

Overview

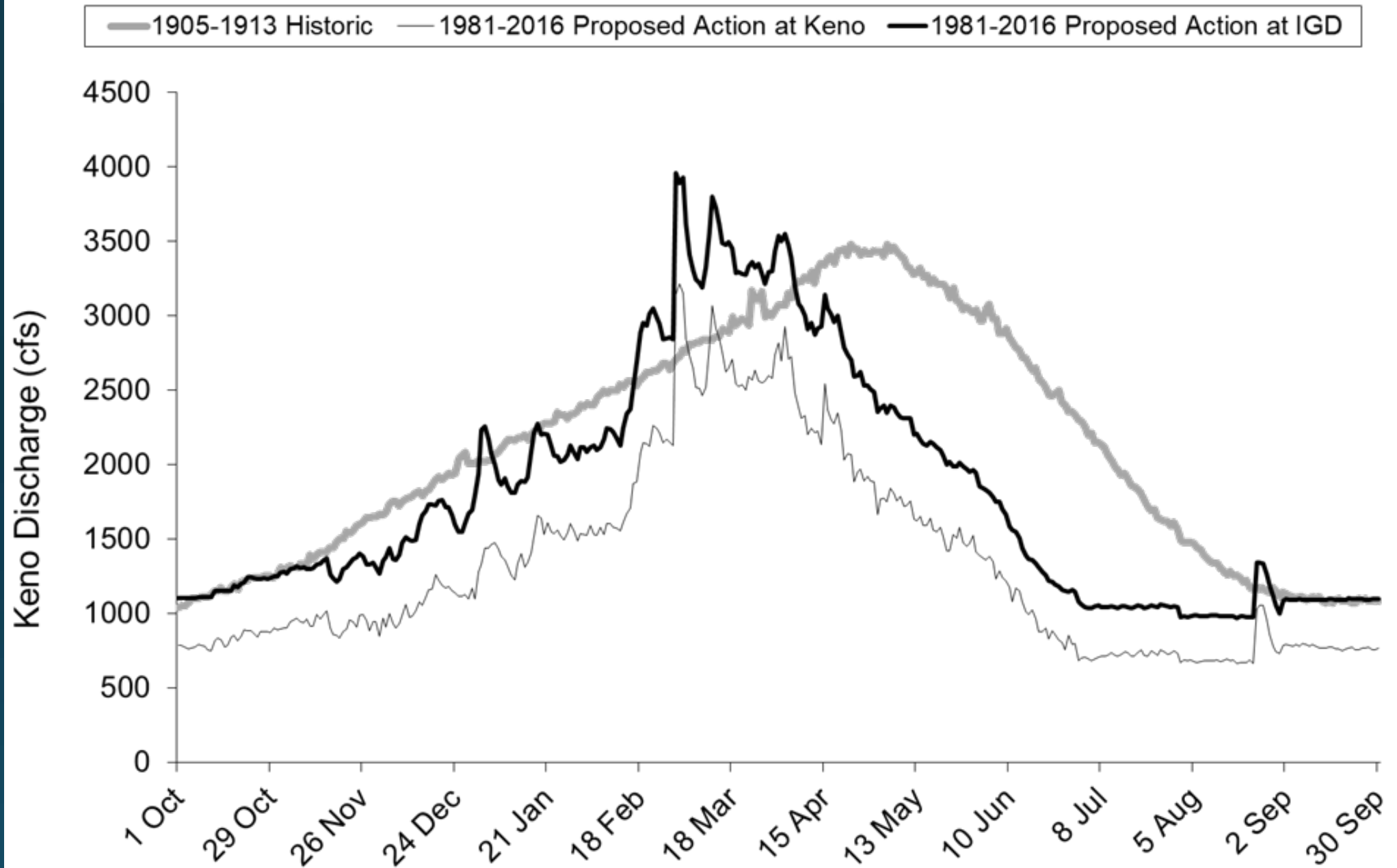
2019 Klamath Project Biological Opinion

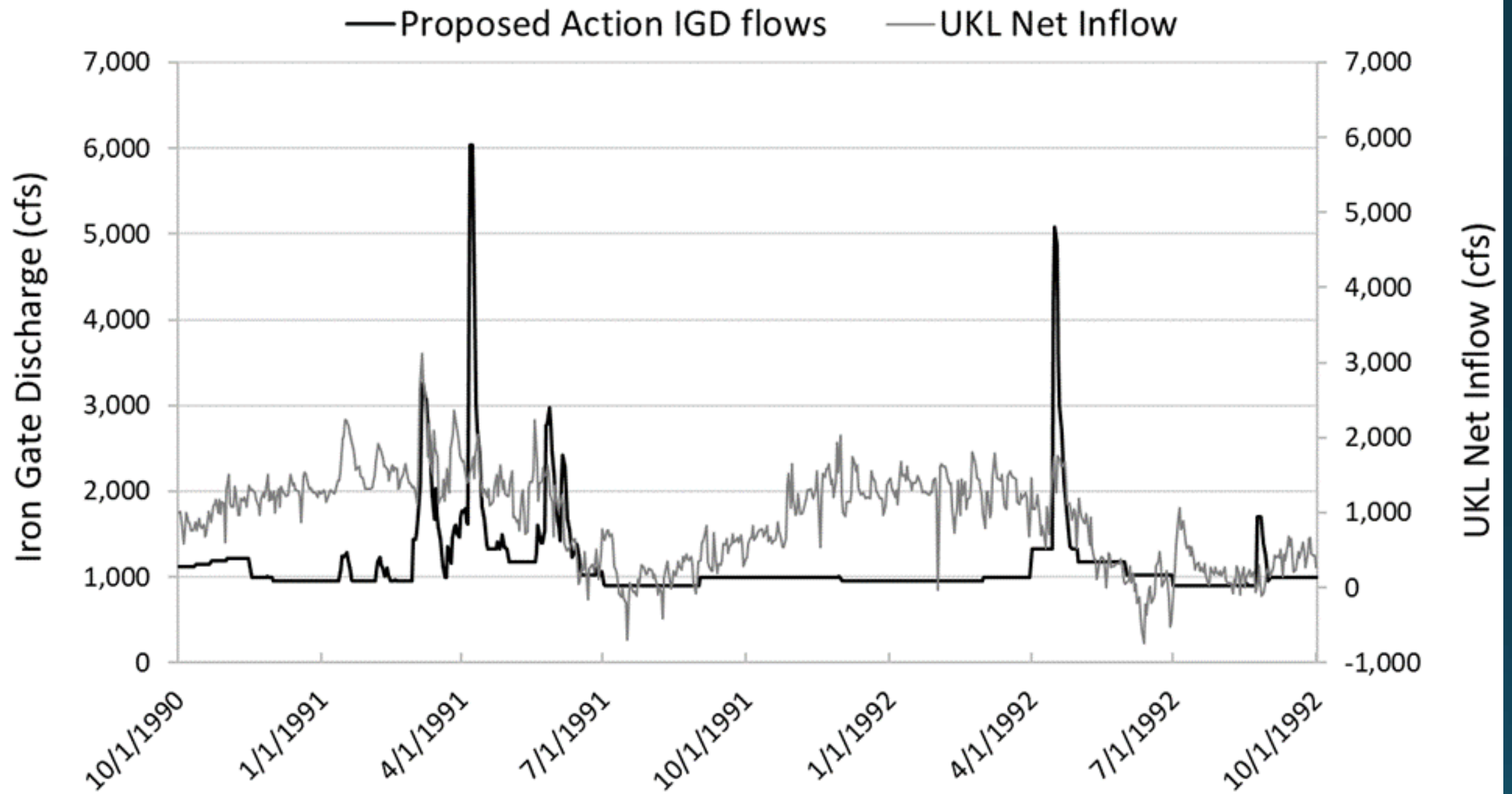
Elements of the Analysis

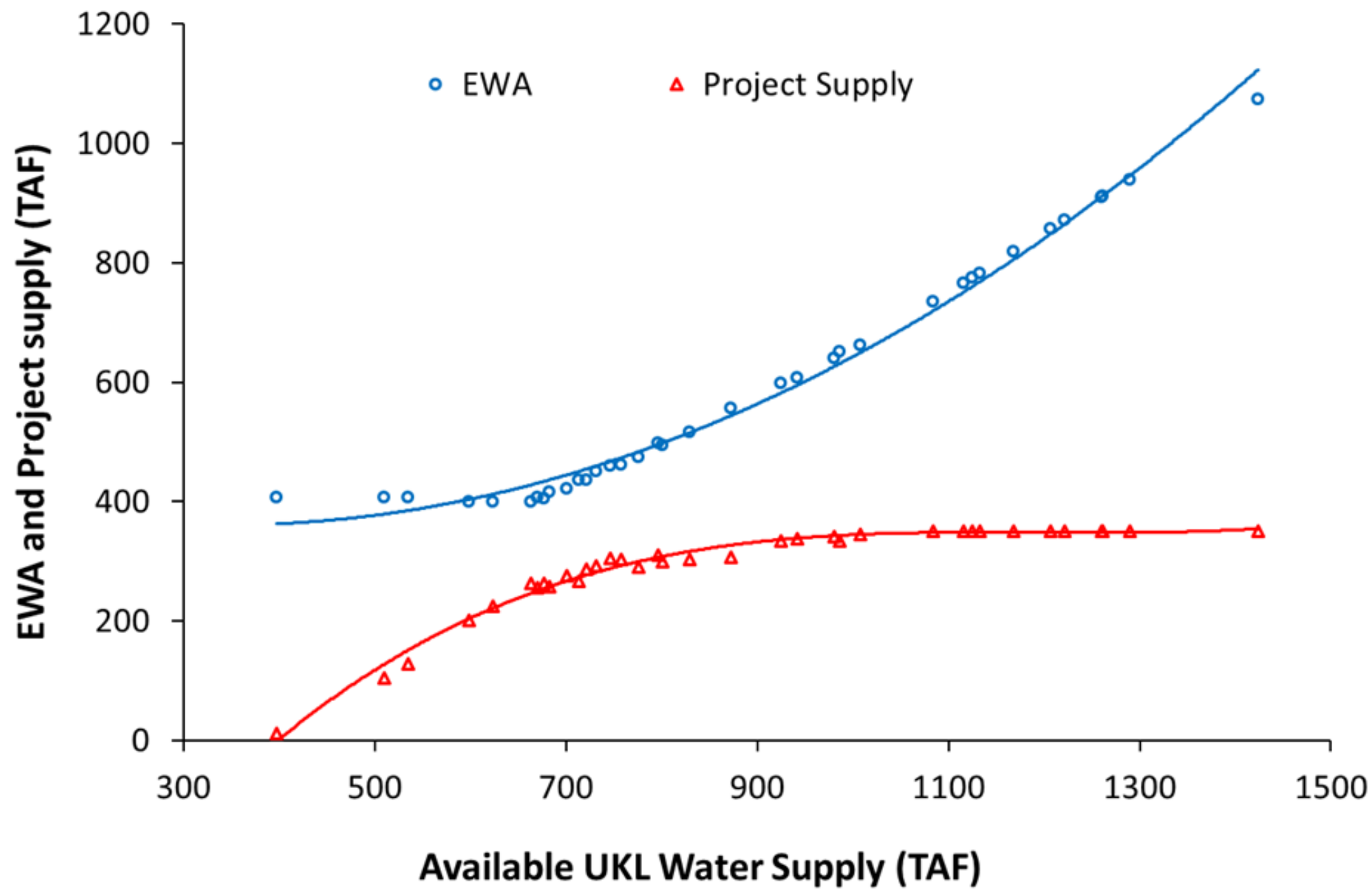
- Hydrology
- Disease Management
- Habitat Availability
- Coho Restoration Program

Modeled Project Deliveries for Period of Record

- Median annual Klamath Project delivery from all surface water sources is approximately 408,00 acre-ft (379,000 acre-ft in spring/summer, 29,000 acre-ft in fall/winter).
- Majority of Project water comes from UKL; median annual Project Supply from UKL is 306,000 acre-ft, with a minimum of 12,000 acre-ft and a maximum of 350,000 acre-ft.
- The difference is supported by diversions from other sources, primarily LRDC and KSD return flows.







Effects to Sediment Maintenance and Geomorphic Flows

- Increased duration of immobile bed conditions (<2,500 cfs)
- Increased frequency of surface flushing flows (6,030 cfs for 72 hours, every year)
- Decreased magnitude and frequency of deep flushing flows (11,250 cfs for 24 hours)
- Minimal reductions to the magnitude and frequency of geomorphic flows (>15,000 cfs) due to limited storage capacities

C. shasta Concerns

- Complex Life Cycle
 - Actinospore Concentrations
 - Temporal and Geographic Presence of Hosts
 - Myxospore Concentrations
 - Temporal and Geographic Presence of Hosts
 - Water Quantity and Quality

Legend:

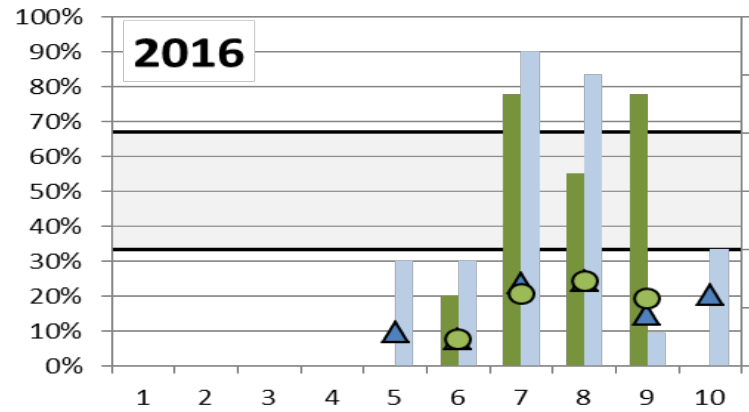
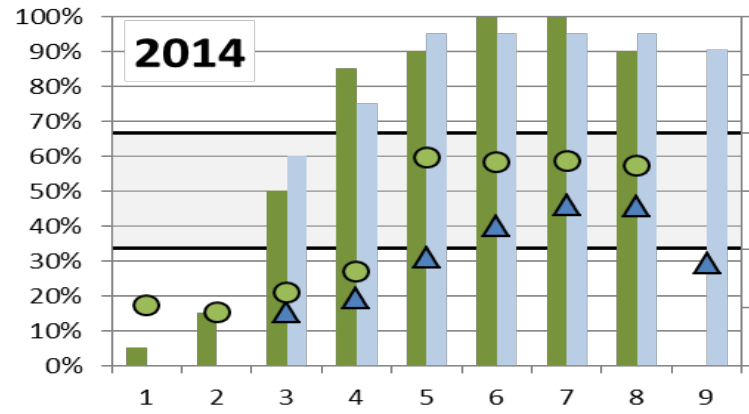
K4 POI

K3 POI

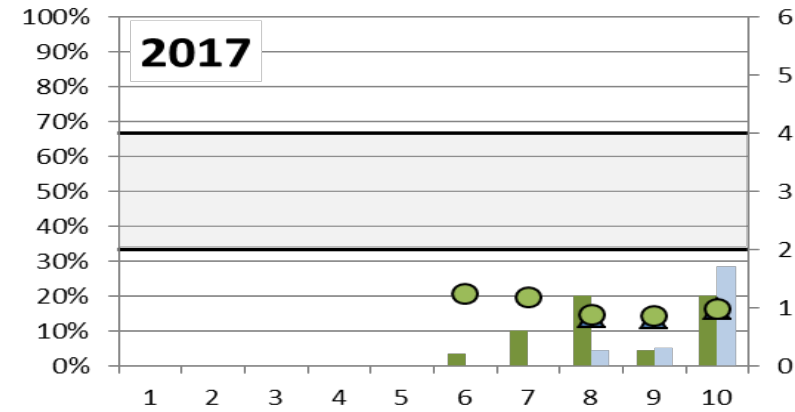
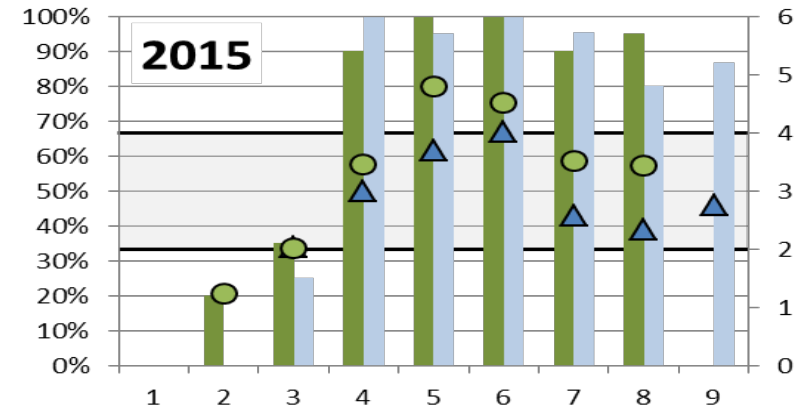
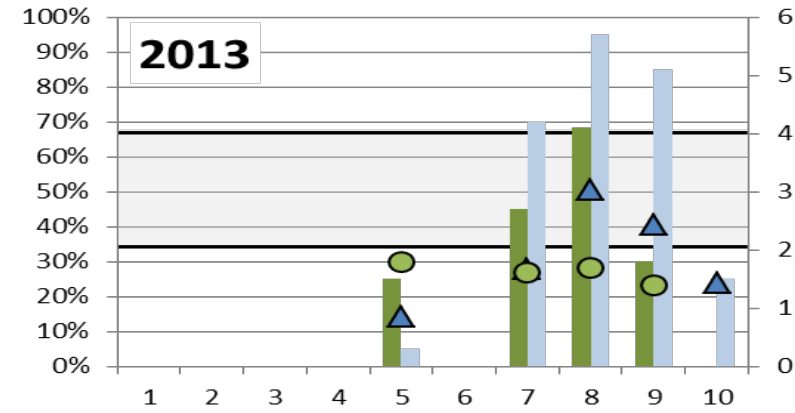
K4 Log DNA

K3 Log DNA

C. shasta prevalence of infection



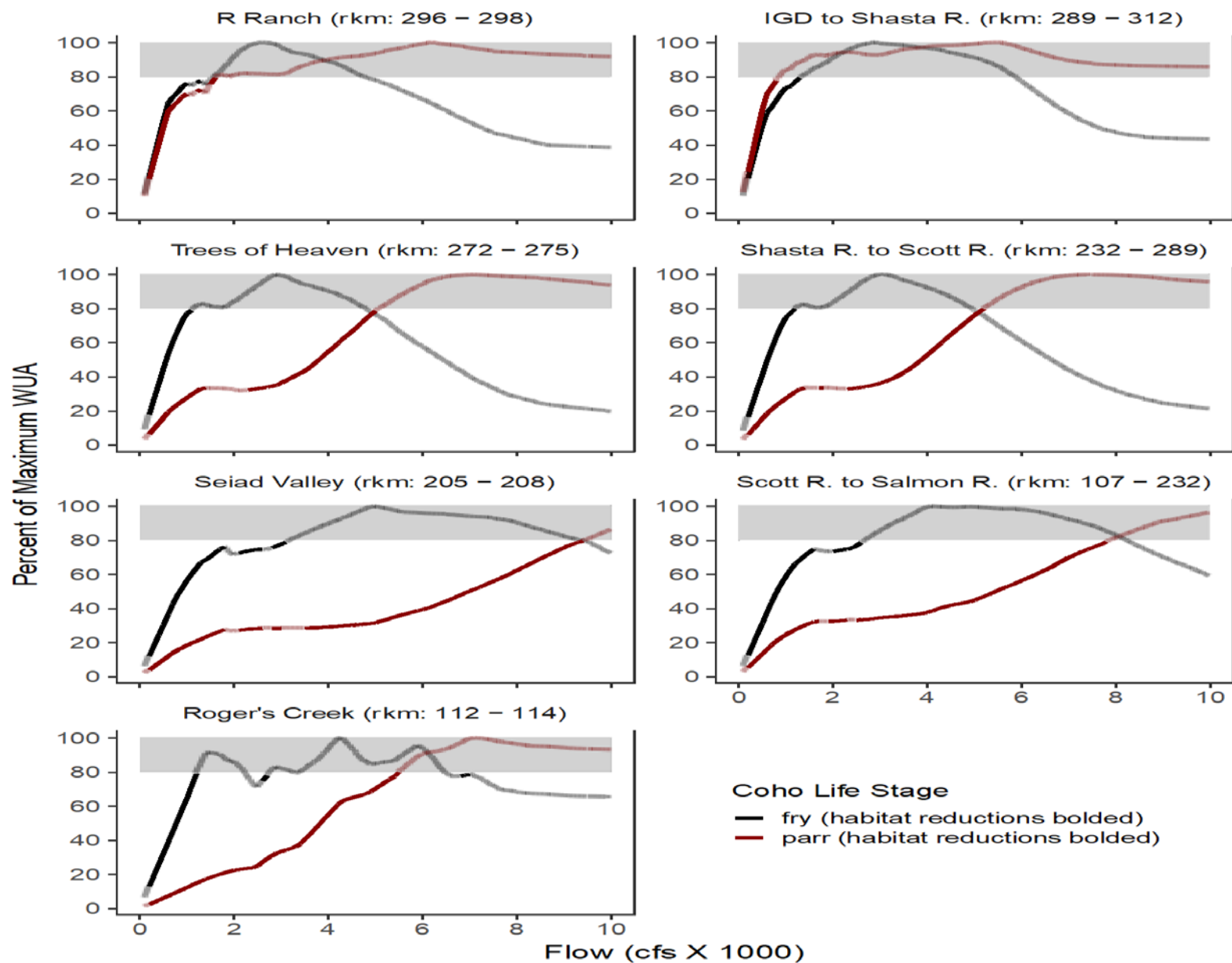
Sample week



C. shasta mean DNA copy number (Log)

Habitat Availability

- Flow vs. Habitat Modeling
- Fry and Juvenile Habitat – Coho and Chinook Salmon



	Iron Gate Dam to Shasta River				Shasta to Scott River				Scott to Salmon River			
Exceedance	March	April	May	June	March	April	May	June	March	April	May	June
95%	1113	1429	1244	1056	1433	1641	1404	1126	2560	2494	1931	1341
90%	1302	1463	1280	1073	1731	1711	1467	1175	2932	2711	2197	1481
85%	1606	1518	1362	1099	1954	1848	1608	1229	3240	3027	2477	1603
80%	1782	1559	1483	1124	2165	1938	1742	1292	3620	3397	2684	1728
75%	1912	1695	1550	1159	2329	2097	1858	1345	3971	3849	2964	1816
70%	2122	1858	1611	1190	2589	2291	1978	1397	4340	4134	3334	1936
65%	2352	2004	1672	1227	2864	2446	2088	1441	4699	4473	3666	2065
60%	2582	2195	1766	1266	3174	2734	2221	1487	5231	4884	4003	2214
55%	2848	2430	1894	1312	3519	2983	2389	1539	6170	5395	4312	2392
50%	3140	2689	2072	1348	3884	3306	2537	1604	6716	5859	4609	2599
45%	3372	3013	2315	1400	4164	3675	2824	1690	7238	6476	5098	2855
40%	3735	3289	2590	1489	4613	3962	3230	1820	7643	6981	5804	3126
35%	4237	3640	2796	1626	5181	4467	3504	2012	8362	7733	6444	3434
30%	4668	3986	2999	1783	5818	4899	3729	2202	9173	8339	6923	3829
25%	5228	4631	3274	1917	6449	5544	4029	2381	10115	8937	7326	4410
20%	6082	5080	3555	2089	6897	6099	4402	2682	11237	9603	7889	4962
15%	6467	5611	3974	2416	7669	6537	4934	3026	12429	10198	8822	5556
10%	7148	6103	4403	2818	8693	7083	5474	3589	14272	11235	9797	6469
5%	8582	6669	5062	3464	10588	7806	6320	4271	17531	12322	10744	7755

Exceedance	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
95%	1114	1184	1146	1187	1229	1331	1547	1333	1095
90%	1135	1198	1163	1213	1267	1564	1591	1375	1129
85%	1162	1211	1188	1253	1305	1837	1699	1490	1171
80%	1184	1227	1199	1280	1348	2013	1766	1630	1214
75%	1202	1241	1218	1320	1407	2156	1912	1710	1258
70%	1226	1262	1241	1357	1481	2423	2057	1788	1307
65%	1246	1286	1263	1396	1568	2641	2257	1876	1345
60%	1260	1320	1293	1456	1710	2908	2466	1997	1377
55%	1286	1356	1328	1559	1905	3216	2704	2124	1415
50%	1315	1394	1392	1703	2182	3547	3005	2303	1466
45%	1343	1419	1454	1887	2442	3813	3349	2569	1540
40%	1364	1451	1576	2106	2750	4274	3636	2894	1660
35%	1389	1471	1766	2417	3120	4757	4039	3155	1832
30%	1408	1534	2027	2776	3471	5233	4447	3339	1975
25%	1440	1595	2293	3186	4032	5946	5127	3611	2156
20%	1466	1661	2676	3770	4749	6465	5576	3970	2373
15%	1511	1774	3188	4378	5561	7146	6155	4417	2683
10%	1573	1955	4047	5740	6937	7974	6547	4847	3222
5%	1712	3812	6112	7861	10689	9817	7216	5689	3858

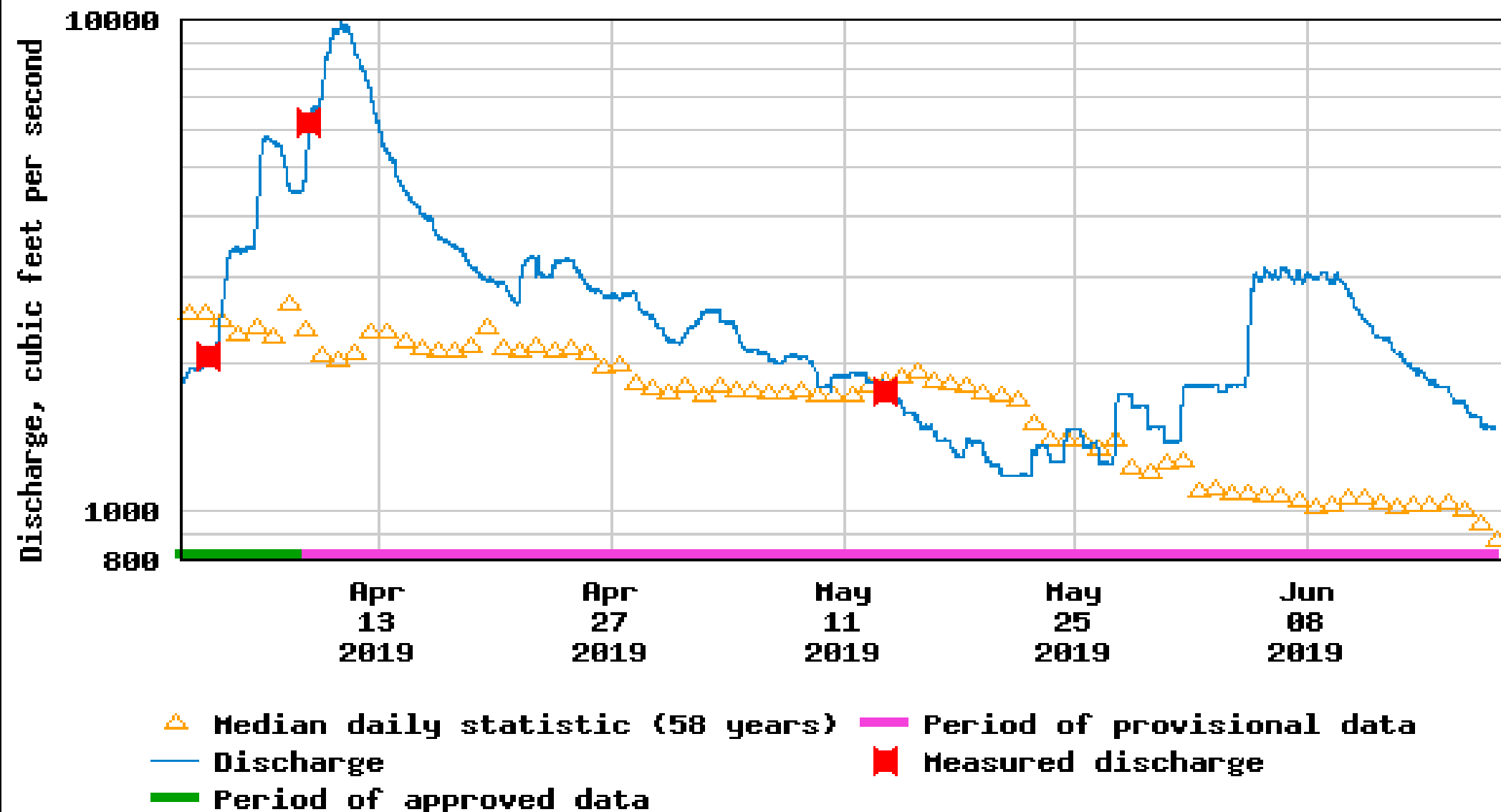
Coho Restoration Program

- Reclamation will provide \$700,000 annually in 2019 and 2020, and \$500,000 from 2021 through 2023 for projects that address limiting factors for SONCC coho salmon in the Klamath Basin
- Projects given the highest priority under this program include access improvement and barrier removal, improved habitat and access to coldwater refugia, instream habitat enhancement and protections, and water conservation

2019

- Hydrology
- Disease

USGS 11516530 KLAMATH R BL IRON GATE DAM CA



C. shasta average spore levels at all sites in 2019

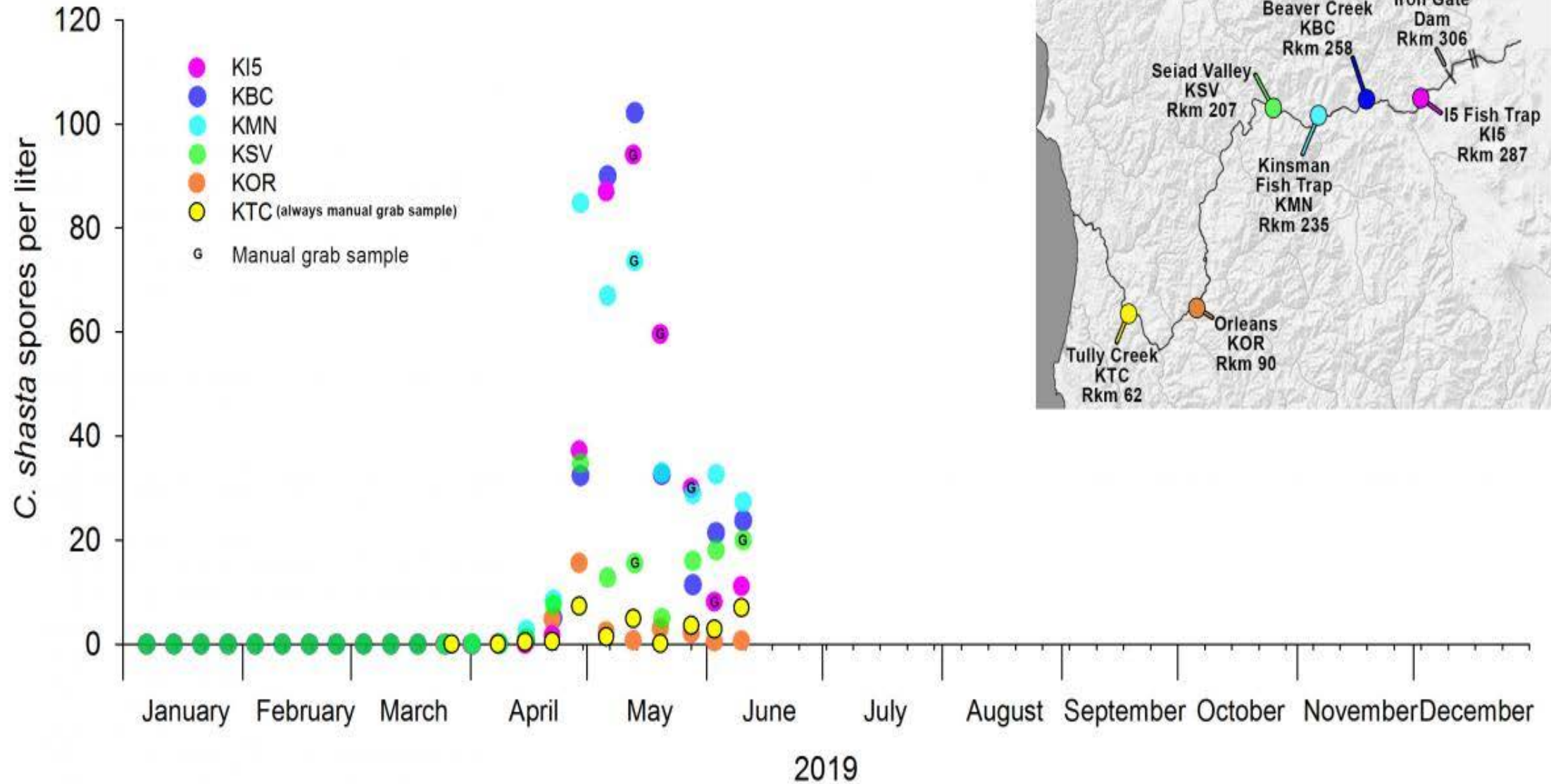


Table 1. Weekly-stratified prevalence of infection (POI) of *Ceratonova shasta* in juvenile Chinook salmon captured in the Shasta To Scott River reach (K4 or Kinsman) of the Klamath River.

Sample Week	Collection Date	Number of Samples Collected	Number of Samples Positive	<i>C. shasta</i> POI	DNA copy number range (log scale)	DNA copy number over 3 logs
1	3/26/19	30	0	0%	n/a	n/a
2	4/2/19	30	0	0%	n/a	n/a
3	4/9/19	30	0	0%	n/a	n/a
4	4/16/19	30	0	0%	n/a	n/a
5	4/23/19	30	0	0%	n/a	n/a
6	4/30/19 5/2/19	30	18	60%	0.9 - 2.6	0%
7	5/7/19	30	25	83%	1.0 – 4.5	13%
8	5/13/19	30	26	87%	0.8 – 4.3	13%
9	5/20/19	30	26	87%	0.8 – 4.9	20%

Questions?