

# Field Report

Alaska Monitoring and Assessment Program

2018 Southeast Rivers Survey

June 22 – August 6, 2018



Alaska Center for  
Conservation Science  
UNIVERSITY of ALASKA ANCHORAGE

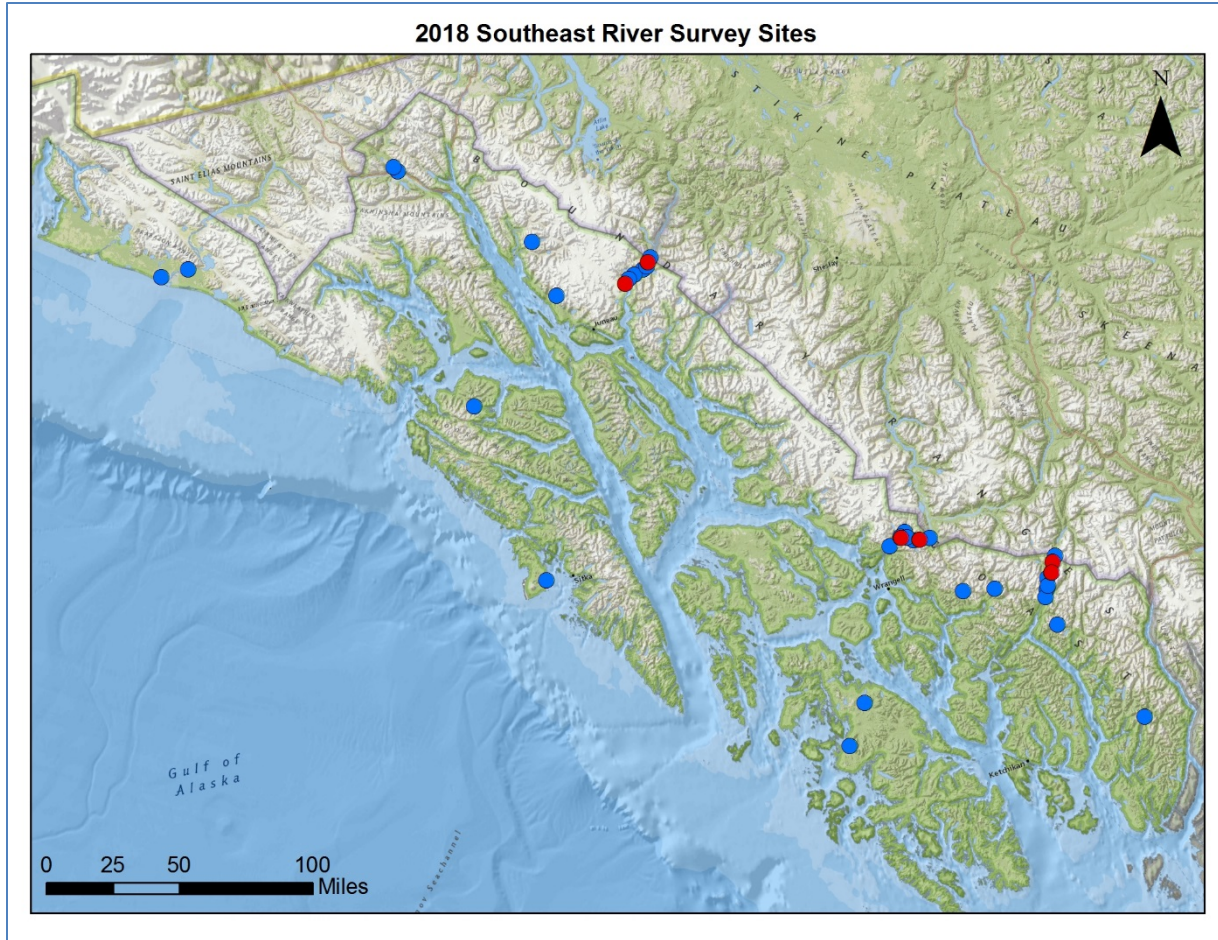


Figure 1 Sites surveyed during the 2018 Southeast Rivers survey, random sites are shown in blue and handpicked sites in red.

### Acknowledgements

This survey was funded in part through Environmental Protection Agency (EPA) Section 106 Clean Water Act grants I-01J19101, I-01J37901, and AA-J25201. Work was completed in cooperation with University of Alaska's Alaska Center for Conservation Science (ACCS), DEC Environmental Health Lab, DEC Fish Tissue Monitoring Program, Alaska Department of Fish and Game (ADF&G), EPA, U.S. Forest Service (USFS), National Park Service, and Ketchikan Indian Community.



## AKMAP 2018 Southeast Rivers Survey

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The Alaska Department of Environmental Conservation (DEC) established the Alaska Monitoring and Assessment Program (AKMAP) in 2004. It focuses on conducting applied environmental research that uses a statistical survey design to provide estimates of the spatial extent of water quality based on a variety of indicators. Examples of indicators include chemical contaminants, macroinvertebrate community structure and water chemistry. Environmental managers use this information to support the protection and restoration of freshwater river and stream environments and mitigate damage to these ecosystems. The purpose of this project was for DEC, EPA, USFS, ADF&G and ACCS to complete the second of a series of 4 aquatic resource surveys in Southeast Alaska. This survey assessed rivers, other surveys will or have already assessed, lakes, streams, and coastal areas.

EPA partners with states and Tribes to complete National Aquatic Resource Surveys to characterize the state of the nation's aquatic resources. These types of surveys are designed based on random sampling and are used in a variety of fields (health surveys or election polls, for example) to determine the status of populations or resources using a representative sample of relatively few members or sites. Random surveys provide scientifically-defensible assessments of the nation's waters and can be used to track changes in condition over time.

Two synthetic stream networks were combined to create the sample frame for this project and provide coverage throughout Southeast Alaska. U.S. Forest Service StreamNet and University of Montana Riverscape Analysis Project (RAP). Large systems were targeted in this survey and we selected Strahler order 5 and larger rivers from StreamNet, and RAP third order or larger rivers. RAP does not include small headwater tributaries and thus the stream order numbers are slightly different than Strahler, RAP third order and above was most similar to Strahler fifth order and above.

For the purposes of this study, the target population included rivers in Southeast Alaska that were above the head of salt, and were reasonably accessed by car, foot, boat, airplane or helicopter. Rivers were selected randomly using a Generalized Random Tessellation Stratified (GRTS) survey design for points with reverse hierarchical ordering.



For random site selection, rivers were split into two strata, one selected 20 sites from across Southeast Alaska (south of the 60<sup>th</sup> parallel); and the second selected 5 random sites from within each of 3 transboundary river watersheds – the Stikine, Taku and Unuk Rivers (total 15 sites). The remaining 6 handpicked sites were selected to maximize coverage on each of the Stikine, Taku and Unuk Rivers. To obtain these 41 sampleable sites, 89 sites were reviewed for accessibility and target status.

In summer 2018 DEC and ACCS staff along with collaborators from USFS, ADF&G, Alaska Department of Natural Resources, and the Ketchikan Indian Community, sampled 36 of 41 total river sites, these included 30 of 35 randomly selected sites for a random site sampling efficiency of 85.7%. Table 1 provides locations for each of the rivers surveyed.

Each sampling team included two scientists, with two separate crews were working concurrently throughout the summer. On arrival at the site, the stream or river was verified to be target – above the head of salt and with more than 50% continuous water. Some sites were dropped because of flooding or related weather hazards, and some were dropped because they were not safely accessible.

Once the site was verified, the crew sampled the site using National Rivers and Streams Assessment wadeable or non-wadeable methods. During the course of surveying a site, biological, water, sediment, and physical habitat samples were collected.

- Physical habitat was surveyed at each of 11 habitat transects evenly spaced throughout the sampling reach. The detailed survey included assessments of riparian habitat, instream fish habitat, vegetation cover, substrate and human impacts.
- Water was collected from midstream at the upstream most transect of each sampling reach. Laboratory analyses were completed for dissolved metals, cations, nutrients, total suspended solids, acid neutralizing capacity, chlorophyll, algal toxins and enterococci.





- The finest sediment available was collected throughout the reach and homogenized. Sediment was analyzed for stable isotopes, total organic carbon, metals, and grain size.
- Biological samples included benthic macroinvertebrates and periphyton, and were collected from each of the 11 habitat transects. Benthic macroinvertebrates were collected using a D-frame kick net and by sampling a 1 square foot quadrat for 30 seconds. Periphyton was collected using a 12-cm<sup>2</sup> area delimiter and by scrubbing the surface area with a brush or collecting surface sediment if no coarse sediment was available. Macroinvertebrates and periphyton were preserved using ethanol and Lugol's iodine, respectively.

Samples are currently being analyzed at various laboratories, complete results are expected in 2019. Preliminary data is available in Table 2, more detailed data is available on request. The success of this project is attributed to the following outstanding personnel:

Amber Bethe, DEC  
 Terri Lomax, DEC  
 Dan Bogan, ACCS  
 Dustin Merrigan, ACCS  
 Leslie Jones, ACCS  
 Jill Weitz, Salmon Beyond Borders  
 Jeff Williams, ADF&G  
 Stephen Todd, ADF&G  
 Rich Chapell, ADF&G  
 Jeannette Alas, ADF&G  
 Lars Sorenson, ADF&G  
 Tony Gallegos, Ketchikan Indian Community



Table 1 - Sites sampled during the 2018 Southeast River Survey.

<b>Monitoring Location ID</b>	<b>Monitoring Location Name</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Date Sampled</b>	<b>Panel</b>
NRS18-AK-10002	Chilkat River	59.4171	-135.9419	8/7/2018	Random
NRS18-AK-10004	Neka River	58.0804	-135.8313	8/3/2018	Random
NRS18-AK-10007	Antler River	58.8490	-134.7797	8/4/2018	Random
NRS18-AK-10008	Herbert River	58.5327	-134.6944	8/2/2018	Random
NRS18-AK-10009	Fred's Creek	57.0650	-135.6056	8/1/2018	Random
NRS18-AK-10016	Chilkat River	59.4464	-135.9746	8/6/2018	Random
NRS18-AK-10049	Shaheen Creek	55.7241	-133.2247	7/12/2018	Random
NRS18-AK-10051	Keta River	55.35123	-130.4530	7/15/2018	Random
NRS18-AK-10059	Harding River	56.3253	-131.7006	7/10/2018	Random
NRS18-AK-10060	Bradfield River	56.2802	-131.4012	7/8/2018	Random
NRS18-AK-10064	Stikine River	56.6853	-132.2414	7/22/2018	Random
NRS18-AK-10077	Hatchery Creek	55.9246	-132.9606	7/13/2018	Random
NRS18-AK-10078	Wilson River	55.984	-130.939	7/16/2018	Random
NRS18-AK-10123	Muddy Creek	59.1807	-138.6698	8/11/2018	Random
NRS18-AK-10129	Alsek River	59.1879	-138.3724	8/12/2018	Random
NRS18-AK-10139	Stikine River	56.6747	-131.9988	7/17/2018	Random
NRS18-AK-10140	Alpine Creek	56.7323	-132.0513	7/19/2018	Random
NRS18-AK-10143	Shakes Slough	56.7166	-132.1079	7/9/2018	Random
NRS18-AK-10147	Stikine River	56.7028	-132.0451	7/19/2018	Random
NRS18-AK-10150	Stikine River	56.6596	-131.8389	7/18/2018	Random
NRS18-AK-10159	Taku River	58.5304	-133.7479	6/26/2018	Random
NRS18-AK-10160	Taku River	58.5146	-133.8541	6/26/2018	Random
NRS18-AK-10162	Taku River	58.5388	-133.7055	6/27/2018	Random
NRS18-AK-10165	Taku River	58.5021	-133.9221	6/24/2018	Random
NRS18-AK-10167	Taku River	58.5791	-133.6418	6/28/2018	Random
NRS18-AK-10177	Unuk River	56.1822	-130.9190	7/25/2018	Random
NRS18-AK-10178	Unuk River	56.2398	-130.8804	7/27/2018	Random
NRS18-AK-10180	Unuk River	56.3393	-130.7339	7/26/2018	Random
NRS18-AK-10181	Unuk River	56.1461	-130.9567	7/25/2018	Random
NRS18-AK-10182	Unuk River	56.1998	-130.8973	7/28/2018	Random
NRS18-AK-Stik1	Stikine River	56.7096	-132.1051	7/20/2018	Handpicked
NRS18-AK-Stik2	Stikine River	56.6677	-131.9352	7/21/2018	Handpicked
NRS18-AK-Taku1	Taku River	58.5579	-133.6785	6/27/2018	Handpicked
NRS18-AK-Taku2	Taku River	58.4840	-133.9735	6/23/2018	Handpicked
NRS18-AK-Unuk1	Unuk River	56.3130	-130.772	7/26/2018	Handpicked
NRS18-AK-Unuk2	Unuk River	56.2582	-130.8194	7/27/2018	Handpicked

Table 2 – Preliminary Water Quality Sample Results (ND= Not detected or below minimum detection limit).

Monitoring Location ID	pH	Temp °C	Conductivity umho/cm	Total suspended solids mg/l	Chl-a ug/l	Ammonia mg/l	Nitrate-Nitrite mg/l	Potassium ug/l	Selenium ug/l	Copper ug/l	Zinc ug/l
NRS18-AK-10002	7.3	6.9	78	220	1.068	ND	0.08	4200	0.148	0.197	ND
NRS18-AK-10004	7.12	12.3	78	4.2	0.356	0.25	0.47	538	0.0578	0.319	ND
NRS18-AK-10007	7.19	16.7	23	ND	0.534	ND	ND	719	0.05	0.425	ND
NRS18-AK-10008	6.65	0.9	8	78	0	ND	ND	1690	0.121	0.226	ND
NRS18-AK-10009	7.3	15.9	51	2.4	0.534	ND	ND	636	0.08	0.453	ND
NRS18-AK-10016	7.2	7.2	80	250	0	ND	0.087	3720	0.162	0.196	ND
NRS18-AK-10049	7.61	12.4	72.2	ND	0.668	ND	ND	218	0.0367	2.73	ND
NRS18-AK-10051	6.87	10.6	18.1	ND	0.401	0.021	0.045	270	ND	0.752	8.22
NRS18-AK-10059	7.13	7.9	18.1	ND	0.134	ND	0.05	479	0.0833	0.492	17.7
NRS18-AK-10060	6.97	8.8	18	3	0.267	ND	ND	572	0.0833	0.519	29.1
NRS18-AK-10064	8.37	10.5	82	190	0	ND	0.04	2460	0.162	0.266	ND
NRS18-AK-10077	7.41	16.9	41.4	ND	0.267	ND	0.06	120	0.0722	2.58	5.82
NRS18-AK-10078	6.92	12.3	11	ND	0.641	ND	0.043	263	ND	0.686	7.62
NRS18-AK-10123	7.6	5.3	67.1	220	0	ND	0.051	4290	0.143	1.01	81.4
NRS18-AK-10129	8.2	4.7	109	48	0	ND	0.1	2740	0.31	0.824	57
NRS18-AK-10139	7.5	8.3	68	170	0	0.013	0.049	2260	0.233	0.386	ND
NRS18-AK-10140	6.5	8.4	4	ND	0	ND	0.056	154	0.0211	ND	ND
NRS18-AK-10143	7.05	3	16.6	8.8	0	ND	0.046	1600	0.0678	0.807	35.4
NRS18-AK-10147	7.85	9.5	68	140	0	ND	0.049	1180	0.264	0.24	ND
NRS18-AK-10150	8.2	7.6	18	350	0	0.011	0.057	2620	0.224	0.191	ND
NRS18-AK-10159	7.93	9.2	130.8	91	0	ND	0.13	2040	0.205	0.664	ND
NRS18-AK-10160	7.98	8.5	118.2	150	1.068	ND	0.29	2610	0.218	0.611	ND
NRS18-AK-10162	8	9.3	131.8	80	0	ND	0.083	2320	0.219	0.749	ND

Monitoring Location ID	pH	Temp °C	Conductivity umho/cm	Total suspended solids mg/l	Chl-a ug/l	Ammonia mg/l	Nitrate-Nitrite mg/l	Potassium ug/l	Selenium ug/l	Copper ug/l	Zinc ug/l
NRS18-AK-10165	8.16	8.9	113	160	2.136	0.018	0.051	2960	0.186	0.66	ND
NRS18-AK-10167	8.04	9.3	142.3	85	1.068	ND	0.074	1770	0.245	0.832	ND
NRS18-AK-10177	7.67	8.1	73.2	52	0	0.029	0.048	808	0.221	0.401	14.9
NRS18-AK-10178	7.42	9.8	72.9	49	0	ND	0.047	1650	0.202	0.802	19.3
NRS18-AK-10180	8.02	6.6	81	94	0	0.0096	0.049	705	0.264	1.85	35.5
NRS18-AK-10181	7.52	9.5	74.3	40	0	ND	0.043	1300	0.219	0.4	12.8
NRS18-AK-10182	7.5	7.8	74.6	140	0	0.051	0.054	1140	0.213	1.13	30.8
NRS18-AK-Stik1	7.7	10.7	72	140	12.816	ND	ND	2380	0.2	0.365	ND
NRS18-AK-Stik2	8.4	10.6	90	150	1.068	ND	0.061	2420	0.194	0.272	ND
NRS18-AK-Taku1	8.04	9.4	138.6	73	2.136	ND	0.075	2350	0.245	0.679	ND
NRS18-AK-Taku2	7.99	9.7	113.5	200	0	ND	0.047	3520	0.178	0.698	ND
NRS18-AK-Unuk1	7.85	8.8	83	47	0	0.025	0.046	1310	0.294	0.302	15
NRS18-AK-Unuk2	7.55	7.7	84.7	71		ND	0.043	777	0.224	0.845	29.7

Table 3 – Preliminary sediment chemistry results (ND=Not detected or below minimum detection limit).

Monitoring Location ID	Total Organic Carbon mg/kg	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Copper mg/kg	Lead mg/kg	Mercury mg/kg	Selenium mg/kg	Silver mg/kg	Zinc mg/kg
NRS18-AK-10002	13000	13400	3.84	0.227	56.9	3.23	0.00949	0.357	ND	60
NRS18-AK-10004	20000	20100	7.29	0.147	25.6	3.99	0.0459	0.226	3.59	59.1
NRS18-AK-10007	2800	5010	0.785	0.0251	3.78	1.15	ND	ND	3.29	20.8
NRS18-AK-10008	760	7890	1.82	0.107	14.4	1.17	ND	0.237	3.19	36.8
NRS18-AK-10009	37000	14400	1.95	0.0301	15.8	2.02	ND	ND	3.68	31.3
NRS18-AK-10016	6100	10600	3.34	0.167	19.5	3.49	0.0123	0.207	0.121	59.1
NRS18-AK-10049	n/a	27900	5.9	0.188	28.8	6.86	0.039	0.384	ND	82



Monitoring Location ID	Total Organic Carbon mg/kg	Aluminum mg/kg	Arsenic mg/kg	Cadmium mg/kg	Copper mg/kg	Lead mg/kg	Mercury mg/kg	Selenium mg/kg	Silver mg/kg	Zinc mg/kg
NRS18-AK-10060	710	7420	0.627	0.0607	11.3	1.91	ND	0.219	ND	46.1
NRS18-AK-10064	4300	21000	7.21	0.254	44.1	6.58	0.0507	0.304	0.16	67.4
NRS18-AK-10078	n/a	6710	0.386	0.0397	7.35	1.29	ND	ND	ND	32.4
NRS18-AK-10123	4700	17300	7.15	0.0885	26.9	3.44	0.0105	ND	ND	42.9
NRS18-AK-10129	8000	14400	2.66	0.107	29.7	2.1	ND	ND	ND	44.2
NRS18-AK-10139	4600	17300	5.49	0.228	36.4	5.26	0.0205	0.306	0.123	56.1
NRS18-AK-10140	5100	7800	1.13	0.0481	3.48	2.87	ND	ND	ND	45.6
NRS18-AK-10143	240	2580	0.279	0.0179	5.8	0.912	ND	ND	ND	17.2
NRS18-AK-10147	2200	14900	4.8	0.185	30.1	4.14	0.0195	0.21	0.0981	54.5
NRS18-AK-10150	7200	18700	7.94	0.321	47.6	6.01	0.0327	0.416	0.155	64.9
NRS18-AK-10159	4800	15400	11.4	0.21	24.9	7.85	0.0277	0.194	0.0926	69.4
NRS18-AK-10160	4100	15100	8.78	0.206	24.1	7.08	0.0248	0.182	0.0824	63.1
NRS18-AK-10162	6500	16800	11.8	0.406	36.5	9.23	0.0423	0.261	0.115	70.7
NRS18-AK-10165	5000	14500	11.5	0.237	25.9	8.38	0.0269	0.179	0.116	73.4
NRS18-AK-10167	6300	16500	11.6	0.25	29.5	9.34	0.0329	0.213	0.107	70.6
NRS18-AK-10177	2500	14700	12.5	0.427	52.6	9.7	0.0315	0.649	3.69	78.4
NRS18-AK-10178	3800	17000	12.8	0.536	59	9.11	0.0354	0.901	3.73	83.3
NRS18-AK-10180	2700	16700	17.2	0.526	58.7	11.3	0.0337	1.36	3.57	82.2
NRS18-AK-10181	2300	17200	12.6	0.464	59.3	9.77	0.0343	0.692	3.9	82
NRS18-AK-10182	4100	15700	12.1	0.42	55.4	8.88	0.0325	0.702	3.78	76.5
NRS18-AK-Stik1	4000	17500	7.45	0.248	37.3	5.05	0.0226	0.297	0.114	60.4
NRS18-AK-Stik2	4900	19000	5.78	0.237	38.8	5.59	0.026	0.287	0.122	62.1
NRS18-AK-Taku1	5800	16200	11.4	0.232	33.6	8.24	0.029	0.326	0.118	72.1
NRS18-AK-Taku2	n/a	15000	8.89	0.2	22.4	6.95	0.0216	0.199	0.0831	62.4
NRS18-AK-Unuk1	3100	15000	12.3	0.444	54	9.13	0.0428	0.809	3.39	74.6
NRS18-AK-Unuk2	2300	16200	9.05	0.457	55.8	7.96	0.0446	0.725	3.54	75.1