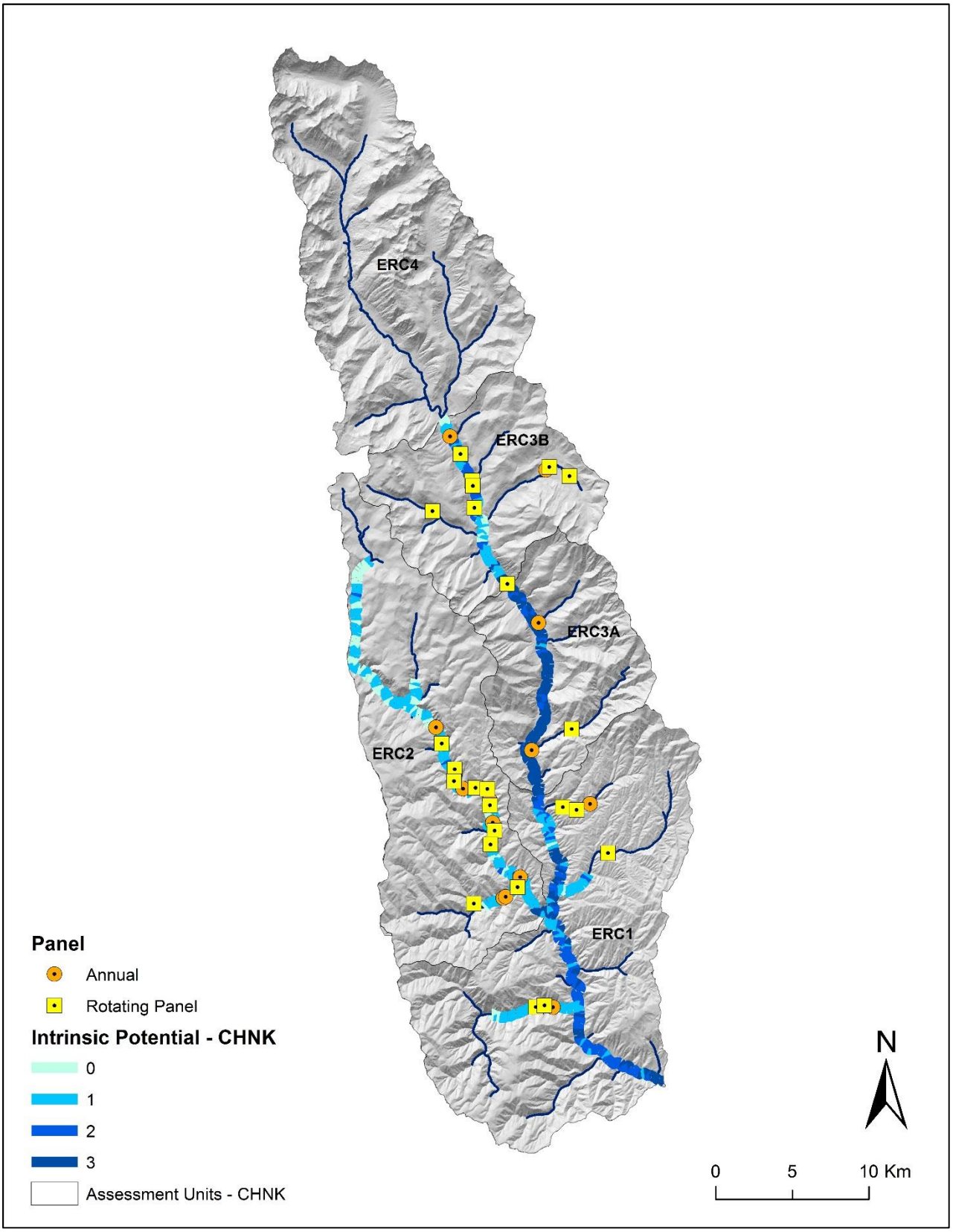
Entiat: Summary of CHaMP Metrics and Modeled Products

- CHaMP metrics are directly measured at each CHaMP site according to probabilistic sampling design. Metric included in this summary are:
  - Sinuosity
  - Substrate < 2 mm
  - Substrate < 6 mm
  - Large Wood Frequency Wetted
  - Large Wood Frequency Bankfull
- Modeled products are built from CHaMP data and additional mechanistic or empirical knowledge, assessed at each CHaMP Site
  - Habitat Suitability Index (HSI)
  - Net Rate of Energy Investment (NREI)

Summary by Chinook Assessment Unit

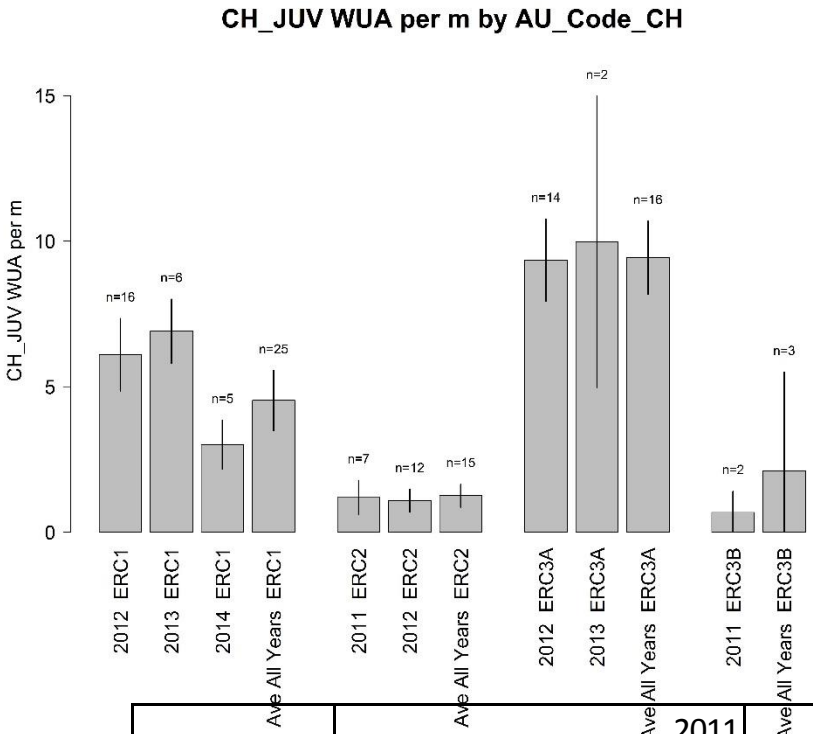
Tucannon: Summary of CHaMP Metrics and Modeled Products

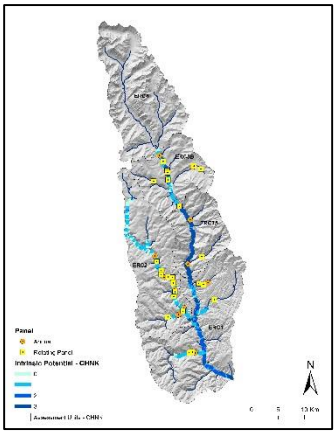
Chinook Intrinsic Potential



Chinook Juvenile Weighted Usable Area

- Source: Habitat Suitability Index (HSI) Model
- Definition: Suitable habitat area (m^2) per meter of stream length for Juvenile Chinook

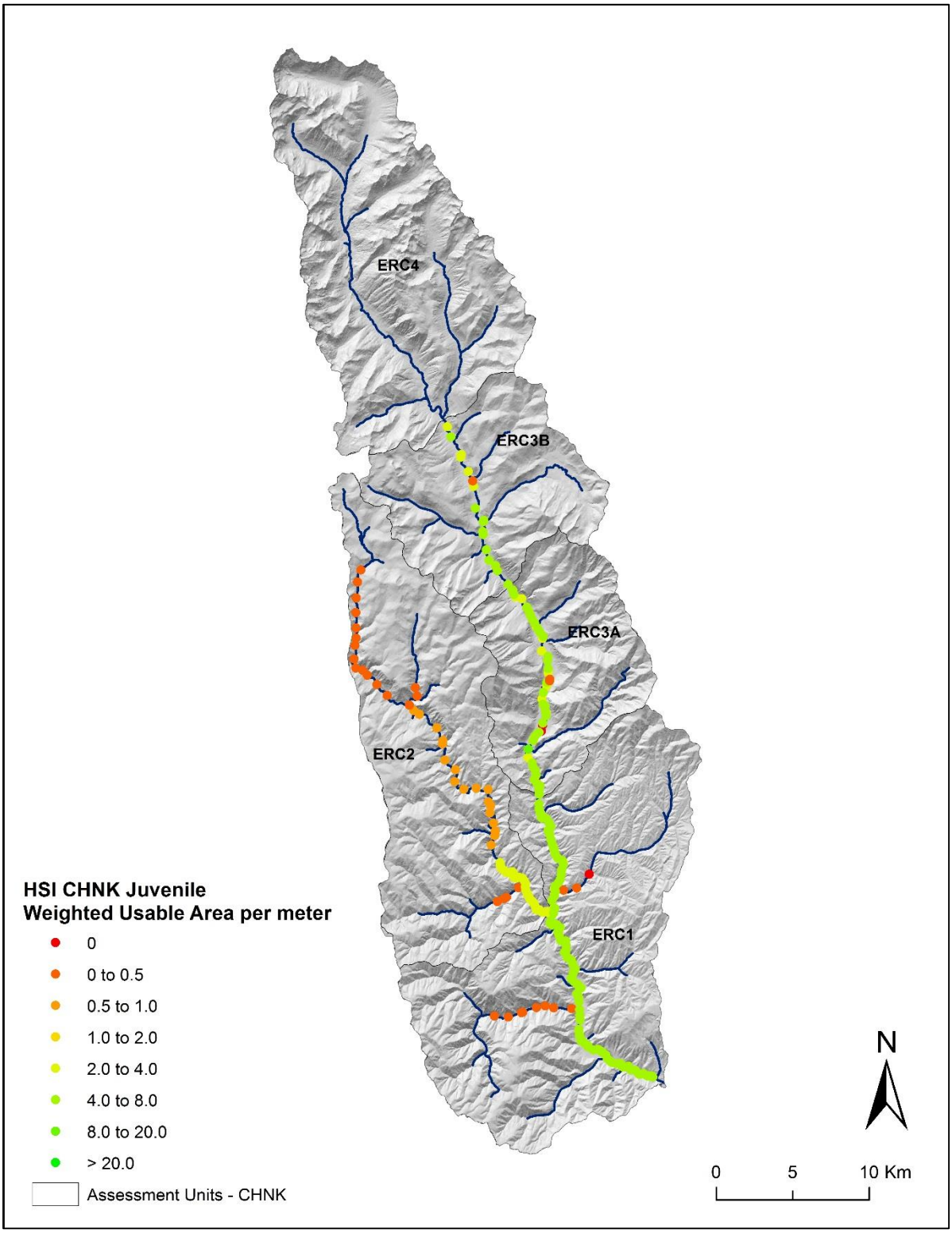




All.Sites	2011	13	0.809	0.631
	2012	47	2.964	3.545
	2013	13	3.402	3.585
	2014	6	3.784	1.946
	Average of All Years	68	3.039	3.632
ERC1	2012	16	6.094	2.877
	2013	6	6.906	1.4
	2014	5	3.008	1.198
	Average of All Years	25	4.528	3.217
ERC2	2011	7	1.192	0.617
	2012	12	1.086	0.854
	Average of All Years	15	1.255	0.882
ERC3A	2012	14	9.357	2.978
	2013	2	9.979	2.552
	Average of All Years	16	9.435	2.936
ERC3B	2011	2	0.678	0.492
	Average of All Years	3	2.101	2.595

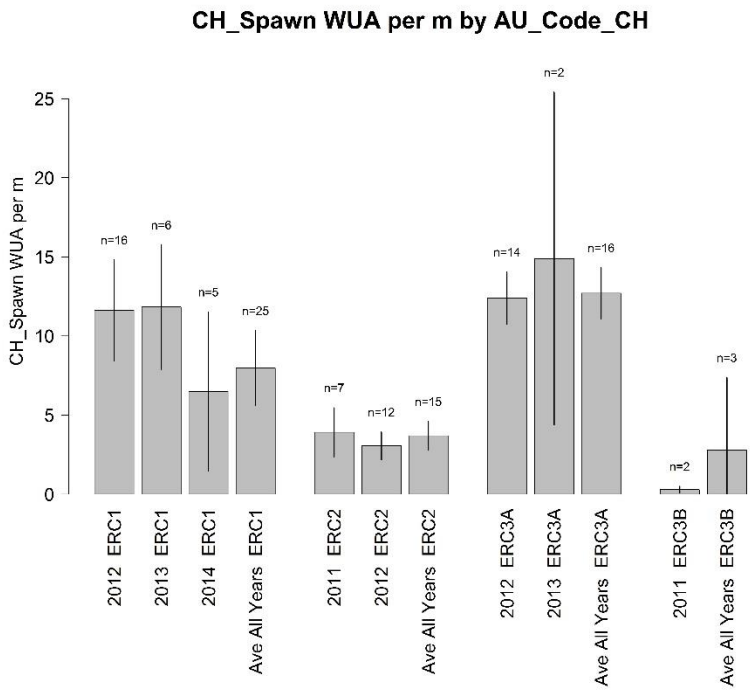
Chinook Juvenile Weighted Usable Area

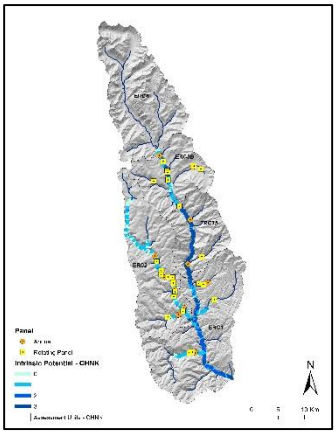
- Source: Habitat Suitability Index (HSI) Model
- Definition: Suitable habitat area (m^2) per meter of stream length for Juvenile Chinook



Chinook Spawner Weighted Usable Area

- Source: Habitat Suitability Index (HSI) Model
- Definition: Suitable Spawning habitat area (m^2) per meter of stream length for Chinook

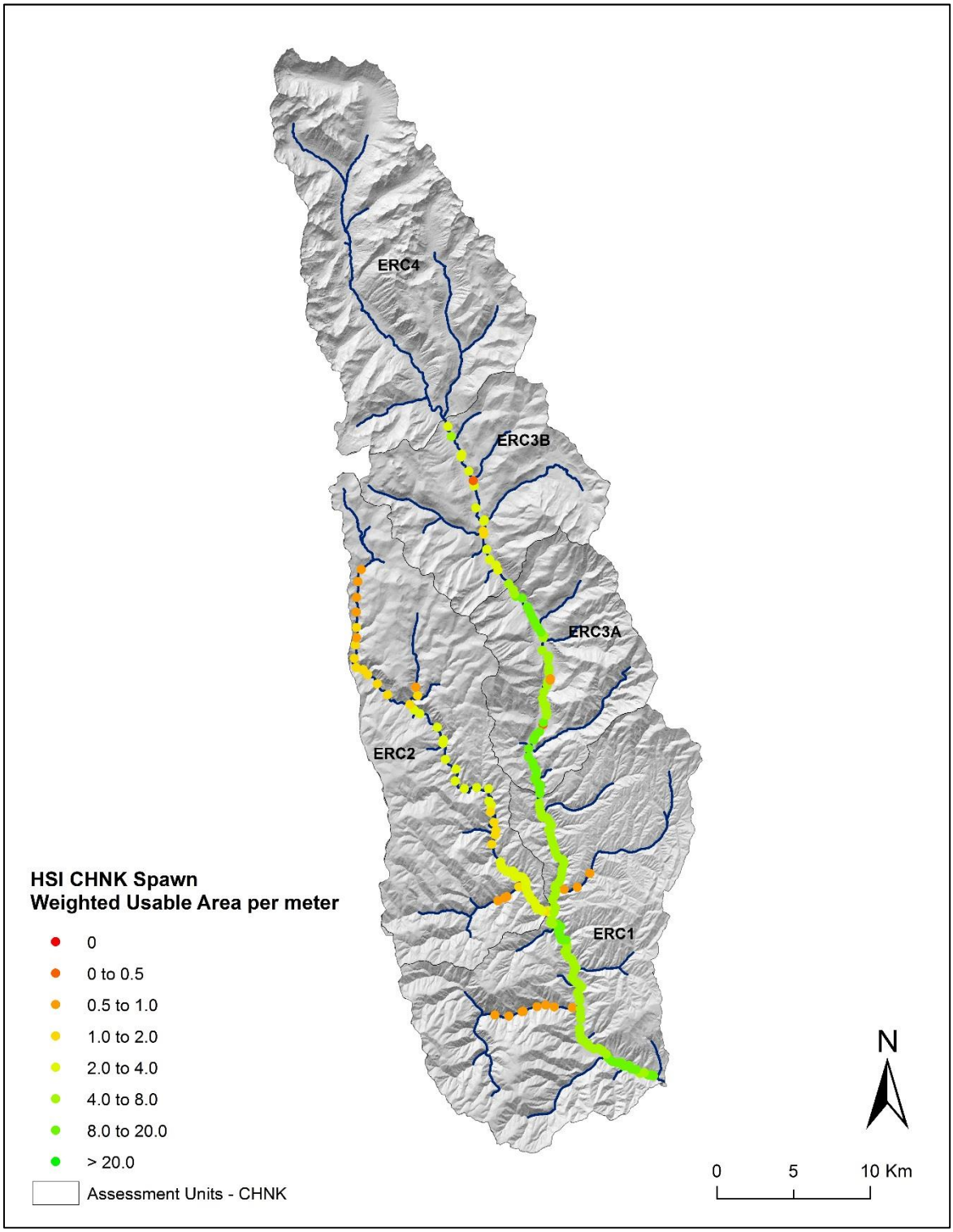




All.Sites	2011	13	2.172	2.216
	2012	47	4.781	5.96
	2013	13	5.466	6.507
	2014	6	6.921	5.312
	Average of All Years	68	4.937	5.897
ERC1	2012	16	11.627	7.371
	2013	6	11.828	5.187
	2014	5	6.498	5.809
	Average of All Years	25	7.973	7.063
ERC2	2011	7	3.921	1.917
	2012	12	3.061	1.948
	Average of All Years	15	3.7	2.151
ERC3A	2012	14	12.39	4.384
	2013	2	14.894	5.358
	Average of All Years	16	12.703	4.592
ERC3B	2011	2	0.288	0.133
	Average of All Years	3	2.781	3.326

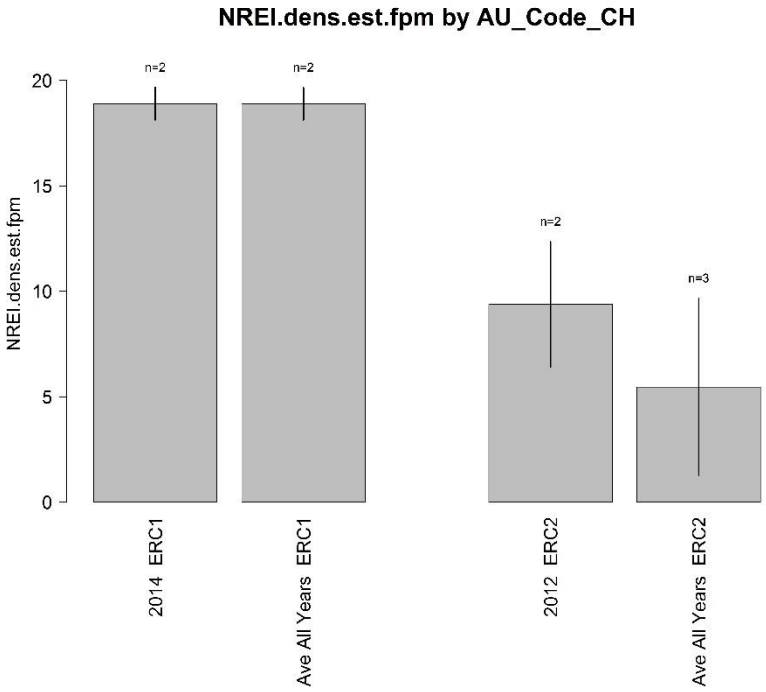
Chinook Spawner Weighted Usable Area

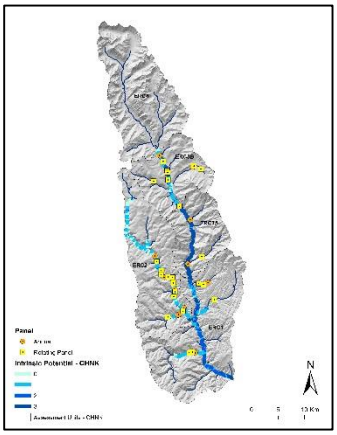
- Source: Habitat Suitability Index (HSI) Model
- Definition: Suitable Spawning habitat area (m^2) per meter of stream length for Chinook



Juvenile Salmonid Capacity

- Source: Net Rate of Energy Intake (NREI) Model
- Definition: Carrying capacity (fish) per meter of stream length

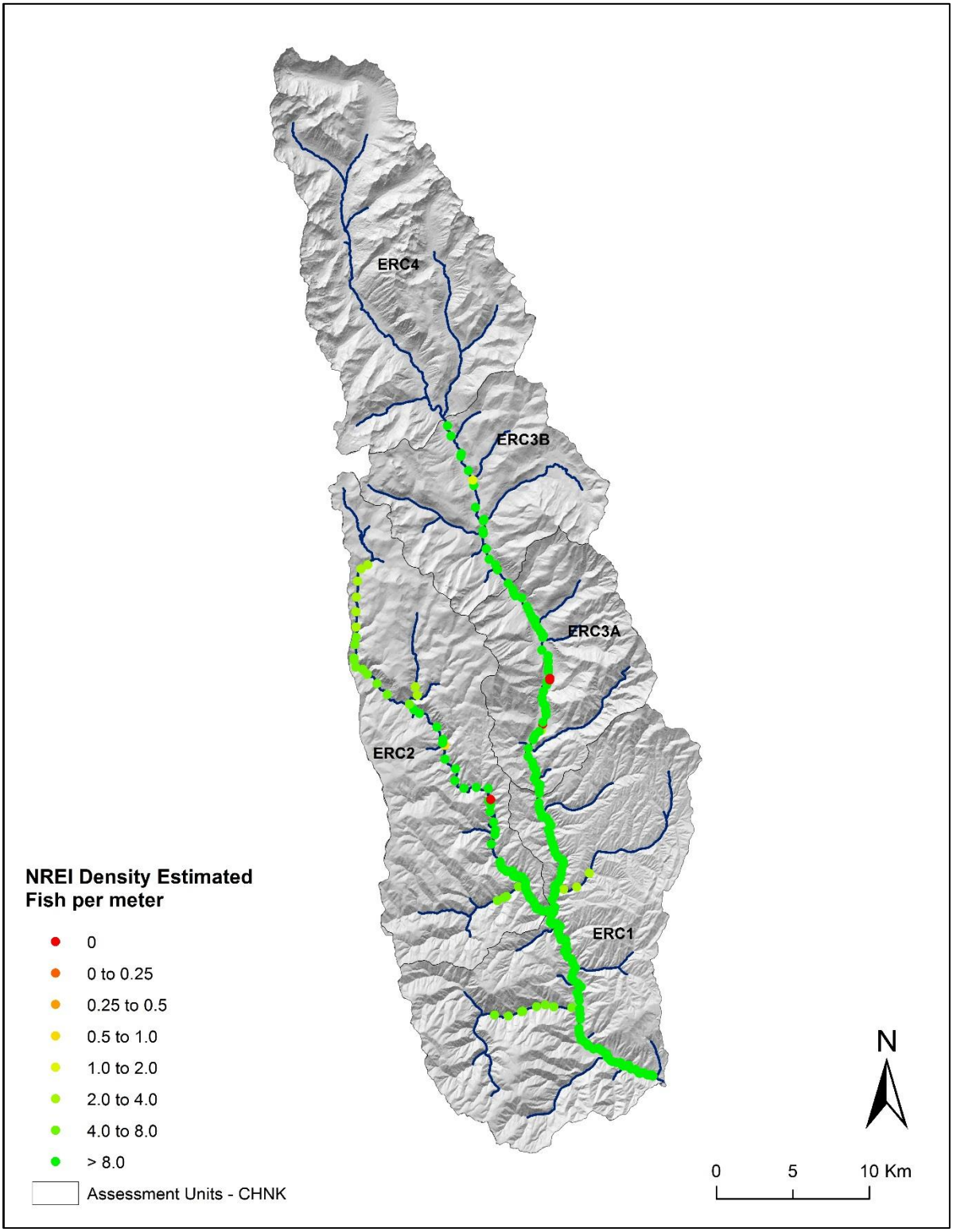




All.Sites	2011	2	3.192	0.11
	2012	2	9.38	1.516
	2014	2	18.893	0.39
	Average of All Years	6	10.225	7.326
	2014	2	18.893	0.39
	Average of All Years	2	18.893	0.39
	2012	2	9.38	1.516
	Average of All Years	3	5.459	3.046

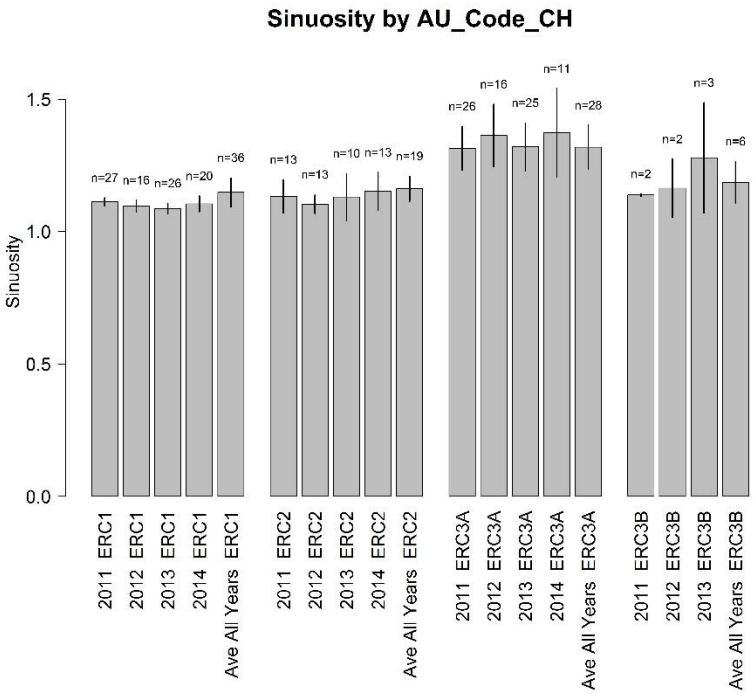
Juvenile Salmonid Capacity

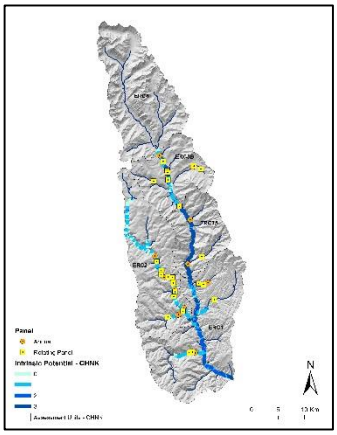
- Source: Net Rate of Energy Intake (NREI) Model
- Definition: Carrying capacity (fish) per meter of stream length



Sinuosity

- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Ratio of the thalweg length to the straight line distance between the start and end points of the thalweg.

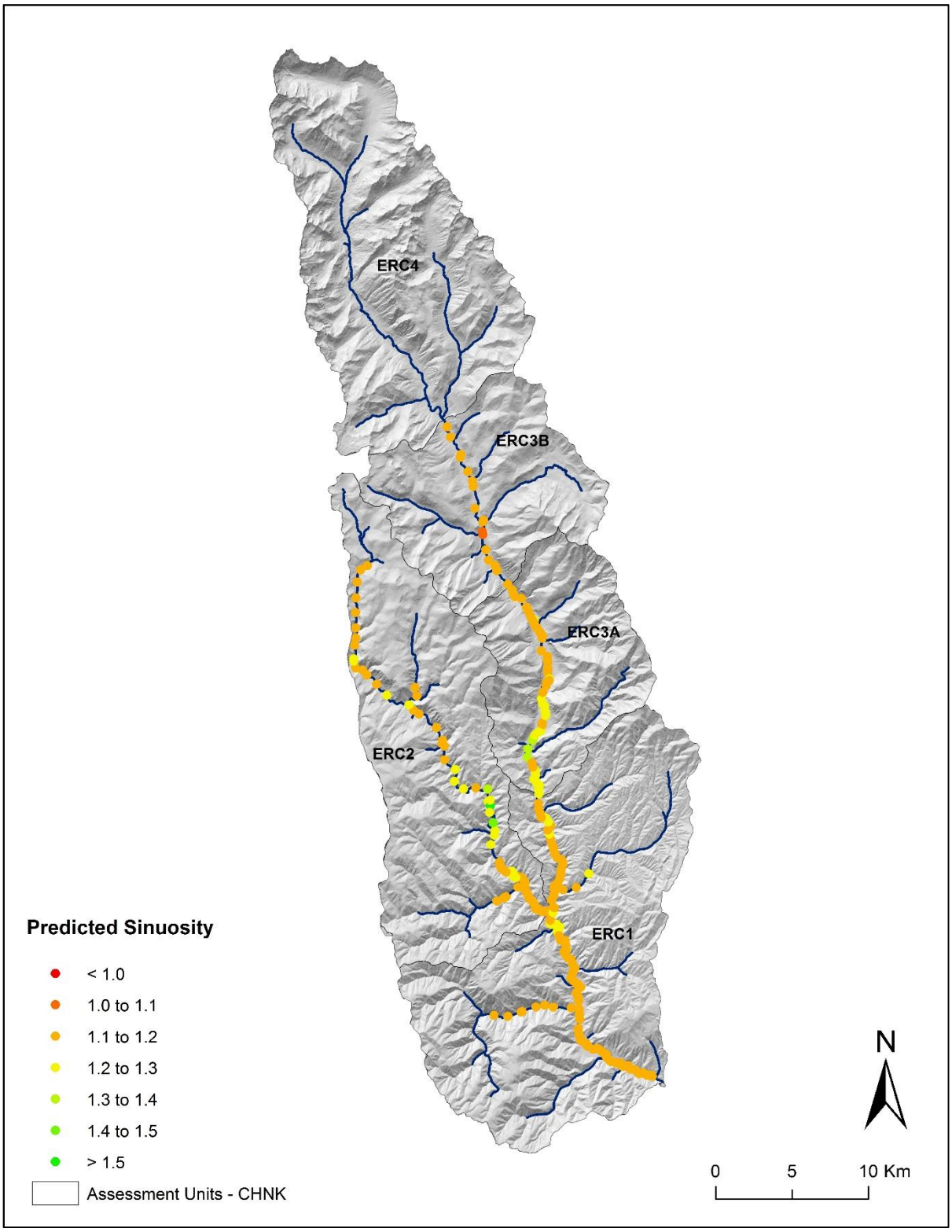




All.Sites	2011	73	1.146	0.138
	2012	52	1.182	0.166
	2013	71	1.188	0.189
	2014	45	1.182	0.219
	Average of All Years	100	1.195	0.18
ERC1	2011	27	1.112	0.049
	2012	16	1.097	0.05
	2013	26	1.087	0.054
	2014	20	1.105	0.075
	Average of All Years	36	1.148	0.139
	2011	13	1.133	0.154
	2012	13	1.104	0.081
	2013	10	1.131	0.158
	2014	13	1.153	0.173
	Average of All Years	19	1.162	0.162
ERC3A	2011	26	1.315	0.26
	2012	16	1.363	0.323
	2013	25	1.32	0.276
	2014	11	1.373	0.323
	Average of All Years	28	1.319	0.274
	2011	2	1.138	0.003
	2012	2	1.164	0.056
	2013	3	1.279	0.15
	Average of All Years	6	1.186	0.111

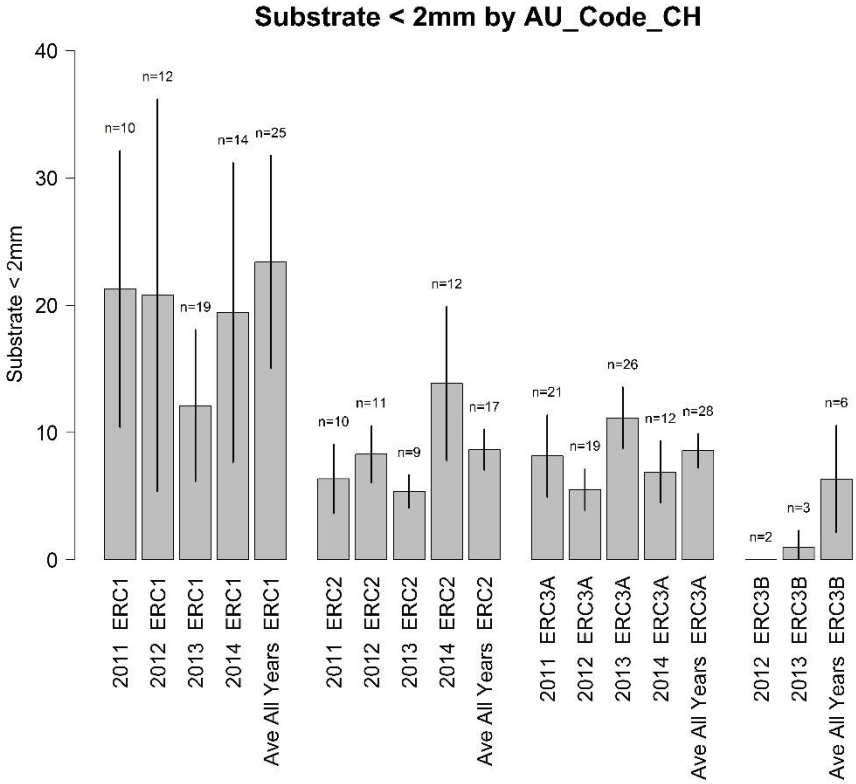
Sinuosity

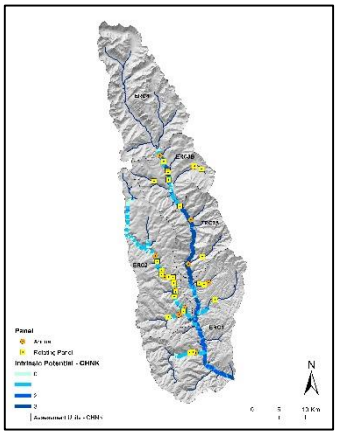
- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Ratio of the thalweg length to the straight line distance between the start and end points of the thalweg.



Substrate < 2 mm

- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Average percentage of pool tail substrates comprised of fine sediment <2 mm

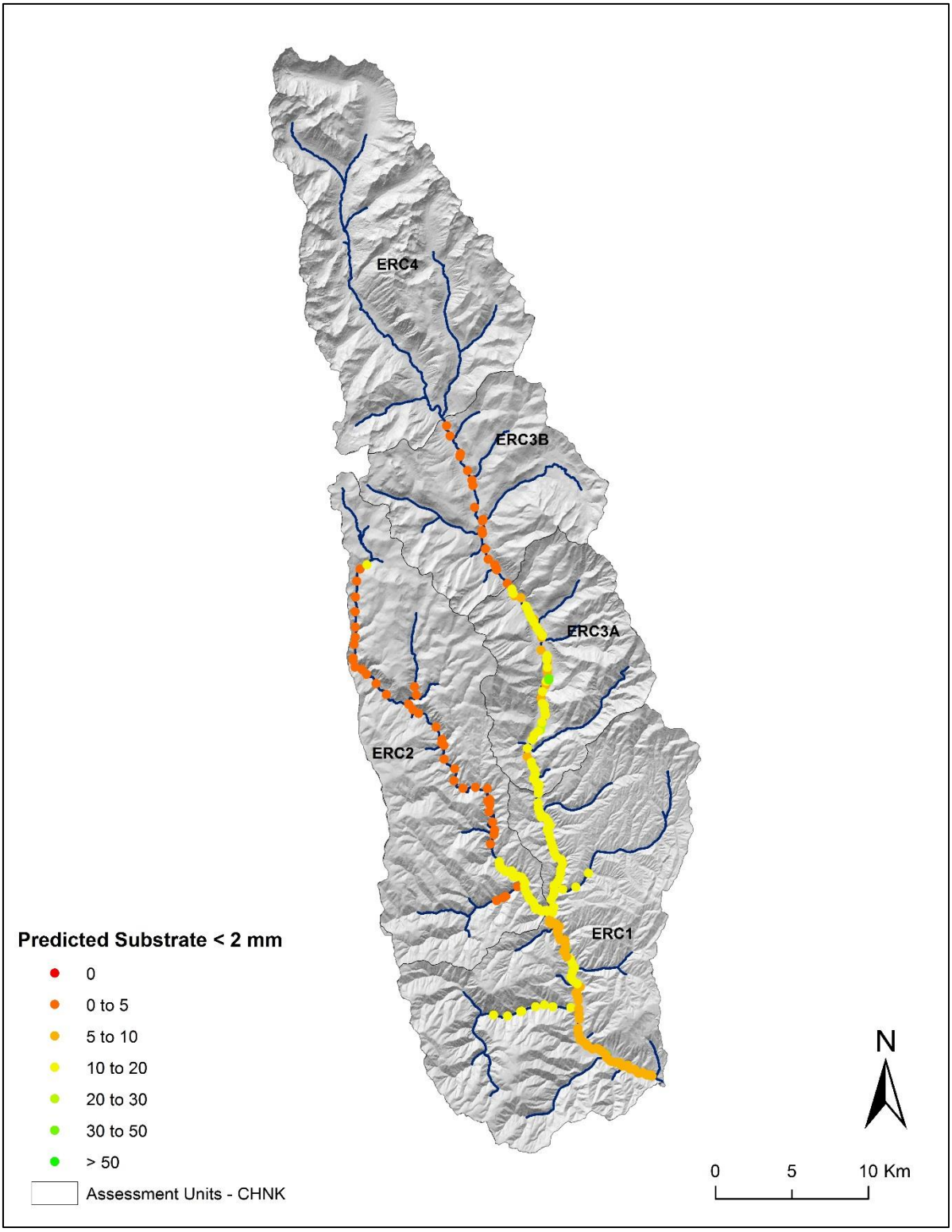




All.Sites	2011	47	15.676	15.306
	2012	48	13.909	17.912
	2013	64	17.428	20.929
	2014	39	13.895	18.645
	Average of All Years	86	17.491	18.502
ERC1	2011	10	21.269	20.353
	2012	12	20.771	30.108
	2013	19	12.112	19.214
	2014	14	19.437	27.358
	Average of All Years	25	23.388	23.609
ERC2	2011	10	6.357	4.743
	2012	11	8.309	4.104
	2013	9	5.36	2.089
	2014	12	13.848	11.294
	Average of All Years	17	8.642	4.062
ERC3A	2011	21	8.147	9.512
	2012	19	5.505	5.021
	2013	26	11.151	8.145
	2014	12	6.905	6.003
	Average of All Years	28	8.558	5.537
ERC3B	2012	2	0	0
	2013	3	0.975	0.948
	Average of All Years	6	6.346	5.959

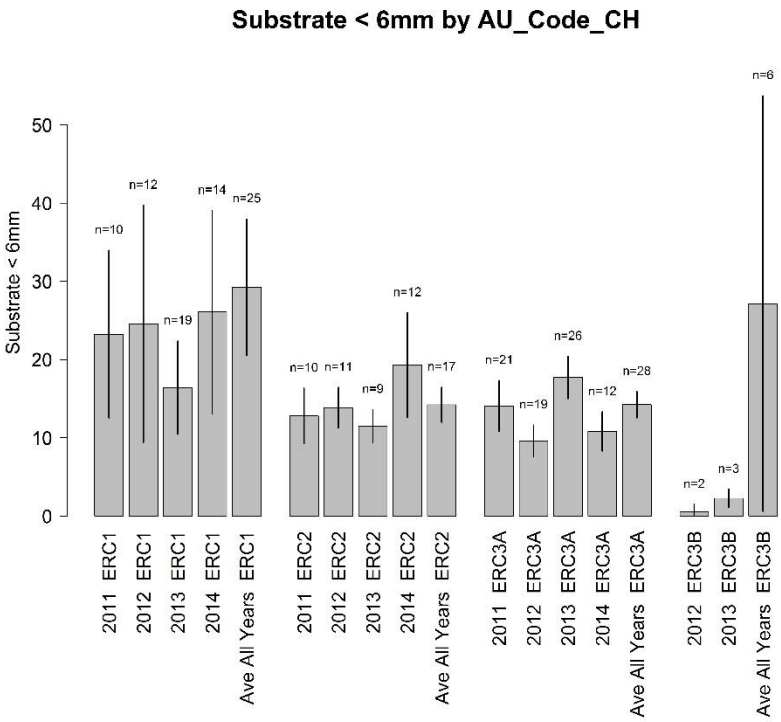
Substrate < 2 mm

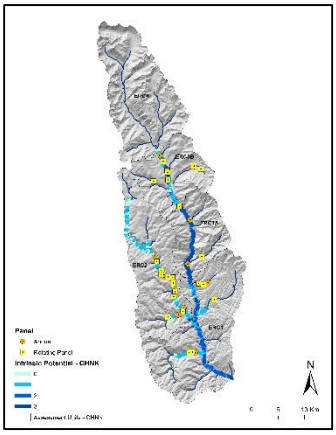
- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Average percentage of pool tail substrates comprised of fine sediment <2 mm



Substrate < 6 mm

- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Average percentage of pool tail substrates comprised of fine sediment <6 mm

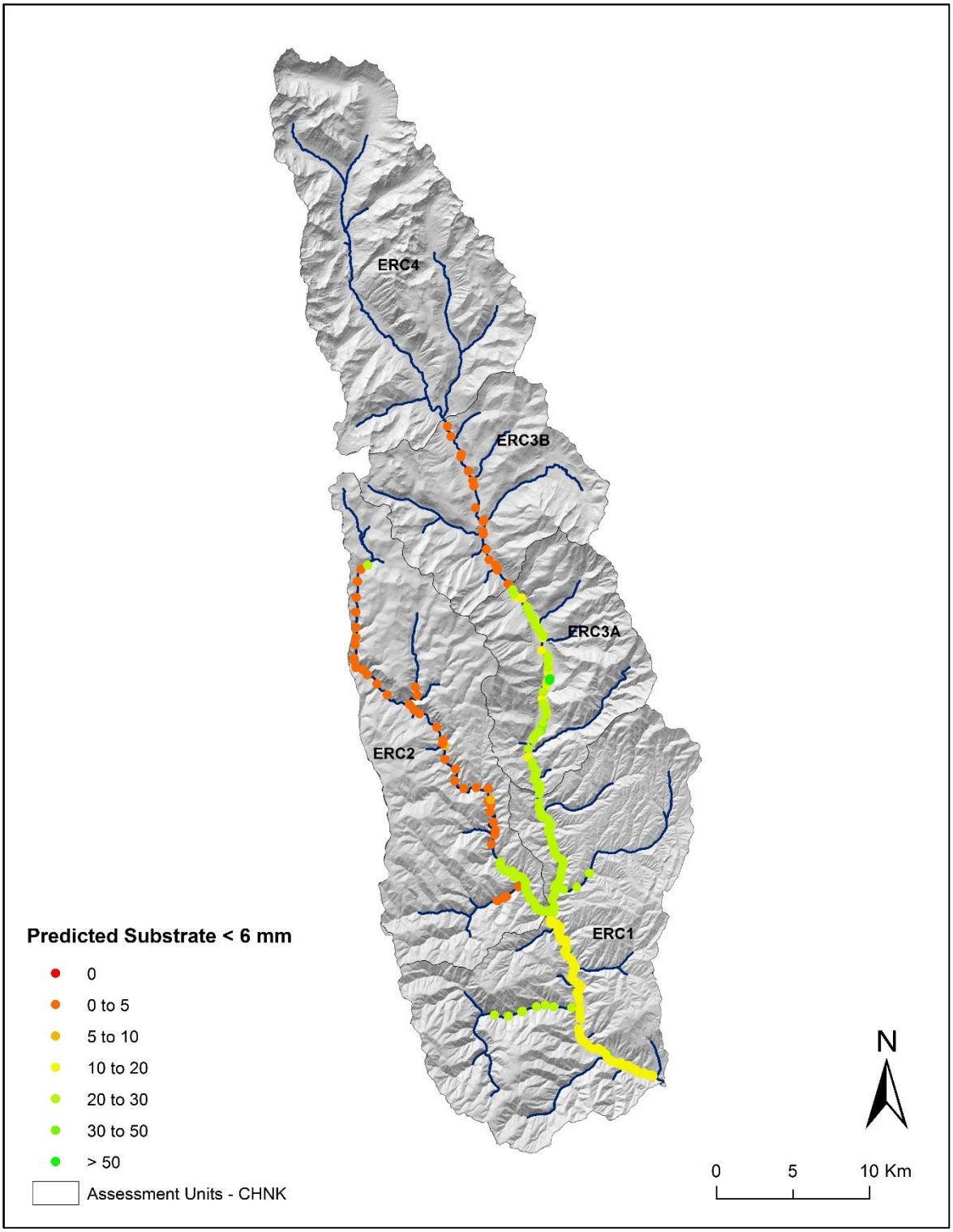




All.Sites	2011	47	25.477	18.875
	2012	48	21.928	25.333
	2013	64	24.473	23.589
	2014	39	19.191	20.455
	Average of All Years	86	25.762	21.294
ERC1	2011	10	23.241	20.071
	2012	12	24.582	29.584
	2013	19	16.425	18.85
	2014	14	26.084	29.644
	Average of All Years	25	29.244	24.566
ERC2	2011	10	12.794	5.946
	2012	11	13.872	5.447
	2013	9	11.49	3.684
	2014	12	19.306	12.578
	Average of All Years	17	14.229	5.658
ERC3A	2011	21	14.077	10.425
	2012	19	9.605	7.001
	2013	26	17.714	10.663
	2014	12	10.831	6.596
	Average of All Years	28	14.239	7.782
ERC3B	2012	2	0.5	0.5
	2013	3	2.271	0.822
	Average of All Years	6	27.158	25.705

Substrate < 6 mm

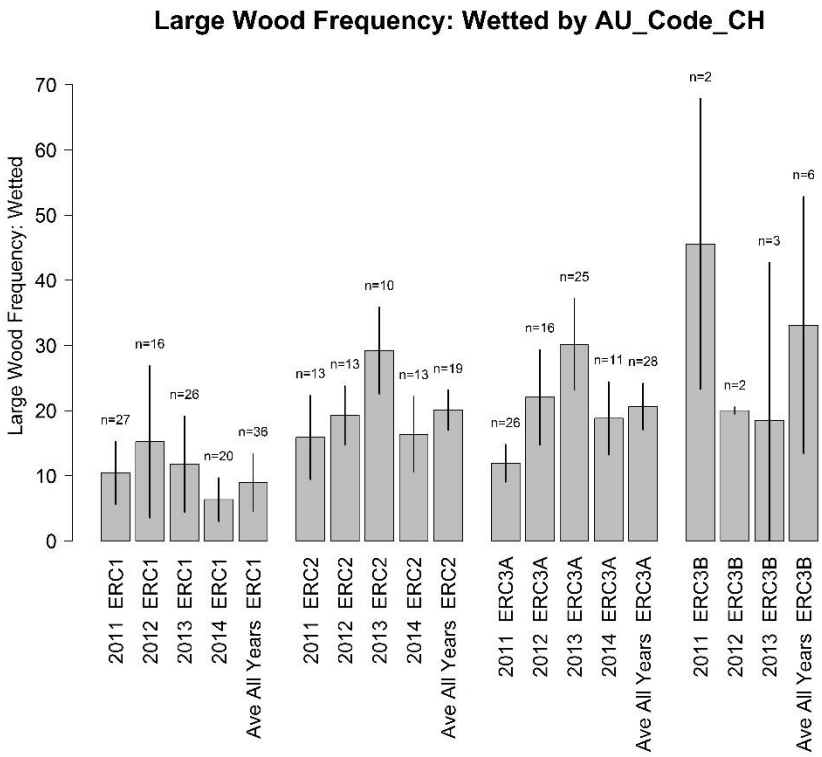
- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Average percentage of pool tail substrates comprised of fine sediment <6 mm

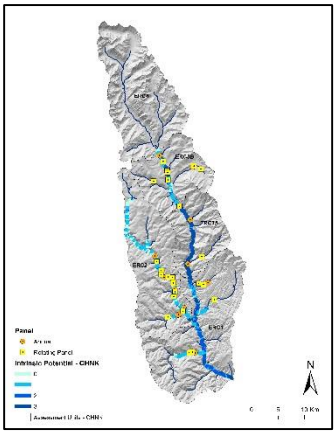


Large Wood Frequency: Wetted

Source: CHaMP Metrics (www.champmonitoring.org)

- Number of large wood pieces per 100 meters within the wetted channel



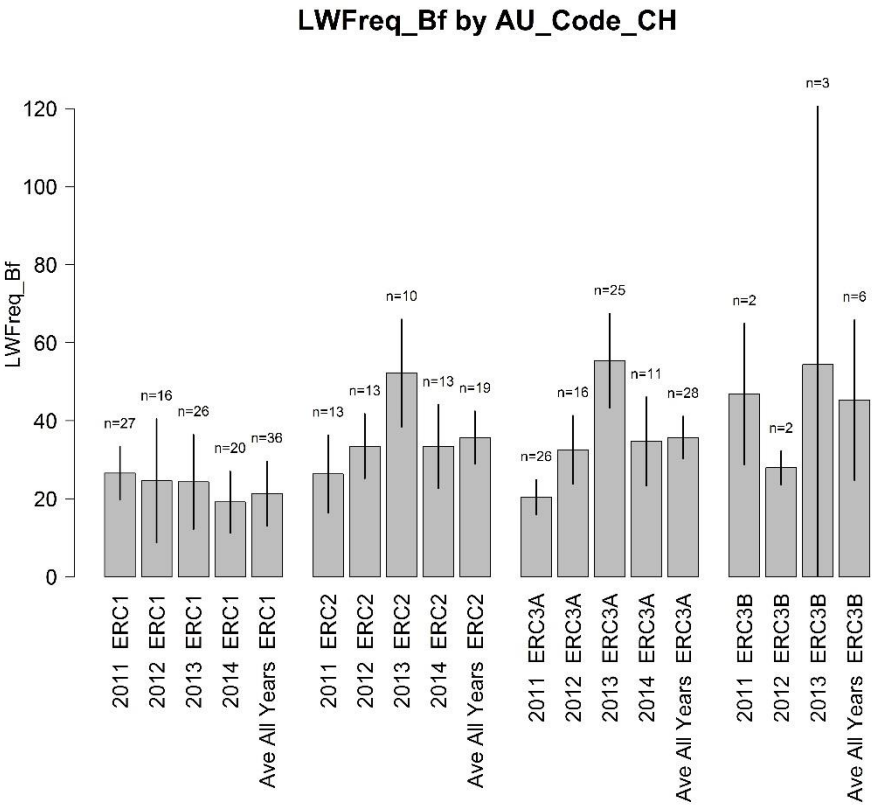


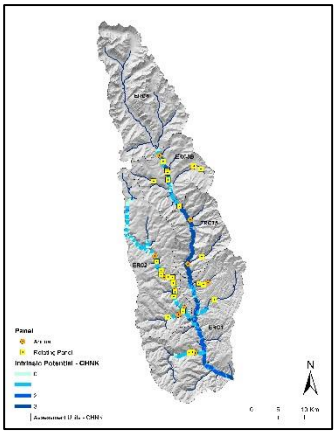
All.Sites	2011	73	27.994	25.573
	2012	52	20.505	20.448
	2013	71	35.856	34.649
	2014	45	12.201	12.063
	Average of All Years	100	26.459	28.384
ERC1	2011	27	10.482	16.065
	2012	16	15.216	26.737
	2013	26	11.8	22.558
	2014	20	6.35	9.15
	Average of All Years	36	8.987	14.263
ERC2	2011	13	15.905	15.492
	2012	13	19.259	10.125
	2013	10	29.217	11.059
	2014	13	16.382	12.015
	Average of All Years	19	20.059	10.035
ERC3A	2011	26	11.935	8.756
	2012	16	22.049	16.617
	2013	25	30.172	20.366
	2014	11	18.816	11.726
	Average of All Years	28	20.648	11.149
ERC3B	2011	2	45.575	16.707
	2012	2	20.011	0.277
	2013	3	18.474	17.49
	Average of All Years	6	33.133	20.825

Large Wood Frequency: Bankfull

Source: CHaMP Metrics (www.champmonitoring.org)

- Total volume of large wood pieces within the bankfull channel



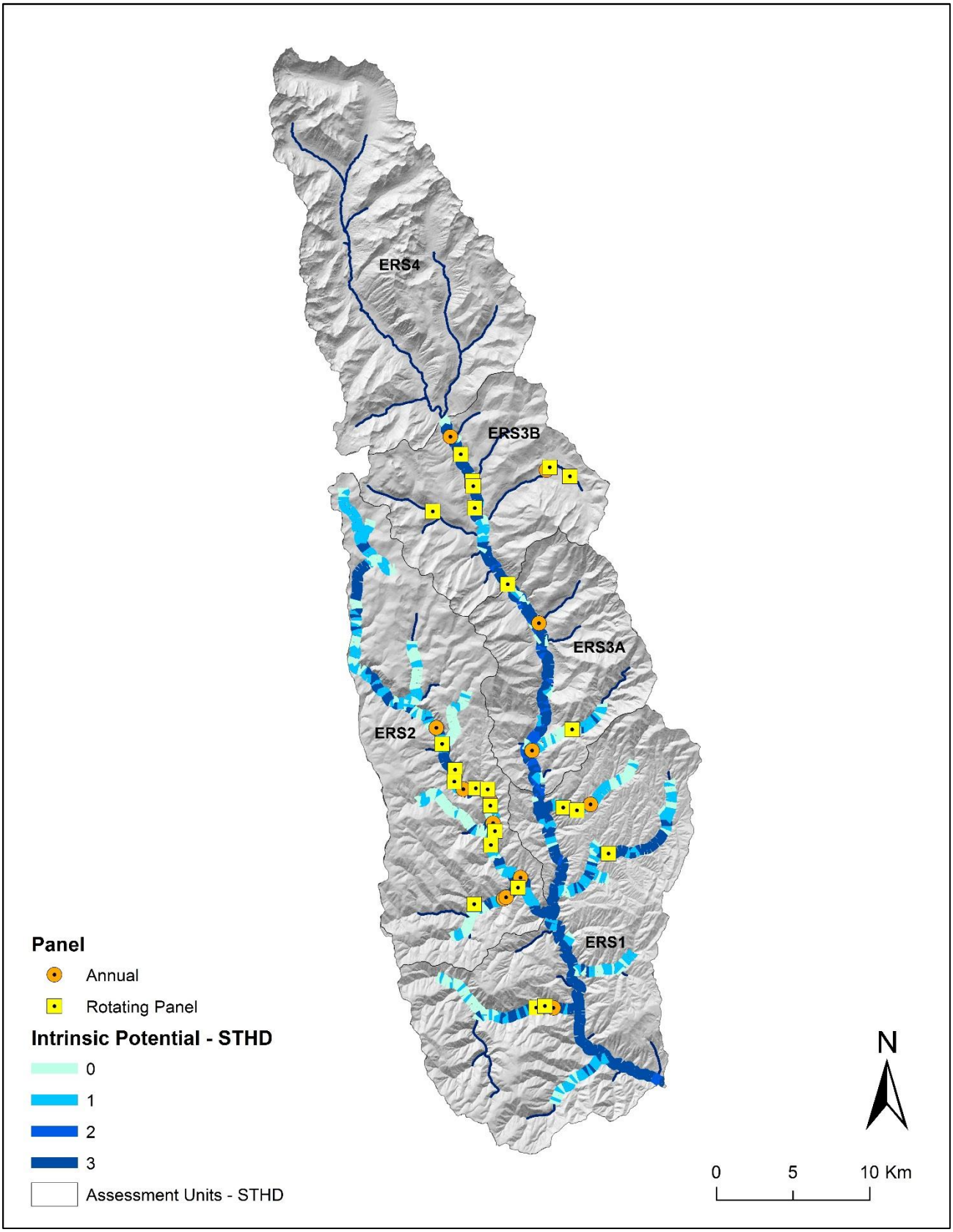


All.Sites	2011	73	39.899	32.424
	2012	52	31.272	25.531
	2013	71	53.388	40.659
	2014	45	26.802	24.045
	Average of All Years	100	39.528	32.596
ERC1	2011	27	26.543	22.336
	2012	16	24.597	35.994
	2013	26	24.304	36.735
	2014	20	19.142	21.769
	Average of All Years	36	21.311	23.588
ERC2	2011	13	26.319	23.068
	2012	13	33.489	21.394
	2013	10	52.219	23.845
	2014	13	33.375	23.806
	Average of All Years	19	35.672	21.827
ERC3A	2011	26	20.45	14.188
	2012	16	32.56	19.683
	2013	25	55.351	35.865
	2014	11	34.733	23.991
	Average of All Years	28	35.706	16.727
ERC3B	2011	2	46.835	13.5
	2012	2	27.924	2.165
	2013	3	54.386	47.747
	Average of All Years	6	45.282	31.163

Summary by Steelhead Assessment Unit

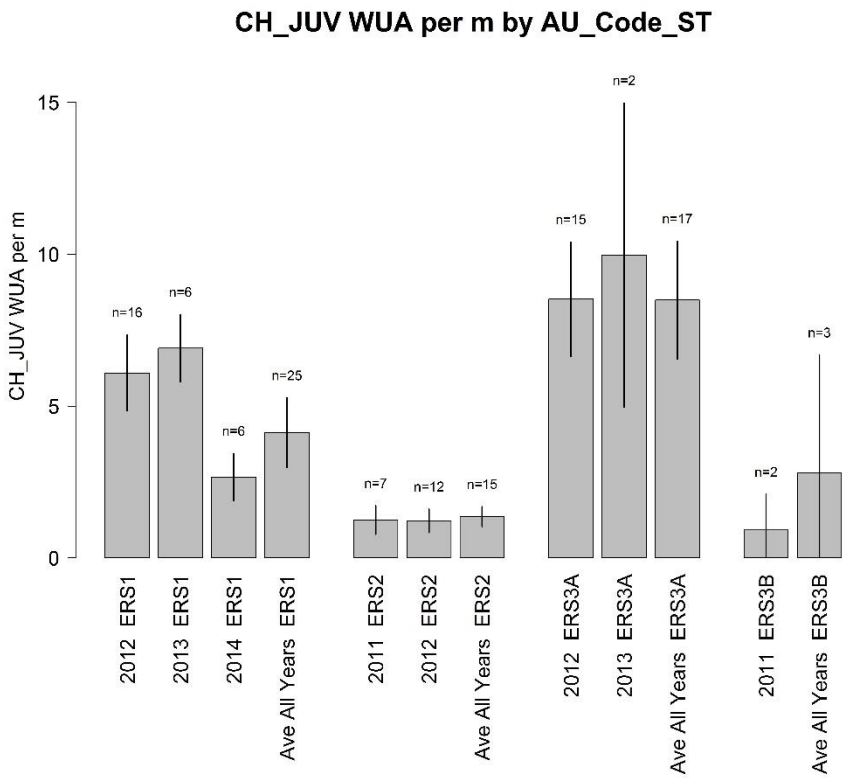
Tucannon: Summary of CHaMP Metrics and Modeled Products

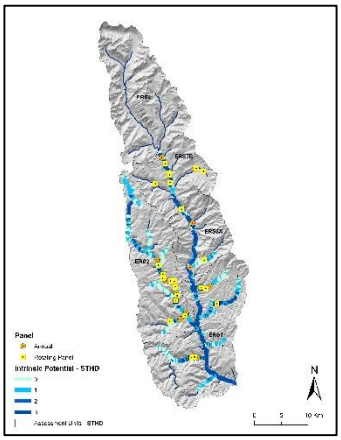
Steelhead Intrinsic Potential



Steelhead Juvenile Weighted Usable Area

- Source: Habitat Suitability Index (HSI) Model
- Definition: Suitable habitat area (m^2) per meter of stream length for Juvenile Steelhead

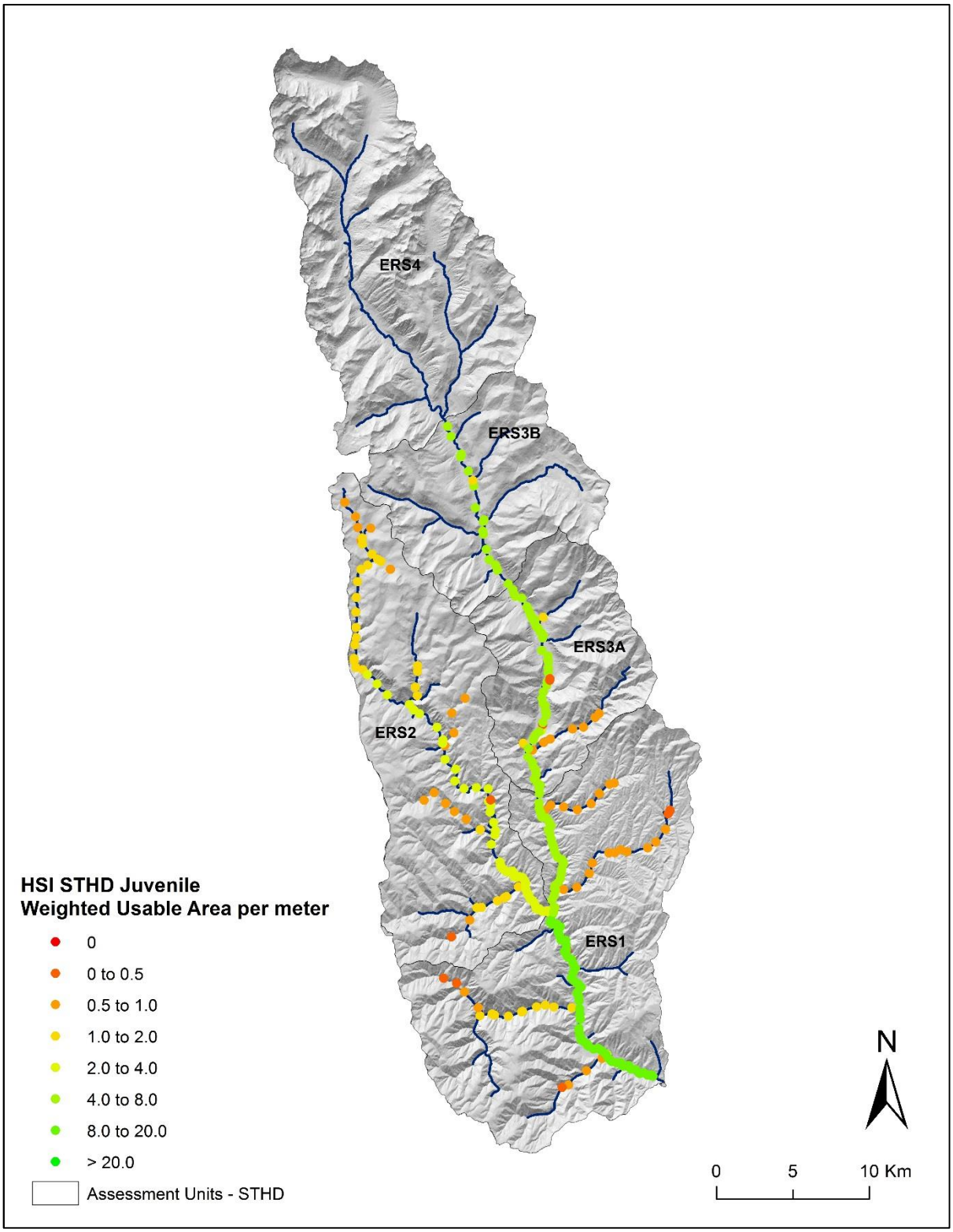




All.Sites	2011	14	1.776	1.23
	2012	48	4.745	5.683
	2013	13	6.085	6.105
	2014	7	8.306	4.876
	Average of All Years	69	4.798	5.6
ERS1	2012	16	12.023	5.483
	2013	6	14.429	3.884
	2014	6	4.871	2.467
	Average of All Years	25	7.997	6.472
ERS2	2011	7	2.464	1.057
	2012	12	2.643	1.756
	Average of All Years	15	2.882	1.679
ERS3A	2012	15	13.006	5.466
	2013	2	13.135	0.169
	Average of All Years	17	12.727	5.426
ERS3B	2011	2	1.848	1.315
	Average of All Years	3	5.536	5.556

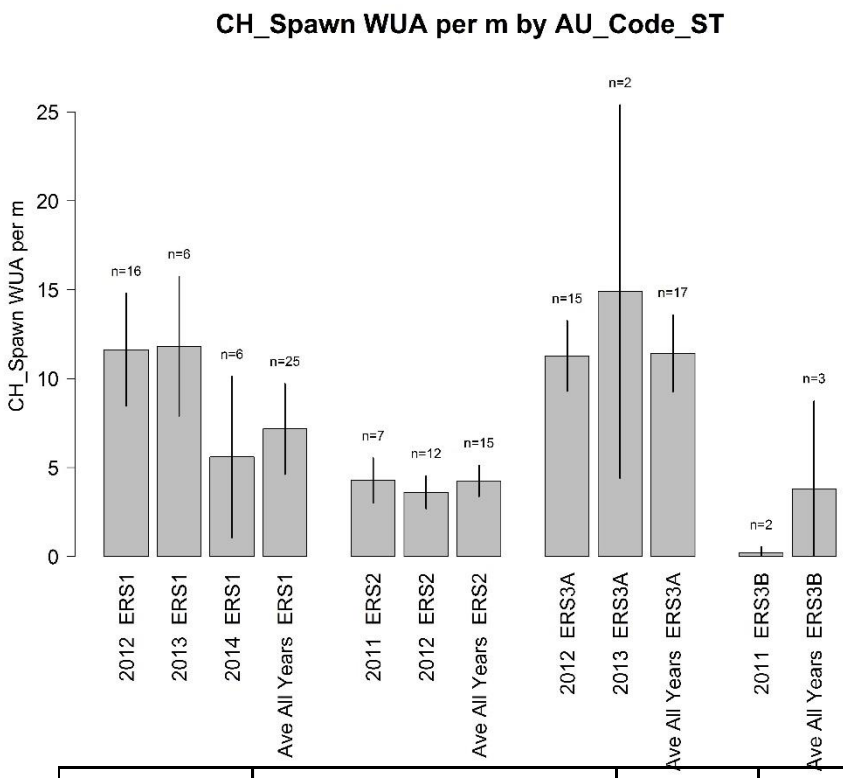
Steelhead Juvenile Weighted Usable Area

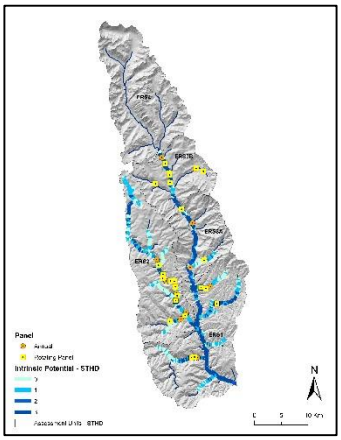
- Source: Habitat Suitability Index (HSI) Model
- Definition: Suitable habitat area (m^2) per meter of stream length for Juvenile Steelhead



Steelhead Spawner Weighted Usable Area

- Source: Habitat Suitability Index (HSI) Model
- Definition: Suitable Spawning habitat area (m^2) per meter of stream length for Steelhead

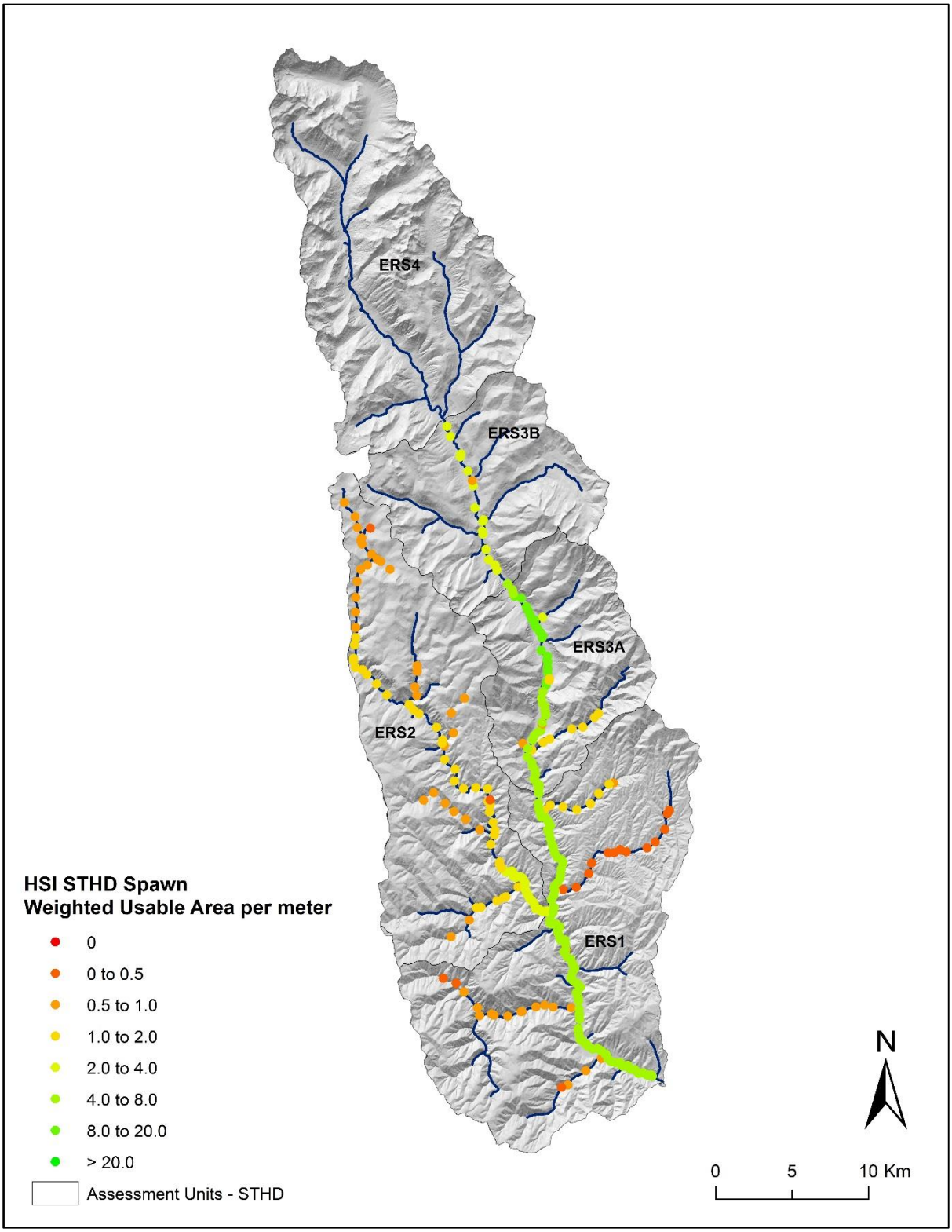




All.Sites	2011	14	2.481	2.428
	2012	48	4.856	5.666
	2013	13	5.29	6.194
	2014	7	6.774	4.857
	Average of All Years	69	4.572	5.468
ERS1	2012	16	11.627	7.371
	2013	6	11.827	5.187
	2014	6	5.599	5.815
	Average of All Years	25	7.173	7.104
ERS2	2011	7	4.28	1.996
	2012	12	3.613	2.08
	Average of All Years	15	4.257	2.168
ERS3A	2012	15	11.279	5.444
	2013	2	14.891	5.361
	Average of All Years	17	11.438	5.734
ERS3B	2011	2	0.223	0.168
	Average of All Years	3	3.808	3.489

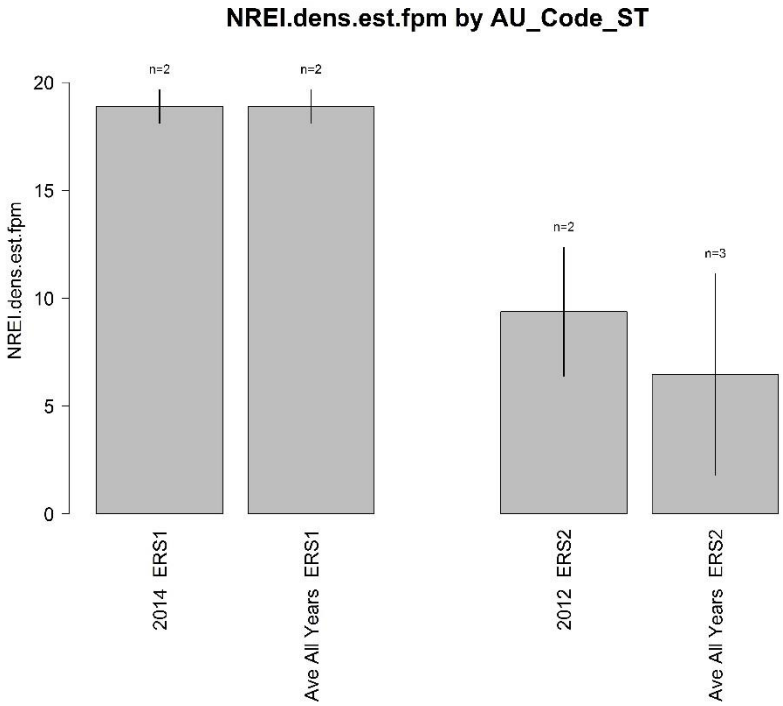
Steelhead Spawner Weighted Usable Area

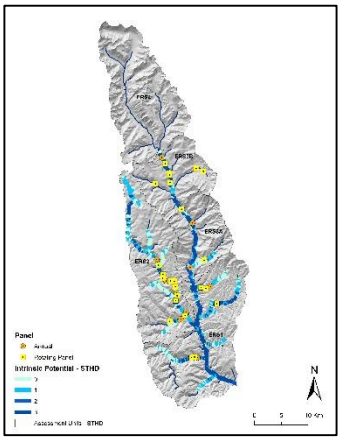
- Source: Habitat Suitability Index (HSI) Model
- Definition: Suitable Spawning habitat area (m^2) per meter of stream length for Steelhead



Juvenile Salmonid Capacity

- Source: Net Rate of Energy Intake (NREI) Model
- Definition: Carrying capacity (fish) per meter of stream length

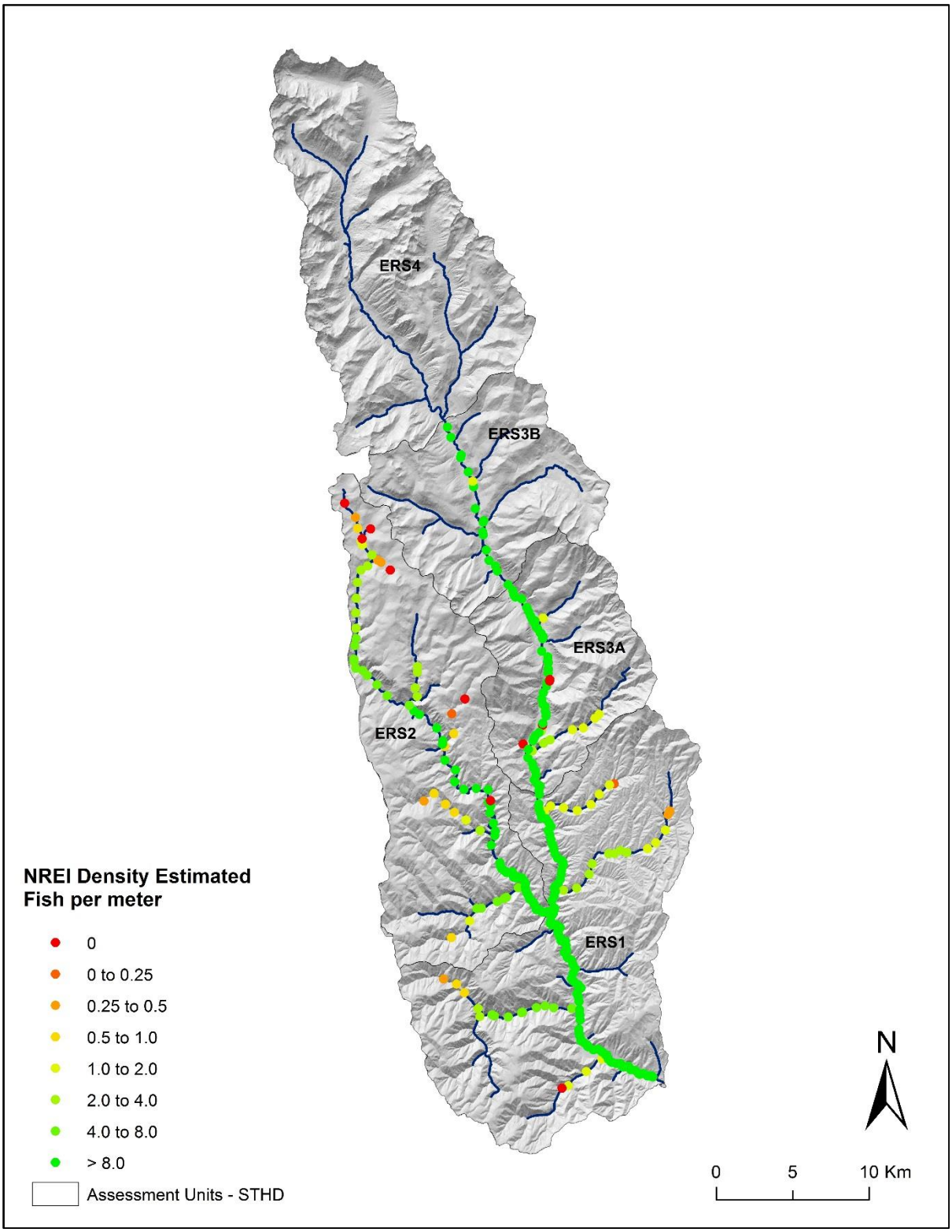




All.Sites	2011	2	3.192	0.11
	2012	2	9.38	1.516
	2014	2	18.893	0.39
	Average of All Years	6	9.904	6.868
ERS1	2014	2	18.893	0.39
	Average of All Years	2	18.893	0.39
ERS2	2012	2	9.38	1.516
	Average of All Years	3	6.465	3.228

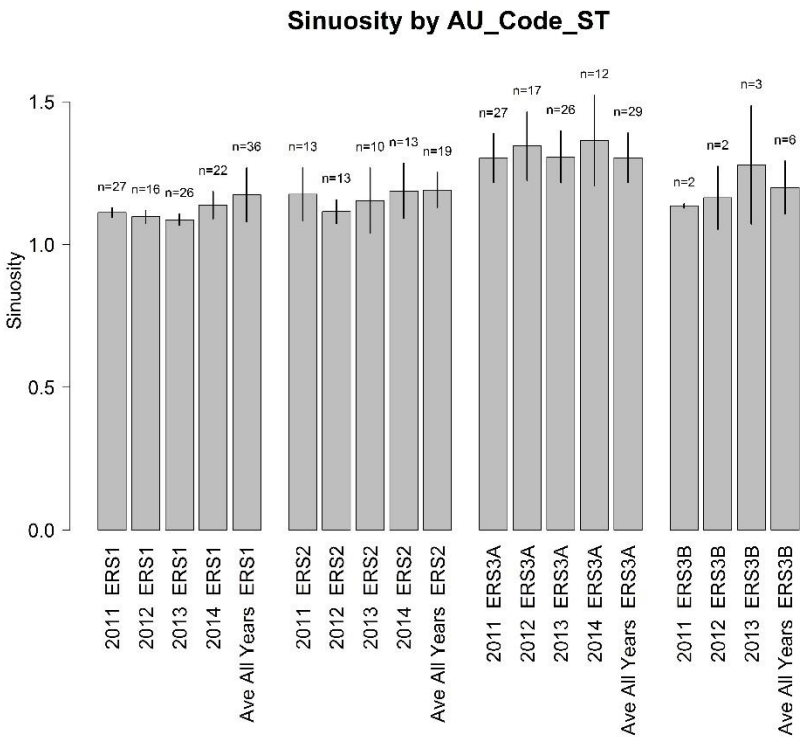
Juvenile Salmonid Capacity

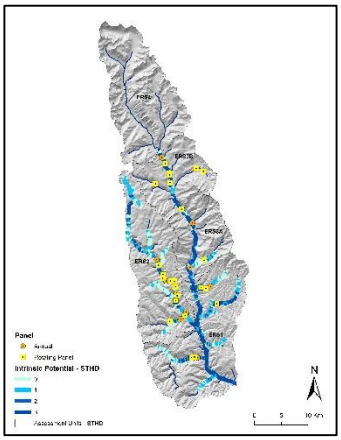
- Source: Net Rate of Energy Intake (NREI) Model
- Definition: Carrying capacity (fish) per meter of stream length



Sinuosity

- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Ratio of the thalweg length to the straight line distance between the start and end points of the thalweg.

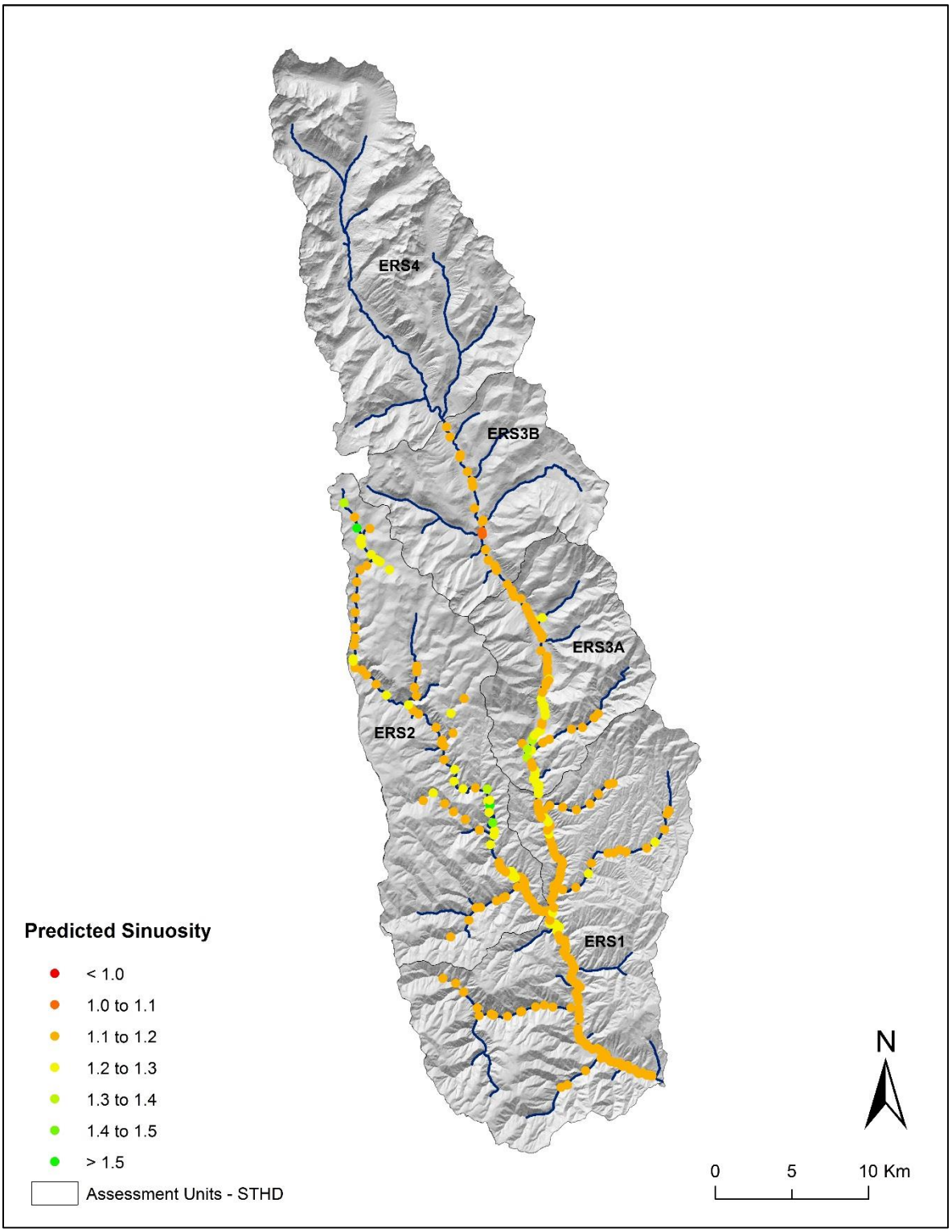




All.Sites	2011	74	1.159	0.153
	2012	53	1.179	0.159
	2013	72	1.194	0.189
	2014	48	1.195	0.217
	Average of All Years	101	1.202	0.182
ERS1	2011	27	1.112	0.049
	2012	16	1.097	0.05
	2013	26	1.087	0.054
	2014	22	1.138	0.134
	Average of All Years	36	1.174	0.168
ERS2	2011	13	1.176	0.189
	2012	13	1.116	0.092
	2013	10	1.154	0.178
	2014	13	1.188	0.197
	Average of All Years	19	1.191	0.182
ERS3A	2011	27	1.303	0.253
	2012	17	1.345	0.314
	2013	26	1.307	0.267
	2014	12	1.364	0.321
	Average of All Years	29	1.304	0.266
ERS3B	2011	2	1.136	0.005
	2012	2	1.164	0.056
	2013	3	1.279	0.15
	Average of All Years	6	1.2	0.123

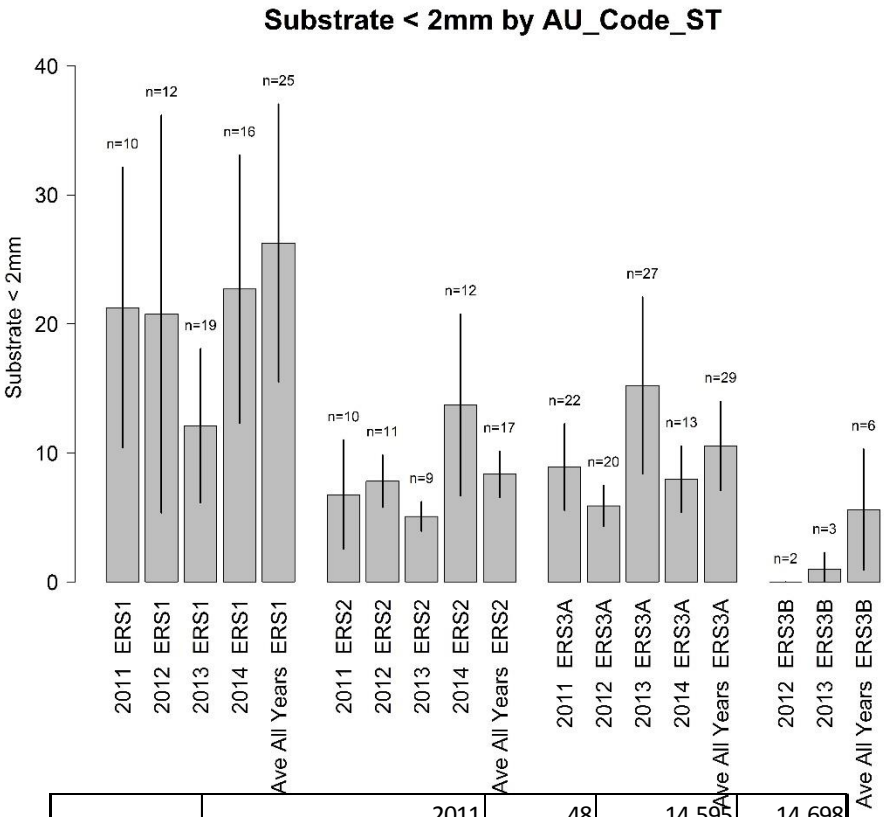
Sinuosity

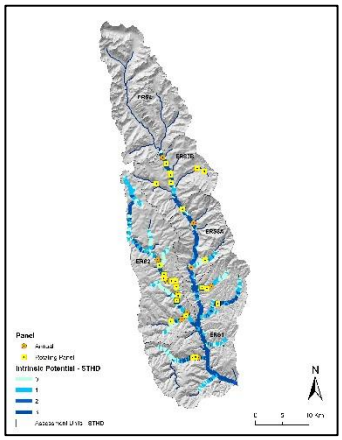
- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Ratio of the thalweg length to the straight line distance between the start and end points of the thalweg.



Substrate < 2mm

- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Average percentage of pool tail substrates comprised of fine sediment <2 mm

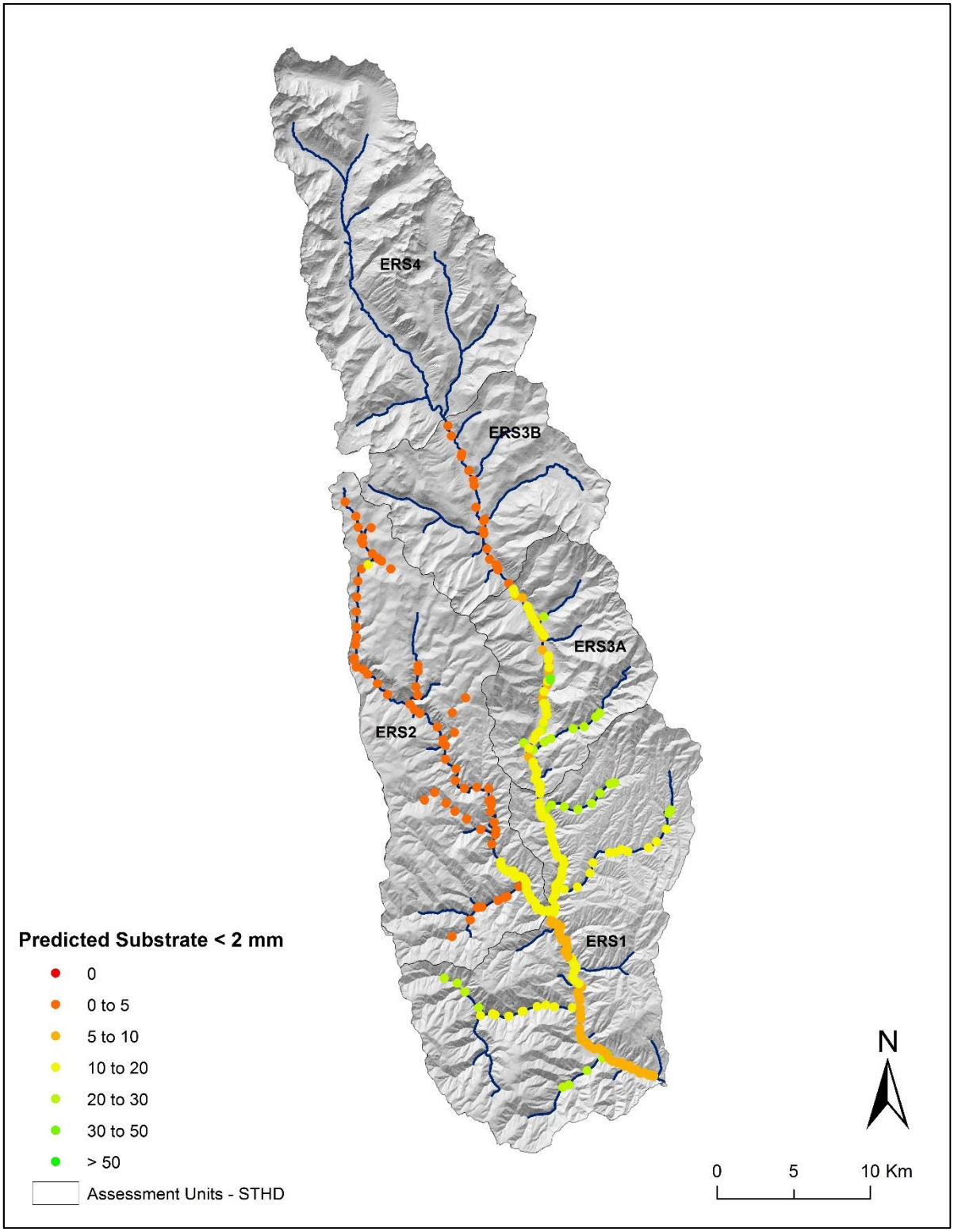




All.Sites	2011	48	14.595	14.698
	2012	49	12.72	17.057
	2013	65	16.603	21.023
	2014	42	15.493	17.851
	Average of All Years	87	17.959	18.492
ERS1	2011	10	21.269	20.353
	2012	12	20.771	30.108
	2013	19	12.112	19.214
	2014	16	22.695	26.439
	Average of All Years	25	26.269	23.238
ERS2	2011	10	6.77	5.907
	2012	11	7.817	3.945
	2013	9	5.087	1.943
	2014	12	13.731	11.815
	Average of All Years	17	8.353	4.357
ERS3A	2011	22	8.909	9.644
	2012	20	5.894	5.039
	2013	27	15.241	16.324
	2014	13	7.968	8.431
	Average of All Years	29	10.554	8.73
ERS3B	2012	2	0	0
	2013	3	0.975	0.948
	Average of All Years	6	5.615	6.544

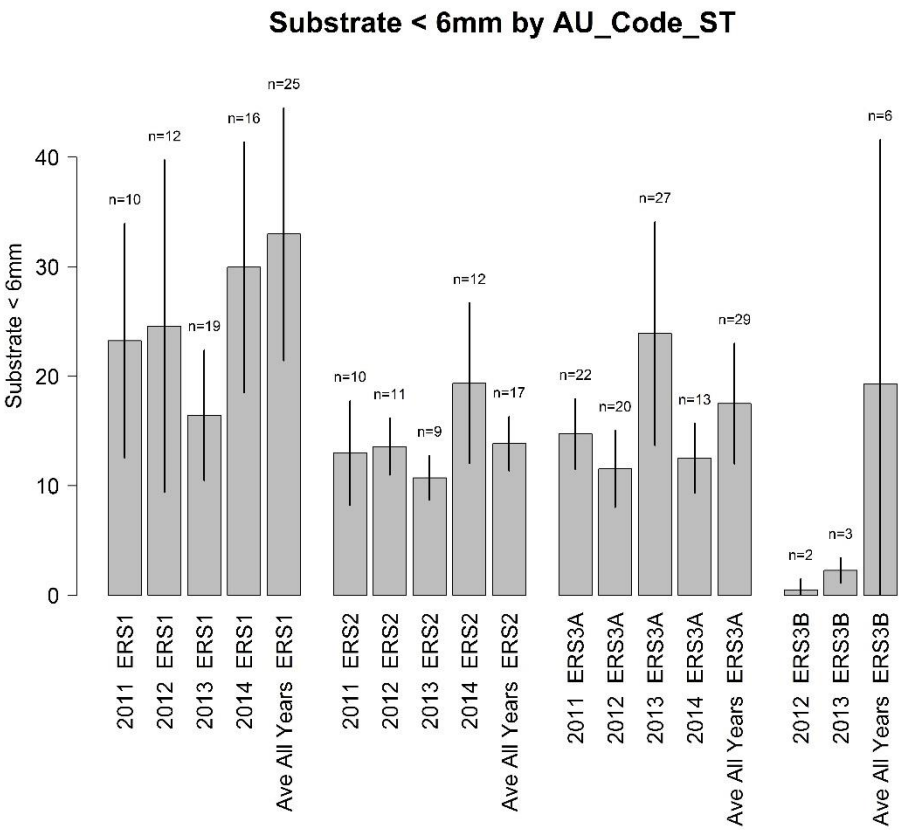
Substrate < 2mm

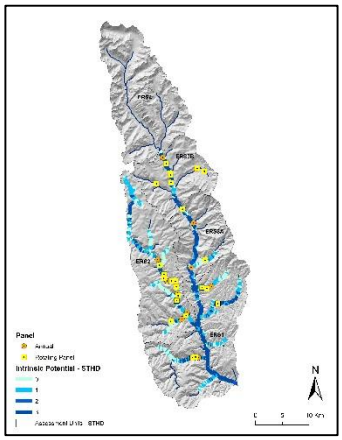
- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Average percentage of pool tail substrates comprised of fine sediment <2 mm



Substrate < 6 mm

- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Average percentage of pool tail substrates comprised of fine sediment <6 mm

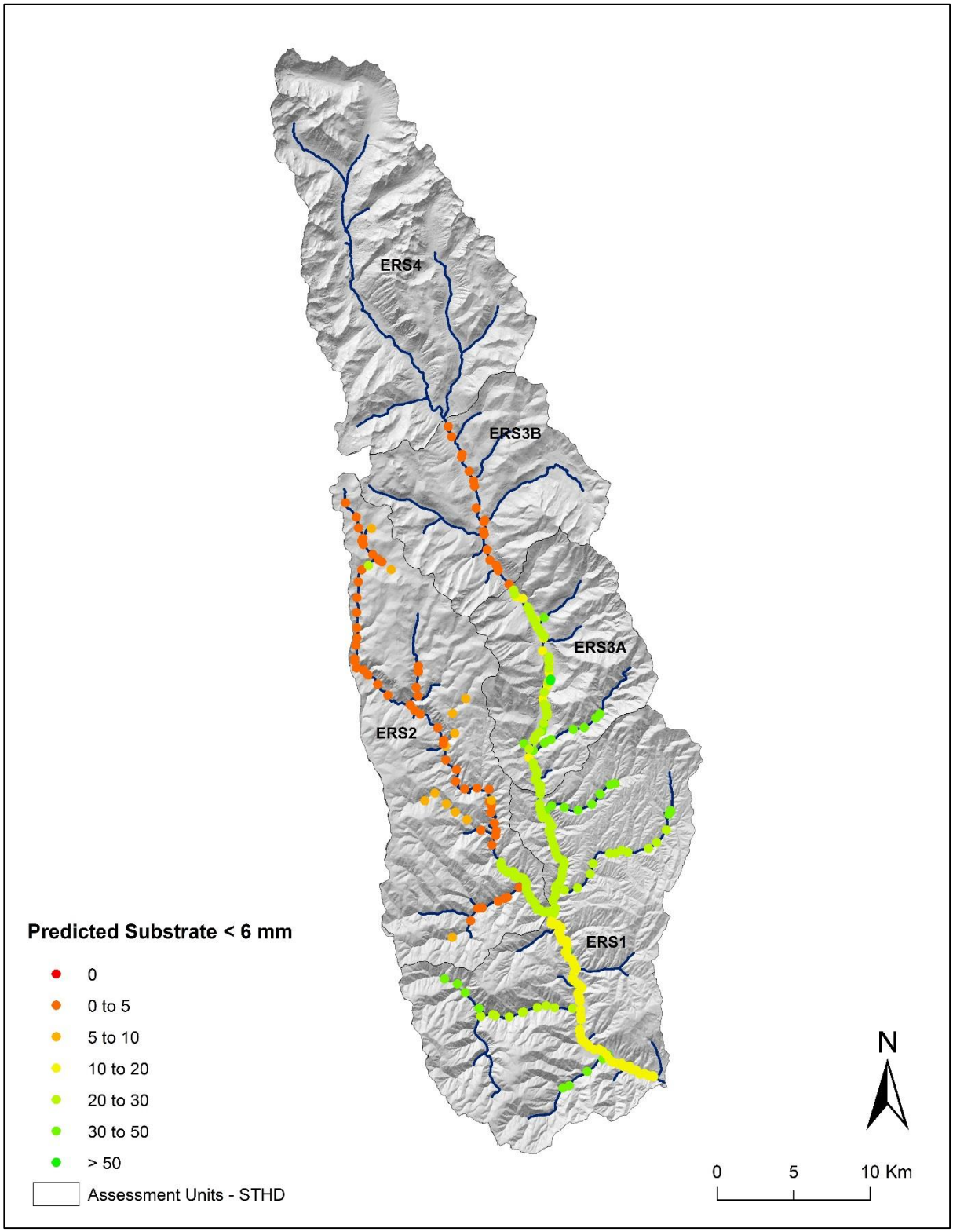




All.Sites	2011	48	23.804	18.219
	2012	49	20.579	24.216
	2013	65	23.577	24.695
	2014	42	21.113	19.784
	Average of All Years	87	26.172	21.593
ERS1	2011	10	23.241	20.071
	2012	12	24.582	29.584
	2013	19	16.425	18.85
	2014	16	29.949	28.755
	Average of All Years	25	32.974	24.571
ERS2	2011	10	12.981	6.996
	2012	11	13.577	5.329
	2013	9	10.723	3.654
	2014	12	19.357	12.667
	Average of All Years	17	13.847	6.062
ERS3A	2011	22	14.726	10.379
	2012	20	11.538	9.713
	2013	27	23.899	23.968
	2014	13	12.527	11.58
	Average of All Years	29	17.509	13.585
ERS3B	2012	2	0.5	0.5
	2013	3	2.271	0.822
	Average of All Years	6	19.304	23.605

Substrate < 6 mm

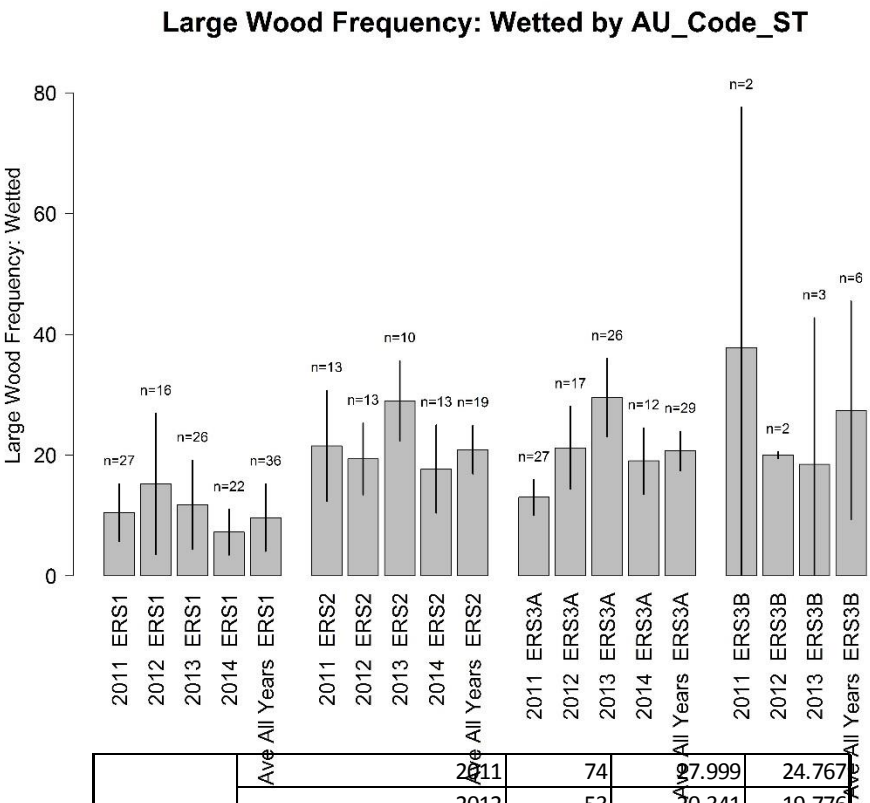
- Source: CHaMP Metrics (www.champmonitoring.org)
- Definition: Average percentage of pool tail substrates comprised of fine sediment <6 mm

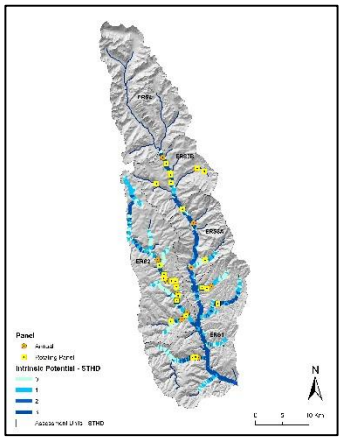


Large Wood Frequency: Wetted

Source: CHaMP Metrics (www.champmonitoring.org)

- Number of large wood pieces per 100 meters within the wetted channel



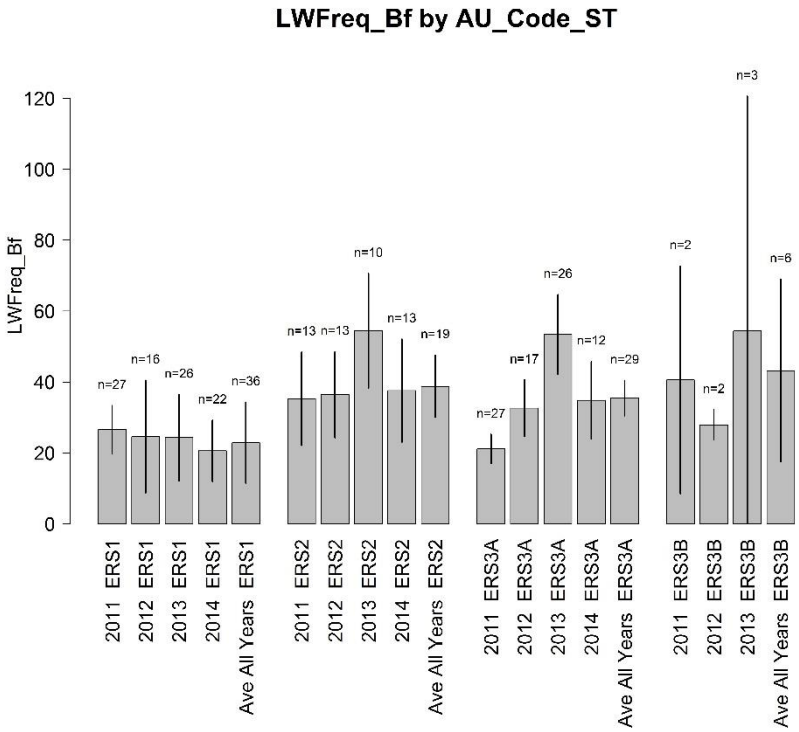


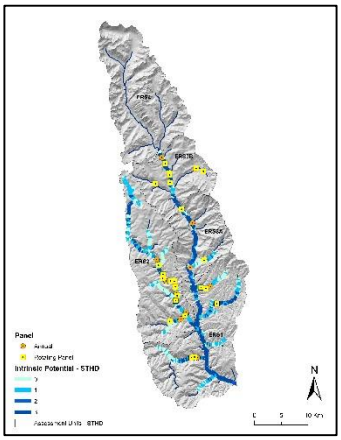
All.Sites	2011	74	27.999	24.767
	2012	53	20.341	19.776
	2013	72	34.506	33.18
	2014	48	13.479	12.717
	Average of All Years	101	26.398	27.55
ERS1	2011	27	10.482	16.065
	2012	16	15.216	26.737
	2013	26	11.8	22.558
	2014	22	7.247	9.816
	Average of All Years	36	9.662	14.074
ERS2	2011	13	21.53	18.355
	2012	13	19.374	11.69
	2013	10	28.987	10.877
	2014	13	17.717	13.02
	Average of All Years	19	20.905	11.257
ERS3A	2011	27	13.013	9.112
	2012	17	21.231	16.114
	2013	26	29.541	19.606
	2014	12	19.057	11.58
	Average of All Years	29	20.711	10.649
ERS3B	2011	2	37.823	22.306
	2012	2	20.011	0.277
	2013	3	18.474	17.49
	Average of All Years	6	27.414	20.561

Large Wood Frequency: Bankfull

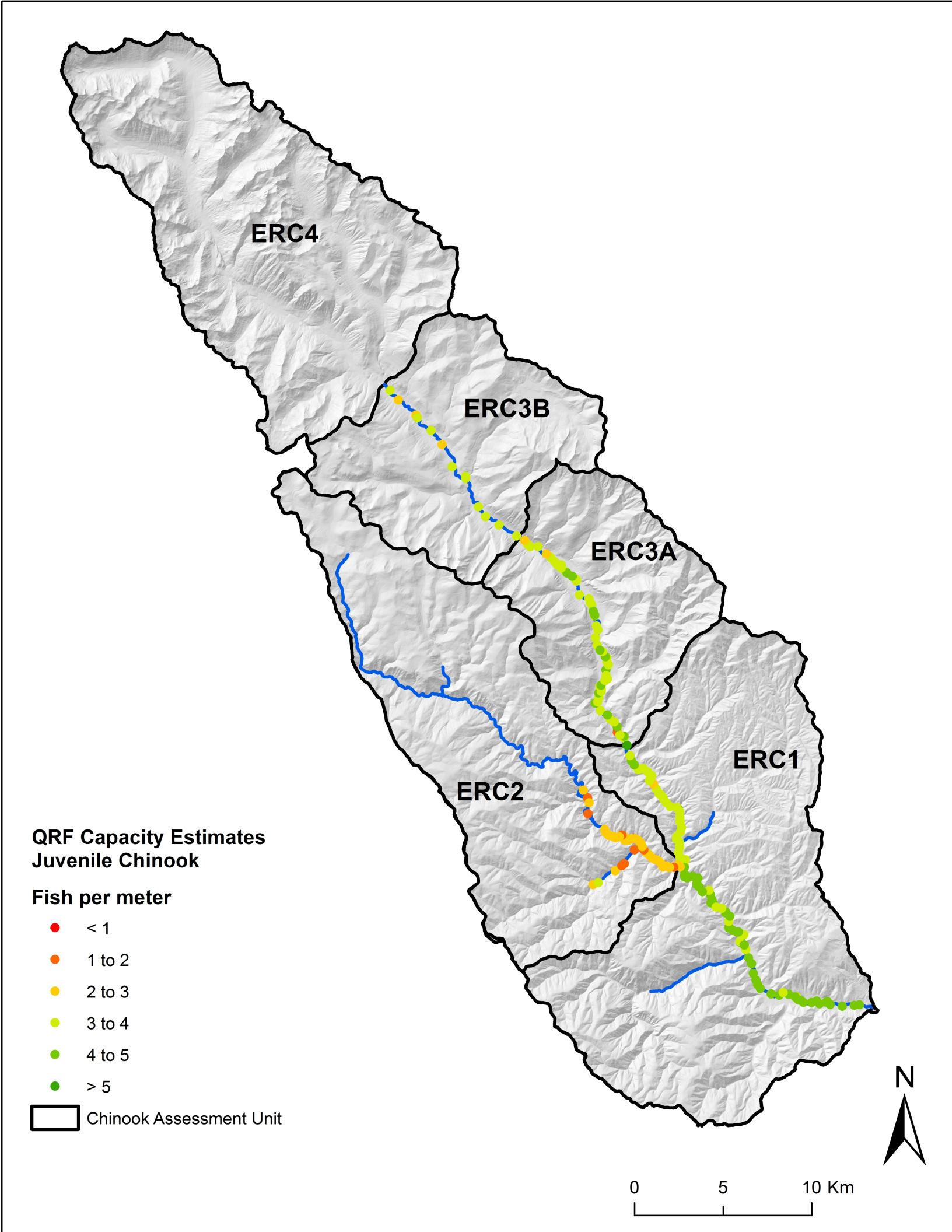
Source: CHaMP Metrics (www.champmonitoring.org)

- Total volume of large wood pieces within the bankfull channel



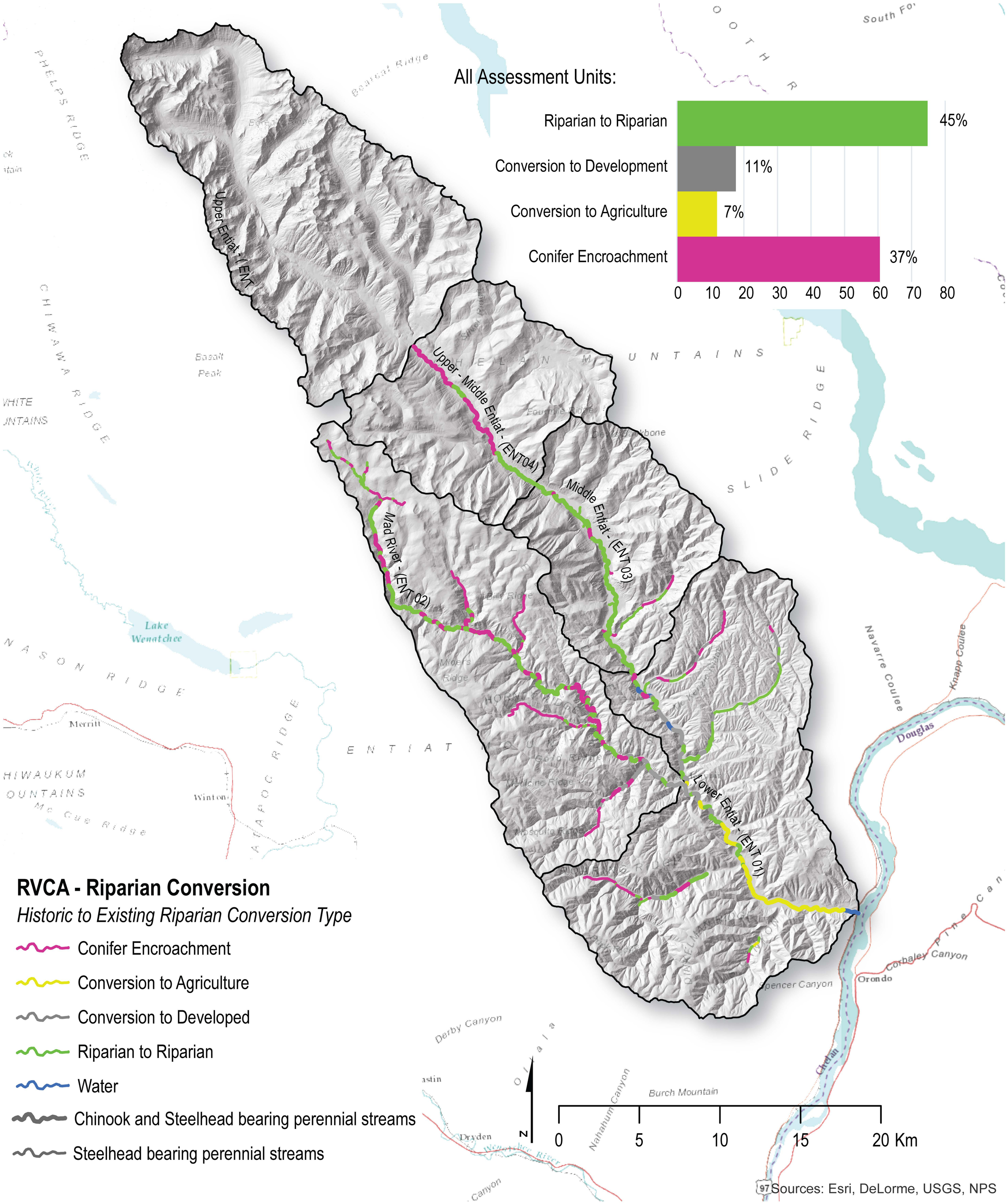


	2011	74	40.743	31.727
	2012	53	32.39	26.237
	2013	72	53.625	40.286
	2014	48	29.595	25.66
All.Sites	Average of All Years	101	40.721	33.281
	2011	27	26.543	22.336
	2012	16	24.597	35.994
	2013	26	24.304	36.735
	2014	22	20.585	22.711
ERS1	Average of All Years	36	22.843	24.312
	2011	13	35.279	26.866
	2012	13	36.421	25.64
	2013	10	54.436	25.545
	2014	13	37.578	26.312
ERS2	Average of All Years	19	38.781	24.742
	2011	27	21.141	13.774
	2012	17	32.642	18.825
	2013	26	53.396	34.934
	2014	12	34.846	23.561
ERS3A	Average of All Years	29	35.47	15.992
	2011	2	40.572	18.024
	2012	2	27.924	2.165
	2013	3	54.386	47.747
ERS3B	Average of All Years	6	43.218	35.284


ERC4
ERC3B
ERC3A
ERC1
ERC2
QRF Capacity Estimates
Juvenile Chinook
Fish per meter
< 1
1 to 2
2 to 3
3 to 4
4 to 5
> 5
Chinook Assessment Unit
N
0
5
10 Km

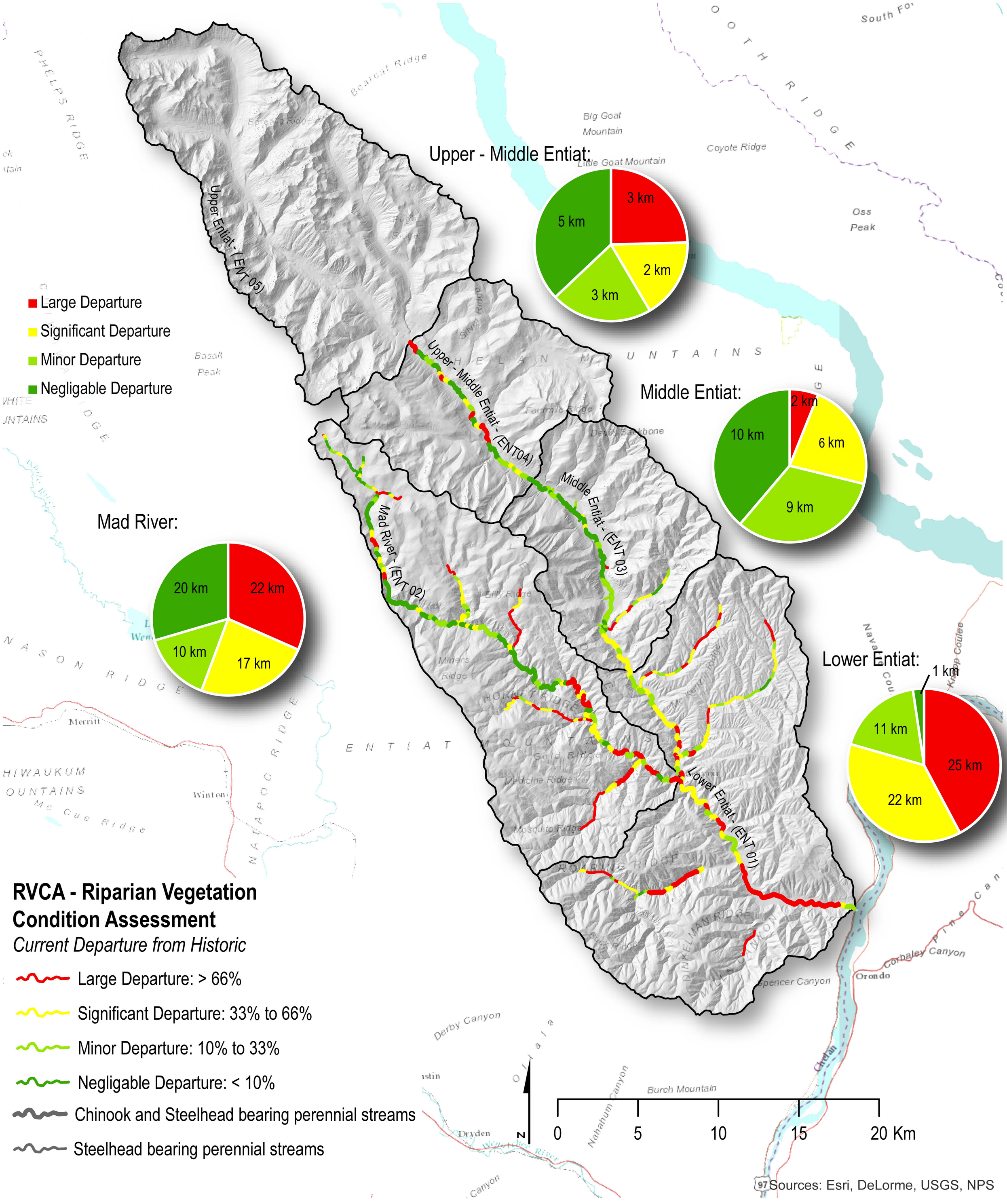
RIPARIAN CONVERSION

Causes for departure from historic



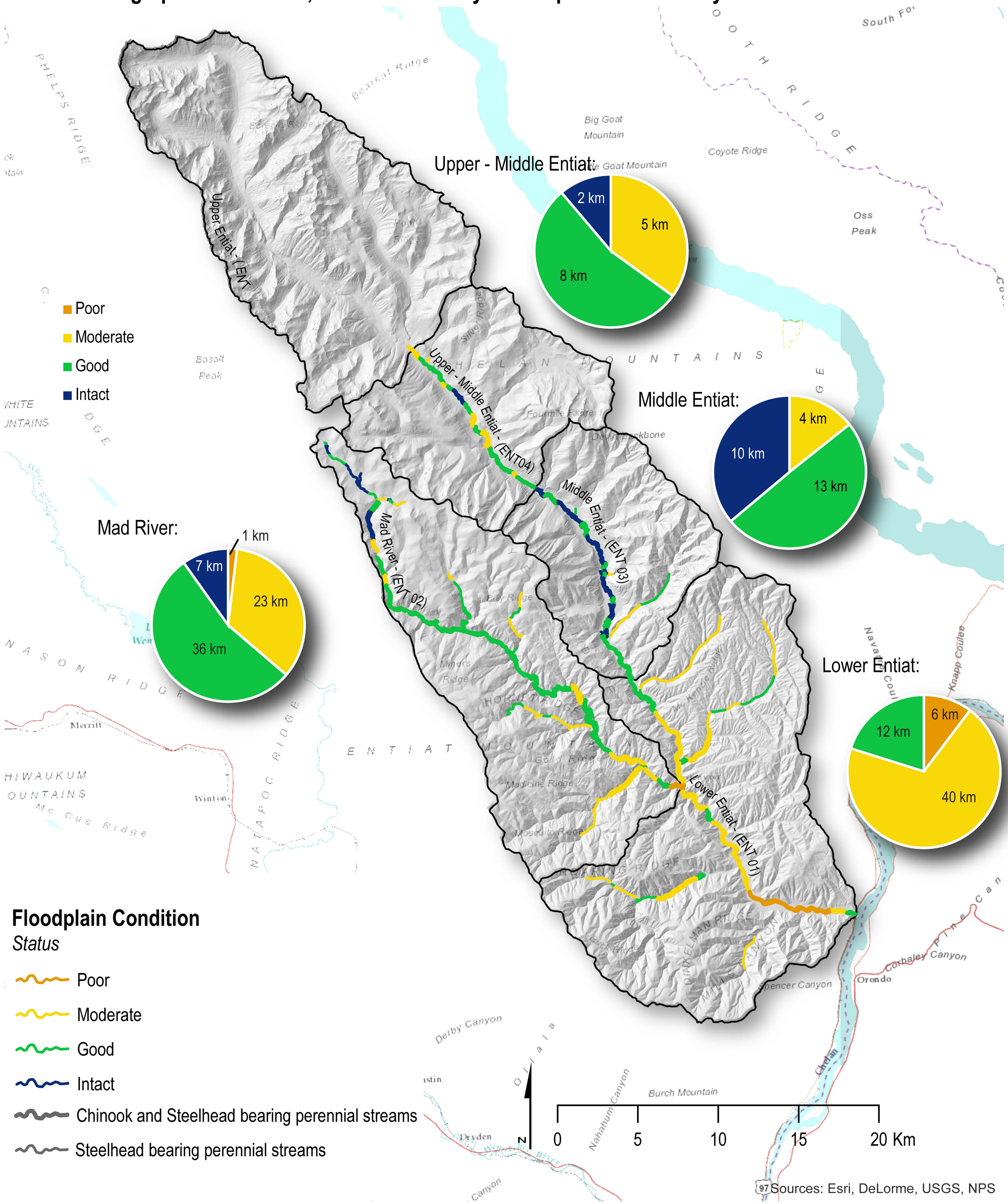
RIPARIAN CONDITION ASSESSMENT

Estimate of current departure from historic within valley bottom

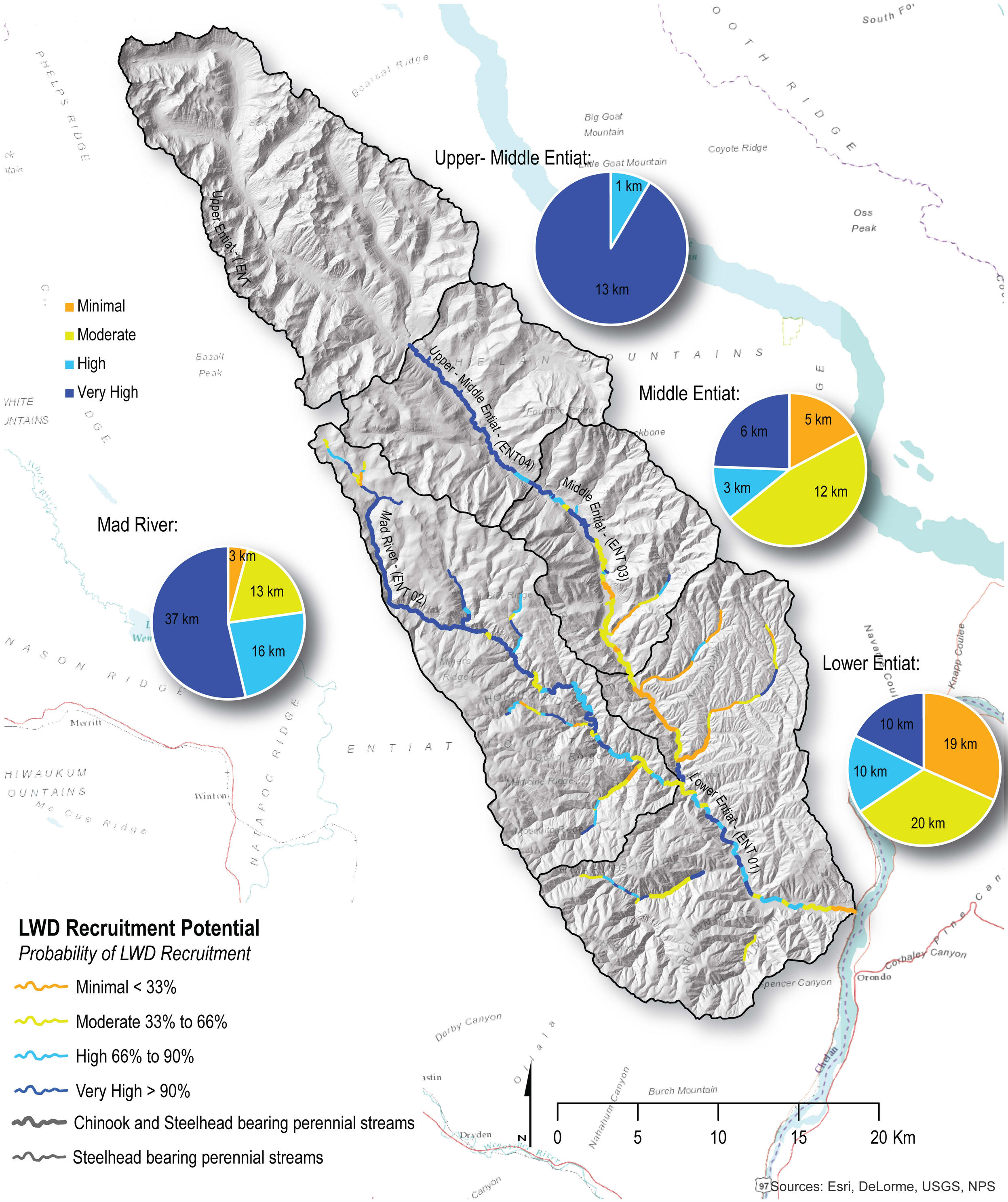


FLOODPLAIN CONDITION ASSESSMENT

Considering riparian conditon, land use intensity & floodplain accessibility



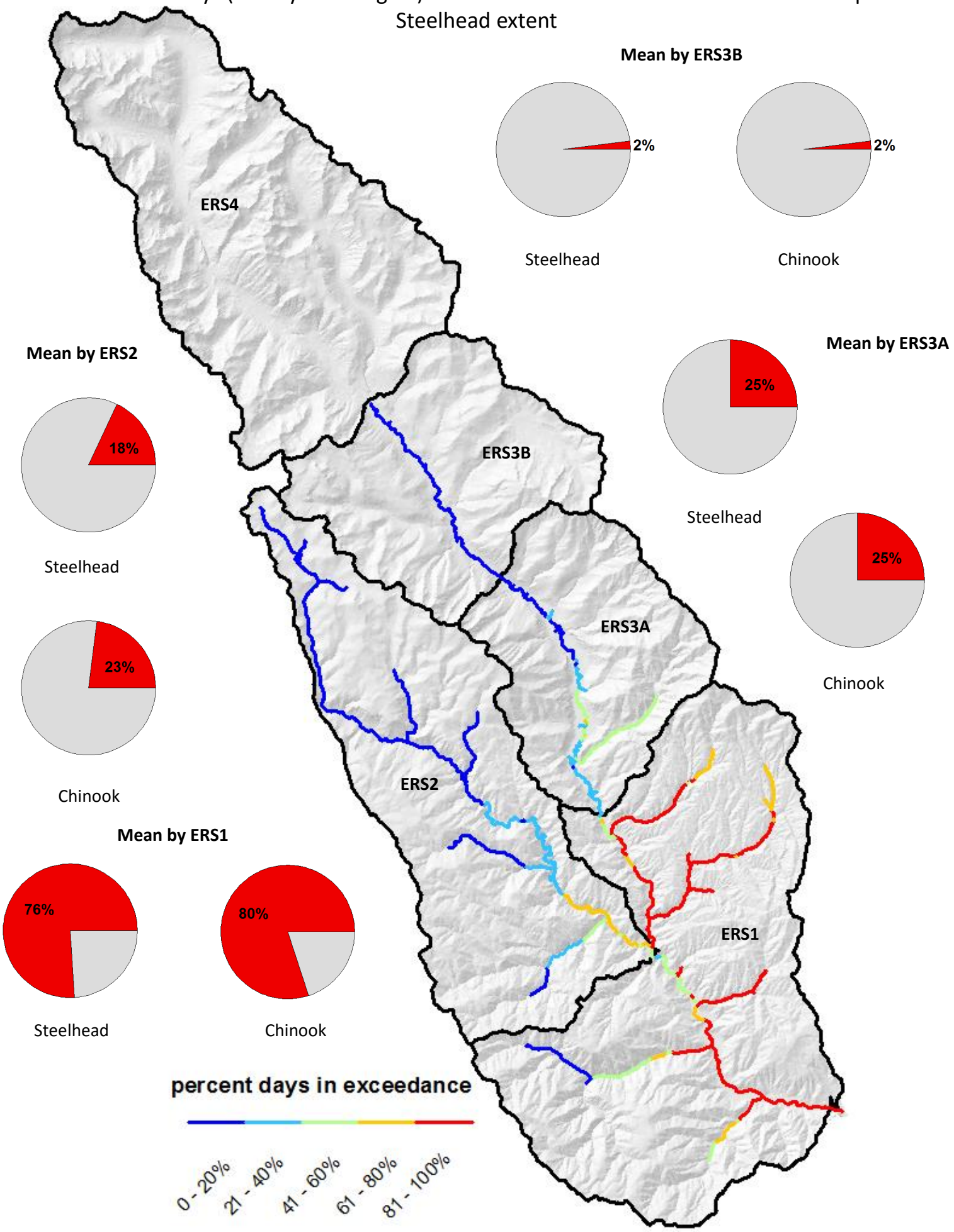
LARGE WOODY DEBRIS RECRUITMENT POTENTIAL



Entiat River 2013

Percent summer days (20 July – 31 August) in exceedance of 18°C maximum stream temperature

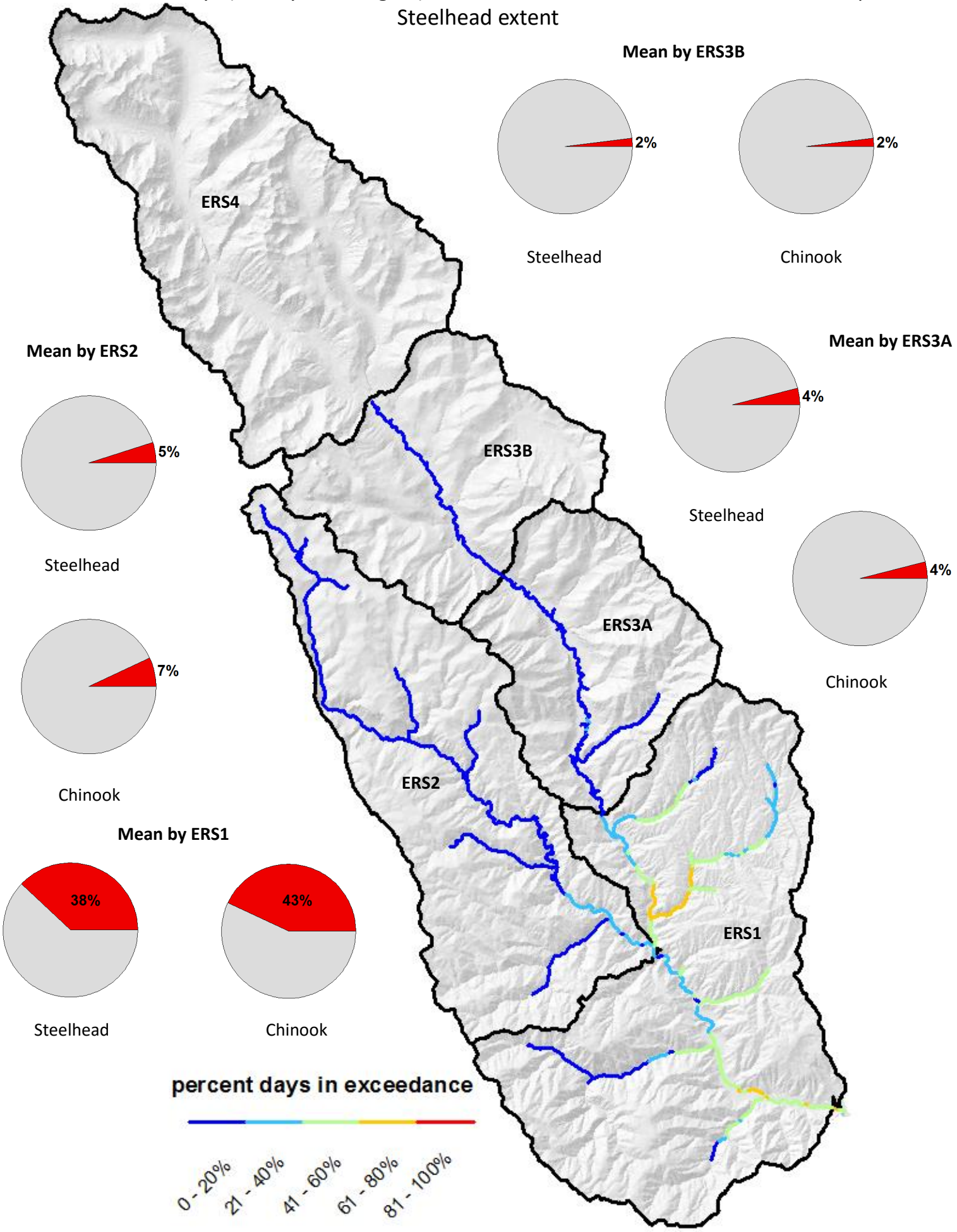
Steelhead extent



Entiat River 2013

Percent summer days (20 July – 31 August) in exceedance of 20°C maximum stream temperature

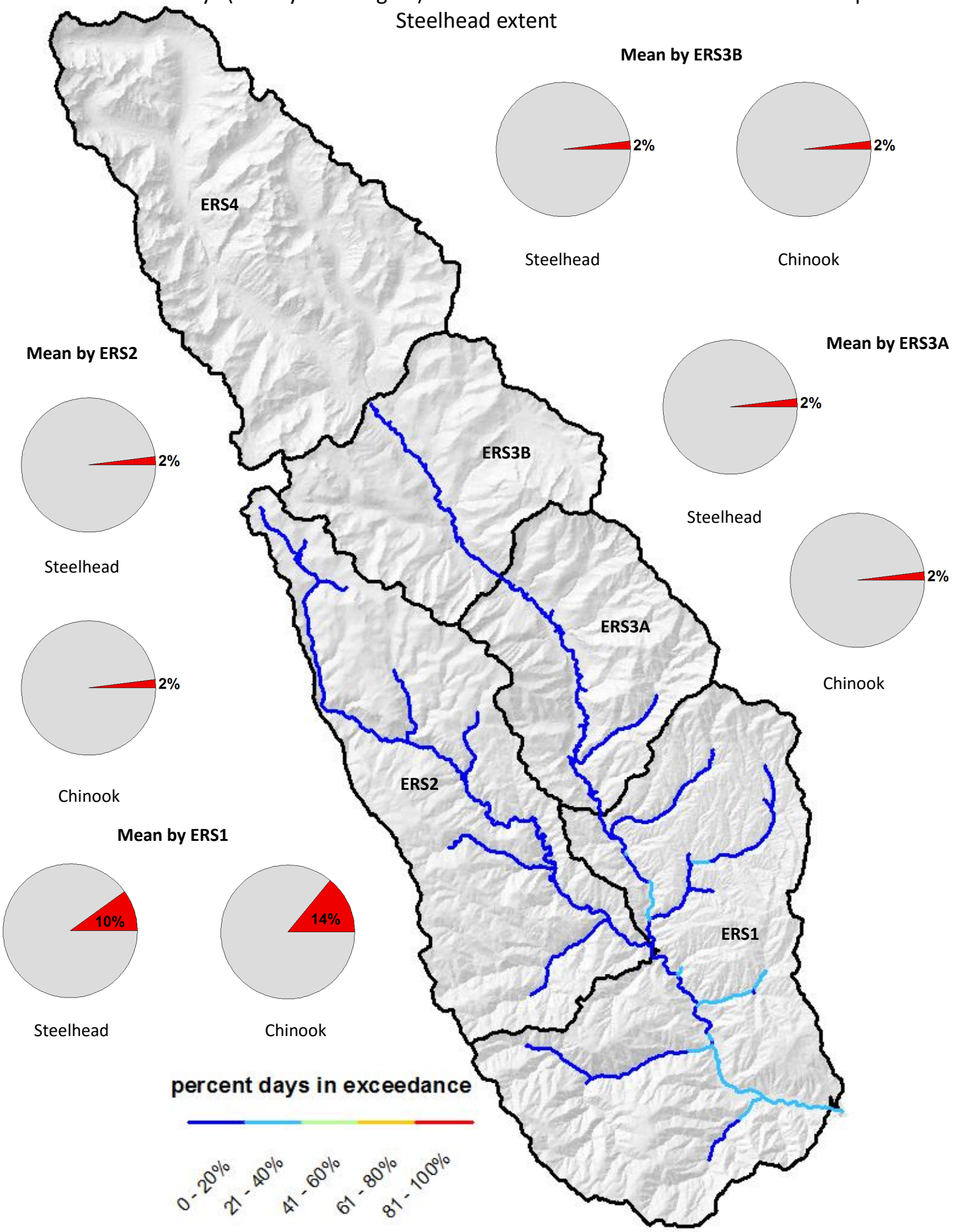
Steelhead extent



Entiat River 2013

Percent summer days (20 July – 31 August) in exceedance of 22°C maximum stream temperature

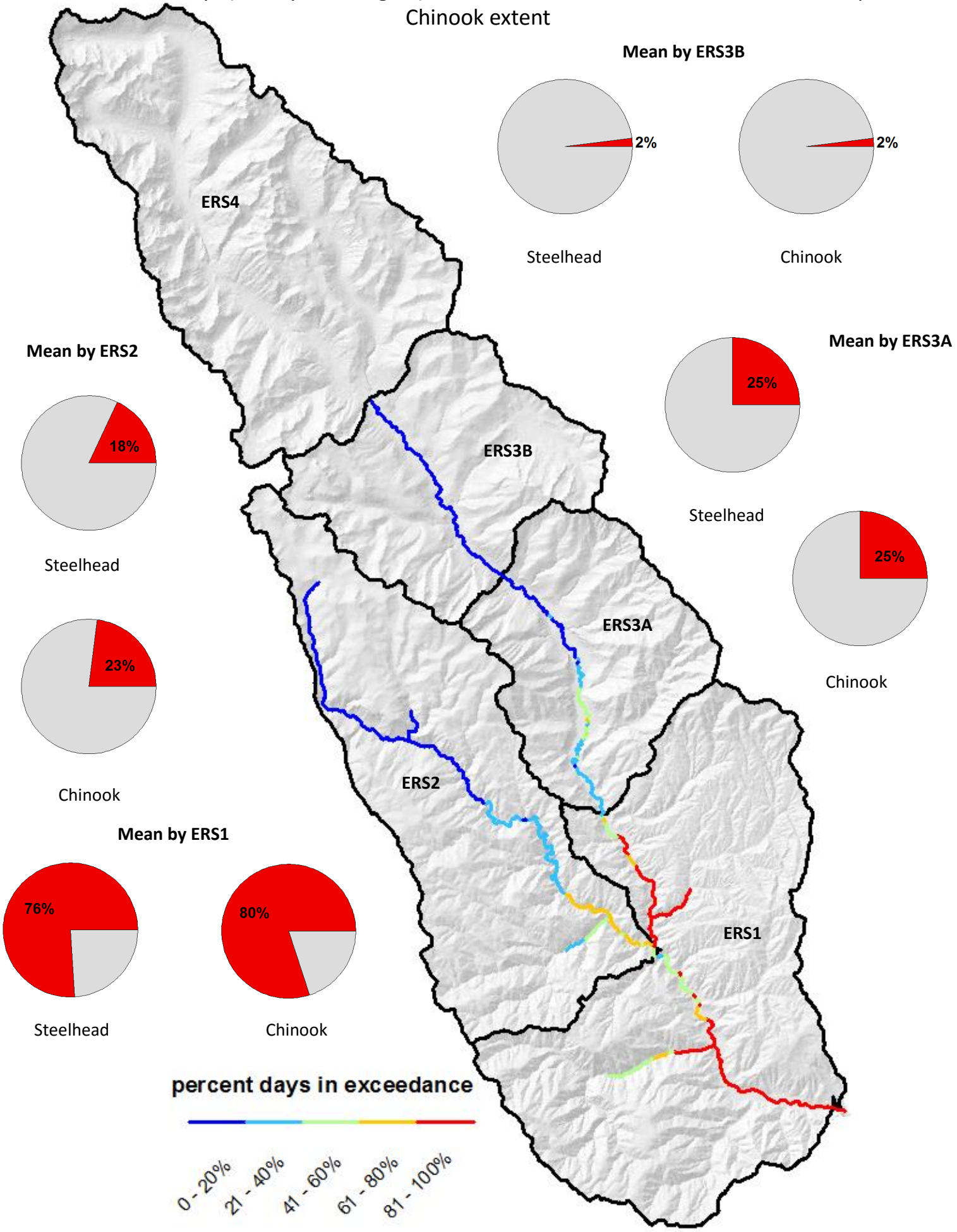
Steelhead extent



Entiat River 2013

Percent summer days (20 July – 31 August) in exceedance of 18°C maximum stream temperature

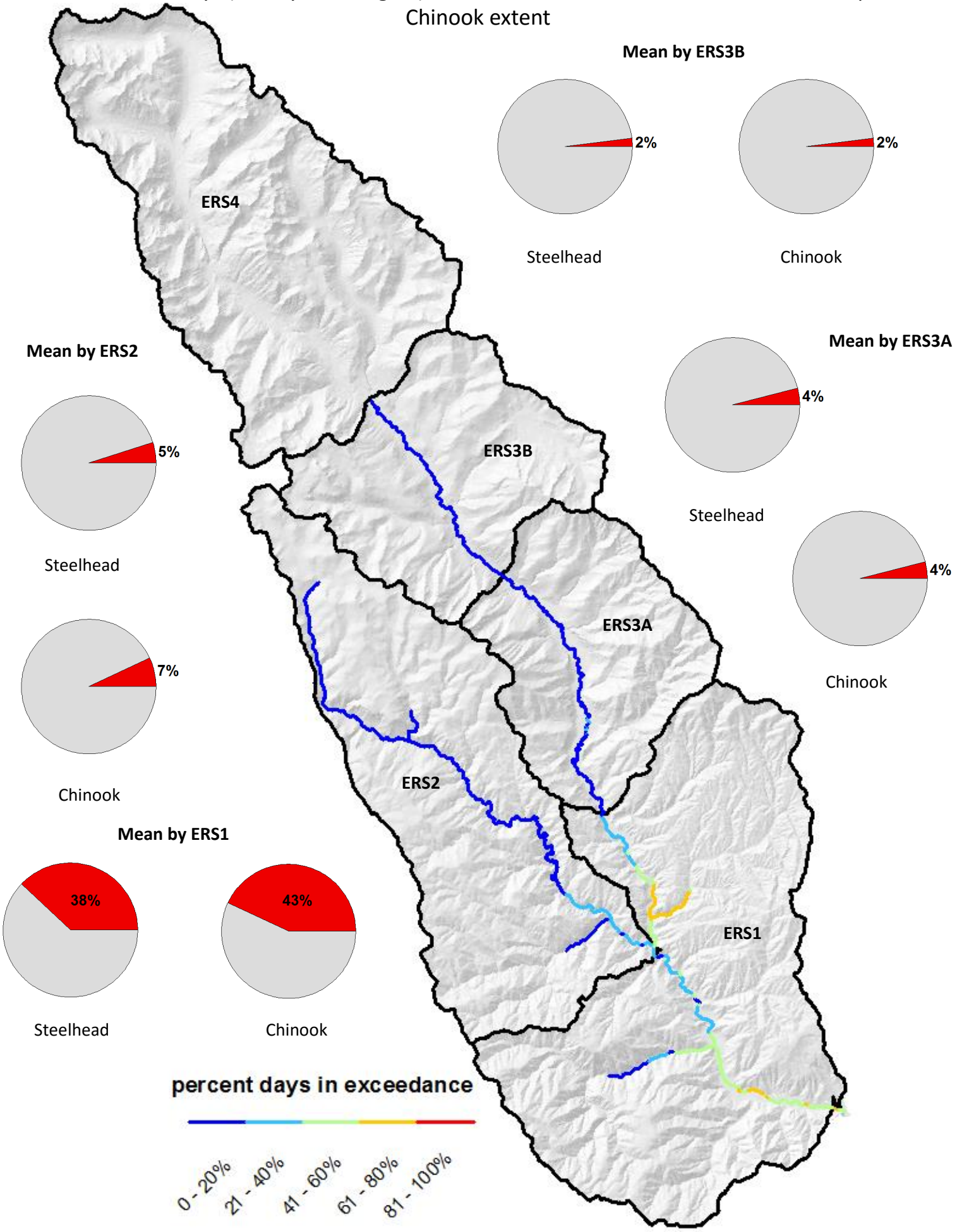
Chinook extent



Entiat River 2013

Percent summer days (20 July – 31 August) in exceedance of 20°C maximum stream temperature

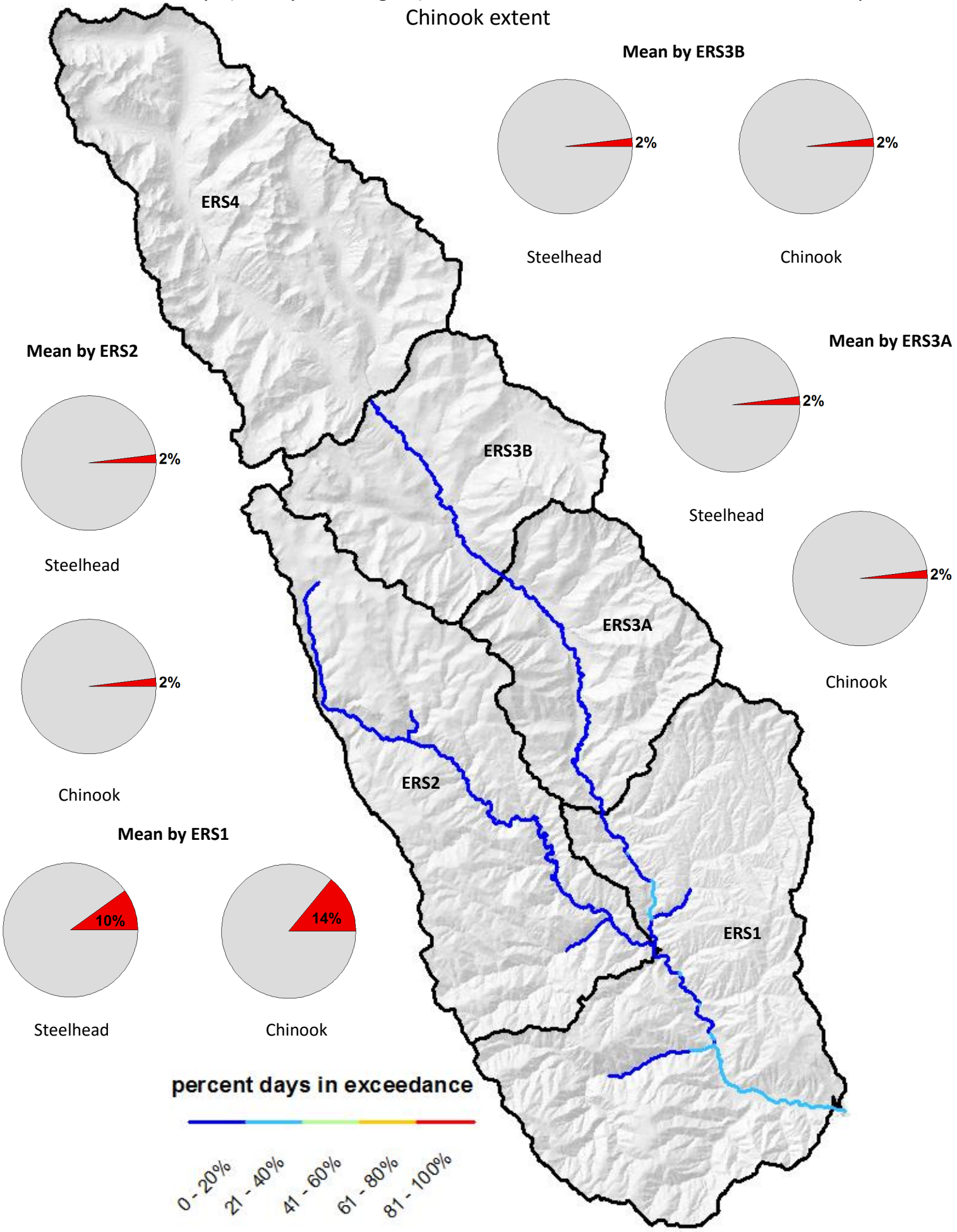
Chinook extent



Entiat River 2013

Percent summer days (20 July – 31 August) in exceedance of 22°C maximum stream temperature

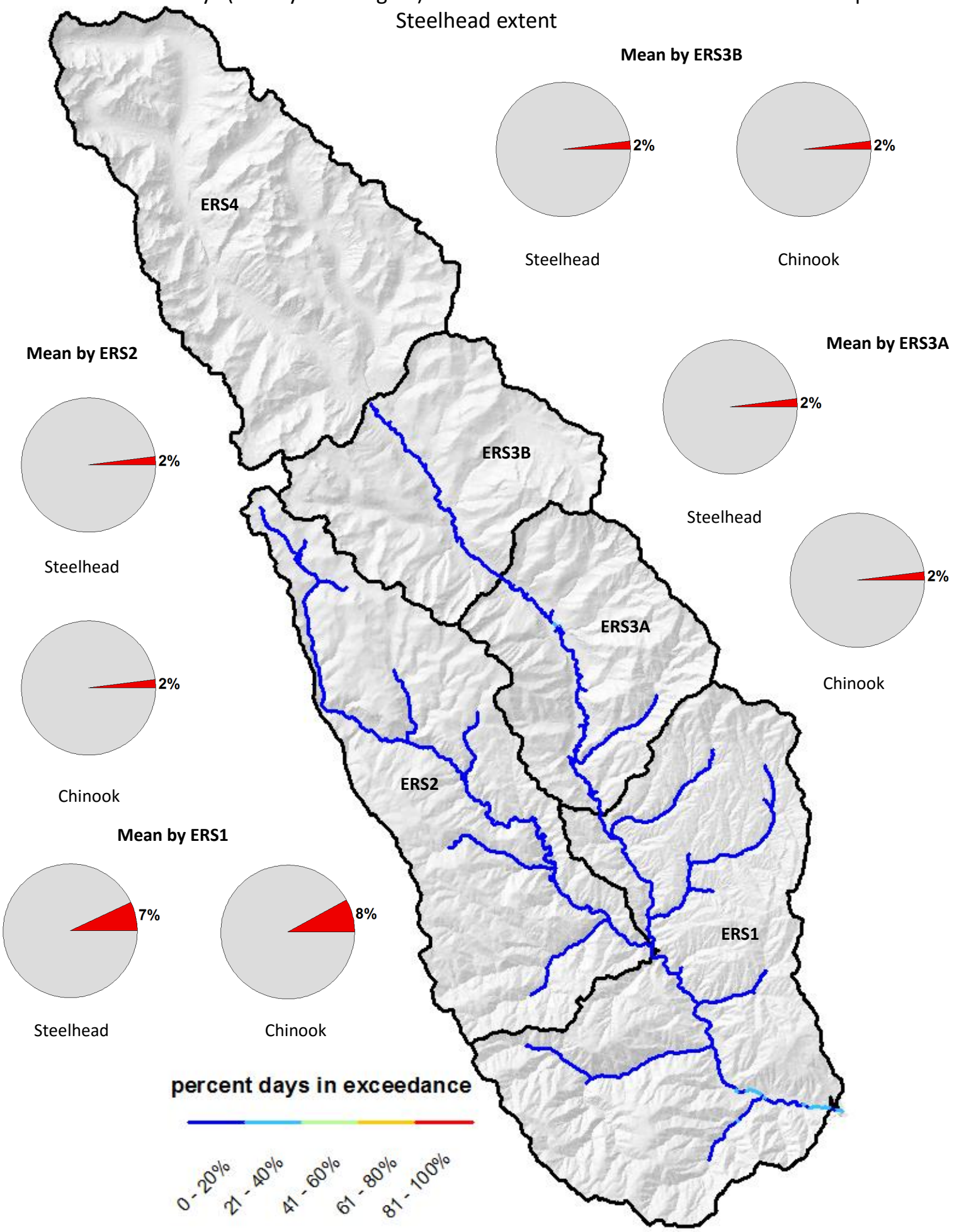
Chinook extent



Entiat River 2012

Percent summer days (20 July – 31 August) in exceedance of 18°C maximum stream temperature

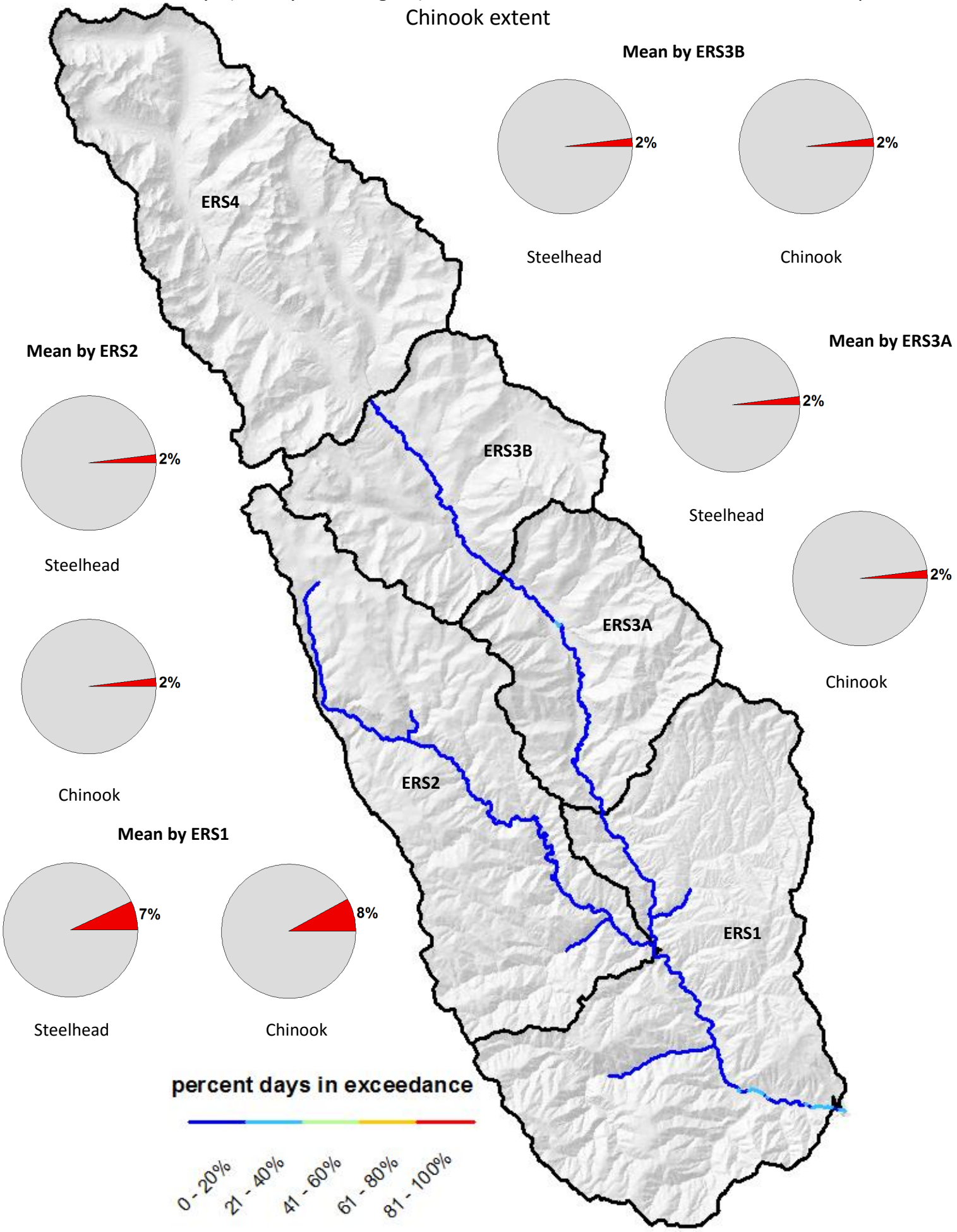
Steelhead extent



Entiat River 2012

Percent summer days (20 July – 31 August) in exceedance of 18°C maximum stream temperature

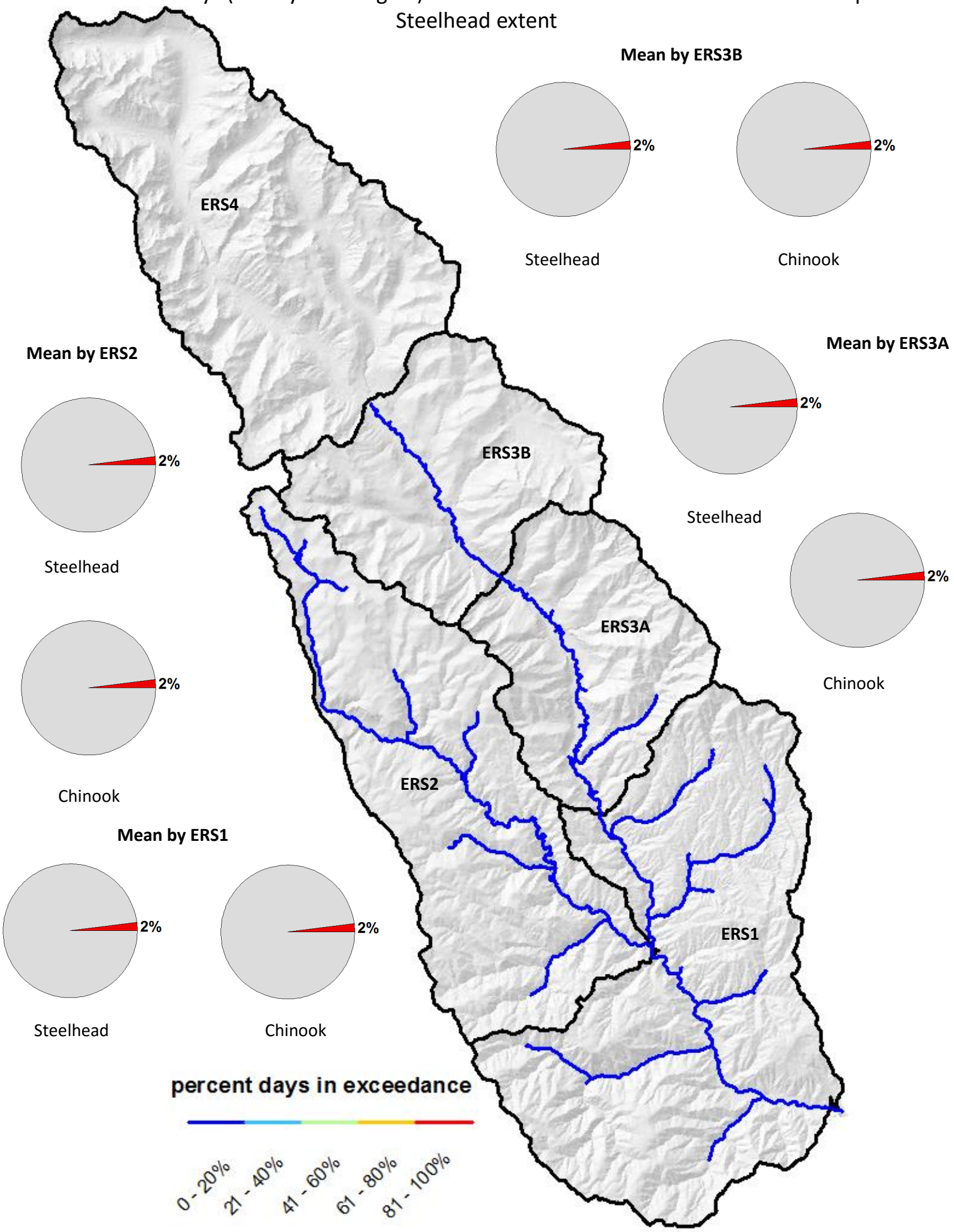
Chinook extent



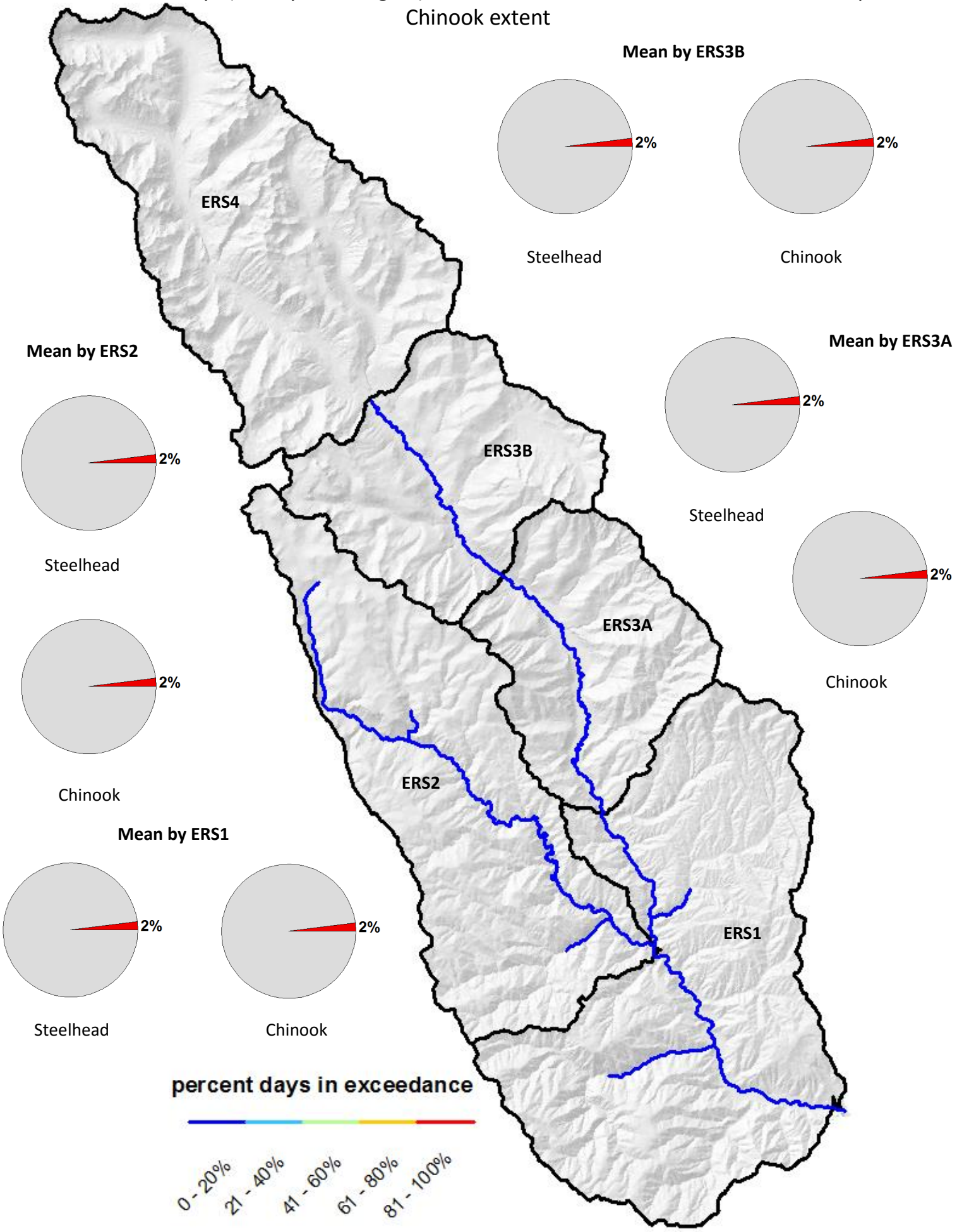
Entiat River 2011

Percent summer days (20 July – 31 August) in exceedance of 18°C maximum stream temperature

Steelhead extent



Entiat River 2011

Percent summer days (20 July – 31 August) in exceedance of 18°C maximum stream temperature

Chinook extent