
P1	1	1	0	0	1	1	2	1	1	0	1	0
P2	0	1	1	1	0	1	0	0	0	1	0	0
P3	0	0	1	0	0	0	2	2	3	0	0	0
P4	1	1	1	0	2	1	0	0	0	0	1	1
P5	0	0	0	1	0	0	0	0	0	0	0	0

Table S14. Moran's I value and the corresponding p value for abundance histories of bird species.

Birds	Moran's I Value	P Value
American Robin	-0.00714	0.623416
Dark-eyed Junco	-0.0244	0.708896
Lincoln's Sparrow	-0.0556	0.051968
Mountain Chickadee	-0.00395	0.517419
Ruby-crowned Kinglet	-0.06249	0.022694
White-crowned Sparrow	0.0265	0.029702
Wilson's Warbler	0.00921	0.189823
Yellow-rumped Warbler	-0.0488	0.110447
American Crow	0.0257	0.017931
Northern Flicker	-0.0112	0.013414
Pine Grosbeak	-0.0165	0.855016
Steller's Jay	-0.0208	0.79216

Table S15. Values of site-specific covariates used in occupancy models. Percent forest and shrub at 100-, 200-, and 300-meter scales are abbreviated to F100, F200, etc.

Site	Elevation	Habitat	F100	F200	F300	S100	S200	S300	PC1water	CCU	PC1inverts	InvertPb	PC1Pb/REE
D1	3465	Shrub	34.3	28.4	19.3	51.4	41.8	37.7	-3.966	0.259	-1.273	13.2	1.854
D2	3421	Forest	57.2	68.8	60.7	42.9	19.9	19	-3.951	0.275	4.602	3.91	-4.318
D3	3359	Shrub	48.6	61	74	51.4	39	25.6	-3.941	0.197	-0.531	12.6	0.840
D4	3317	Forest	57.2	62.4	66.5	40	29.1	19.9	-3.903	0.262	2.872	13.3	-2.603
D5	3284	Forest	88.6	92.2	94.3	8.6	4.3	2.2	-3.873	0.229	-2.104	30.4	2.387
US1	3426	Grass	22.9	44.7	50.6	22.9	28.4	22.8	-1.058	9.37	2.790	21.4	-2.643
US2	3395	Shrub	11.4	36.1	46.2	62.9	35.5	27.5	-0.541	10.3	0.151	31.2	-0.131
US3	3366	Shrub	42.8	39	47.5	25.7	22	15.5	-0.025	11.3	-2.489	41.0	2.380
US4	3343	Forest	25.7	37.5	38.6	34.3	24.8	16.1	5.928	26.4	-3.404	35.0	3.846
US5	3304	Forest	100	100	95.8	0	0	1.3	5.928	26.4	-3.404	35.0	3.846
LS1	3222	Shrub	45.7	79.4	88.3	54.3	20.6	11.7	0.029	8.37	-4.725	23.3	3.680
LS2	3199	Forest	45.8	65.3	80.1	54.3	34.8	17.7	-0.382	7.73	-3.882	21.7	2.762
LS3	3172	Shrub	45.8	77.3	84.2	54.3	22.7	15.8	-0.793	7.09	-3.04	20.1	1.844
LS4	3078	Shrub	20	65.2	83.2	68.6	26.2	13	-1.678	6.41	-3.04	20.1	1.844
LS5	3047	Forest	100	100	98.6	0	0	1.3	-2.563	5.73	-3.04	20.1	1.844
P1	3198	Forest	68.5	75.2	84.5	8.6	4.3	3.2	7.421	28.6	6.420	3.08	-6.058
P2	3155	Forest	100	92.1	91.5	0	7.8	6	2.624	15.7	4.751	6.63	-4.722
P3	3131	Forest	54.3	76.6	85.2	45.7	23.4	14.9	2.552	15.6	3.082	10.2	-3.386
P4	3116	Forest	100	89.3	94.9	0	10.6	5.1	2.480	15.5	1.413	13.7	-2.05
P5	3076	Forest	100	100	100	0	0	0	2.480	15.5	1.413	13.7	-2.05

Table S16. Values of survey-specific covariates used in occupancy models. V1, V2, and V3 refer to visits 1, 2, and 3.

Site	Julian			Start Time			Start Temp			Wind			Sky			Noise		
	V1	V2	V3	V1	V2	V3	V1	V2	V3	V1	V2	V3	V1	V2	V3	V1	V2	V3
D1	15	20	22	268	93	56	48	39	43	1	0	0	0	0	0	0	0	0
D2	15	20	22	245	122	74	47	43	42	1	0	1	0	0	0	0	1	1
D3	12	16	22	247	70	94	51	34	40	1	0	1	0	0	0	0	0	1
D4	12	16	28	212	98	260	56	37	63	1	0	1	0	0	1	0	0	0
D5	12	16	28	190	116	237	50	39	62	1	0	1	0	0	1	0	0	0
US1	9	15	20	127	100	273	44	34	61	1	0	0	1	0	1	0	0	0
US2	9	15	30	163	123	272	48	34	54	1	0	1	1	0	0	0	0	0
US3	9	15	30	204	61	249	56	33	53	1	1	1	1	0	0	0	0	0
US4	9	15	20	229	154	207	53	33	40	1	0	0	1	0	1	0	0	0
US5	9	15	20	256	176	183	55	36	41	1	0	0	1	0	1	0	0	1
LS1	12	22	28	151	156	211	39	40	56	0	0	0	0	0	1	1	1	1
LS2	12	22	28	134	168	200	39	40	54	0	0	0	0	0	1	1	0	0
LS3	12	16	22	106	168	183	34	37	43	1	1	0	0	0	1	0	0	0
LS4	12	16	22	39	240	250	42	56	53	0	1	0	0	0	1	0	0	0
LS5	16	22	28	258	227	176	57	53	53	1	1	1	0	1	1	1	1	1
P1	28	30	30	141	50	59	48	37	37	0	0	0	1	2	2	0	0	0
P2	28	30	30	111	76	85	44	37	37	0	0	0	1	1	1	0	1	1
P3	28	30	30	88	105	114	42	37	38	1	0	0	1	1	1	1	1	1
P4	28	30	30	162	133	142	52	40	41	0	0	0	1	1	1	0	1	1
P5	28	30	30	55	157	166	43	42	43	0	0	0	1	1	1	1	1	1

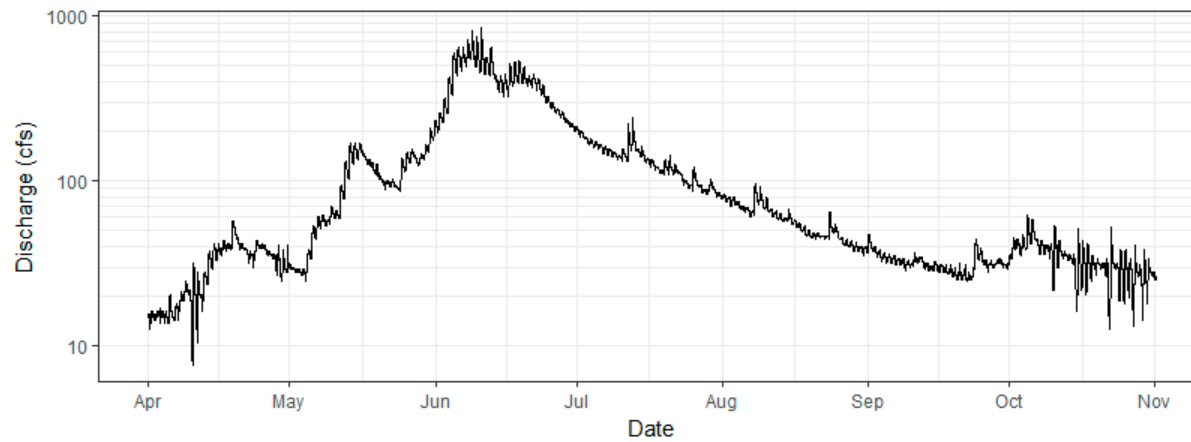


Figure S1. Streamflow in the Snake River watershed. This is the 2017 hydrograph as recorded at USGS gage 09047500, located downstream of the study area on the Snake River.