Klamath River Outmigrant Monitoring Update – May 13, 2013

Synopsis: The outmigration of juvenile salmonids is monitored annually on the mainstem Klamath River by the USFWS Arcata Fish and Wildlife Office (AFWO) and the Karuk Tribe of California. The objectives of this collaborative project are to:

1. Estimate the weekly abundance of juvenile Chinook salmon and collect pertinent biological data such as fork lengths and presence of clinical signs of disease at three selected locations on the mainstem Klamath River.
2. Collect, preserve, and deliver weekly-stratified, random samples of young-of-the-year Chinook salmon to the Service's California-Nevada Fish Health Center for conducting QPCR assays to estimate infection rates in the outmigrant population.
3. Collect relative abundance and biological data on coho salmon and steelhead at the three locations on the mainstem Klamath River.

Information generated by this study are used for a variety of purposes, including stock recruitment analyses, to inform flow management decisions, to further develop a fish disease model, and to validate and calibrate the SSS (Stream Salmonid Simulator) Chinook salmon production model, among others.

Monitoring this season began on March 5, 2013 at three sites on the mainstem Klamath River located between Iron Gate Dam (IGD; rkm 309.65) and the Scott River confluence (rkm 232.95). The upstream-most site (rkm 307.75), referred to as the "Bogus Trap Site", is located on the right bank downstream of the Bogus Creek confluence on Blue Heron RV Park property. The second location is the "I-5 Trap Site" (rkm 293.55), which is positioned on the left bank downstream of the Carson Creek confluence and upstream of the I-5 bridge river crossing. The site located furthest downriver is the "Kinsman Trap Site" (rkm 237.55) and is positioned on the left bank just upstream of the Kinsman Creek confluence. Trapping at the Bogus Trap Site is conducted using a single 3.1 m wide and 1.6 m tall frame net. Sampling at the I-5 Trap Site is conducted using two inline 8-ft diameter rotary screw traps (RST) and one 3.1-by-1.6 m frame net. One 5-ft diameter RST is used to capture fish at the Kinsman Trap Site. Traps are typically operated four nights per week (Monday through Thursday) and checked once daily while in operation.

Supplemental migration timing and magnitude and fish size data are also collected by weekly depletion seining at the Klamathon/Copco-Ager Bridge crossing (Klamathon Site, rkm 300.70). Seine catch numbers are not reported in this summary but fish sizes and disease observations are included.

This project update provides an in-season summary of the mean catch per day by week (Table 1) of Chinook and coho salmon, and steelhead at each trap site. In addition, we provide weekly estimates of the mean fork length of young-of-the-year (YOY) Chinook and coho salmon from the each of the three trap sites and the Klamathon seine site (Table 2). Expansions to generate weekly-stratified abundance estimates are not presented here and instead, are calculated after the trapping season concludes.

Included in this project update is a weekly-stratified summary of clinical signs of disease observed in the catch for the three trap and single seine sample sites (Table 3). Note that these data are based on the visual presence of external symptoms of disease, which may not always be revealed by infected fish. The percentage of live YOY Chinook salmon in the trap and seine catches that exhibit distended bellies, gill fungus, and pale gills are presented separately for each site on a weekly basis (Table 3). Distended bellies may be a clinical sign of infection by the myxosporean parasites, *Ceratomyxa shasta* and *Parvicapsula minibicornis*. Gills of juvenile salmonids ≥45 mm FL are evaluated for color (red, pale/pink, white, or tan) and condition (normal, eroded, or fungal). Pale gills may be due to anemia associated with *P. minibicornis* infection. Gill fungus is likely *Saprolegnia* growing upon a columnaris (*Flavobacterium columnare*) infection.

To more accurately determine infection rates for the outmigrant juvenile Chinook salmon population passing the Kinsman Trap Site, weekly-stratified random samples are collected, preserved, and delivered to the Service's California-Nevada Fish Health Center (CA-NV FHC) to process using QPCR assays. The CA-NV FHC investigates infection rates of *C. shasta*, *P. minibicornis* and other pathogens in juvenile salmonids in the Klamath River annually in the reach between Iron Gate Dam and the estuary. The CA-NV FHC typically releases about two or three in-season updates (which are posted on the AFWO website) and a final report for each season.

We also present daily mean discharge below IGD (Figure 1) and at the Kinsman Trap Site (Figure2) from March through July 2000 to 2013 to help portray pertinent flow conditions. Flow at the Bogus and I-5 trap sites is represented by USGS Gauging Station 11516530 (Klamath River below IGD, California). Discharge at USGS 11520500 (Klamath River near Seiad Valley, California) minus dicharge at USGS 11519500 (Scott River near Fort Jones, California) is used as a surrogate flow for the Kinsman Trap Site.

If you have any questions regarding this summary, please contact Steve Gough at (707) 825-5197 or Bill Pinnix, (707) 825-5129.

Table 1. In-season summary of the average catch per day by week of adipose fin-clipped (AD Clip) and non adipose fin-clipped (No Clip) Chinook salmon and steelhead and left maxillary-clipped (LM Clip) and non-maxillary clipped (No Clip) coho salmon by trap at the Bogus, I-5, and Kinsman trap sites on the mainstem Klamath River, 2013. Note that RST = rotary screw trap, UPS = upstream, DNS = downstream, and YOY = young-of-the-year.

								Chinook (*O. tshawytscha*)			Coho (*O. kisutch*)			Steelhead (*O. mykiss*)		
	Survey	Sample	Q (cfs) [a]		Water Temp. (F) [b]		Trapping	YOY				Age 1 +			Age 1 +	
Trap	Week	Dates	Min	Max	Min	Max	Days	No Clip	AD Clip	Age 1+	YOY	No Clip	LM Clip	YOY	No Clip	AD Clip
Bogus Frame	1	3/6-3/8	1230	1250	39.7	41.1	3	312.67	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00
	2	3/12-3/15	1570	1600	41.5	42.2	4	826.25	0.00	0.00	0.00	0.00	0.00	0.00	0.75	0.00
	3	3/19-3/22	1660	2170	41.0	45.5	4	759.75	0.00	0.00	0.00	0.00	2.25	0.00	0.50	0.00
	4	3/26-3/29	2200	2430	46.7	47.4	4	841.50	0.00	0.00	0.00	0.00	0.00	0.00	0.25	0.00
	5	4/2-4/5	1810	2290	48.7	50.5	3	4477.67	0.00	0.00	29.67	0.00	0.00	0.33	1.00	0.00
	6	4/9-4/12	1430	1590	51.4	52.5	4	2663.25	0.00	0.00	40.75	0.00	0.00	0.25	0.00	0.00
	7	4/16-4/19	1430	1670	51.0	52.1	4	1470.75	0.00	0.00	25.00	0.00	0.00	0.00	0.50	0.00
	8	4/23-4/26	1150	1170	53.7	54.5	4	100.50	0.00	0.00	7.25	0.00	0.00	2.25	0.00	0.00
	9	4/30-5/3	1150	1160	55.0	57.7	4	205.25	0.00	0.00	3.00	0.00	0.00	18.25	0.00	0.00
	10	5/7-5/10	1130	1170	57.9	60.9	4	170.75	0.00	0.00	1.75	0.00	0.25	38.25	0.00	0.00
I-5 UPS RST	1	3/7-3/8	1230	1230	39.3	42.4	2	116.50	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00
	2	3/12-3/15	1410	1600	41.7	42.9	2	258.00	0.00	0.00	0.00	0.00	0.00	0.00	1.50	0.00
	3	3/19-3/22	1660	2170	42.2	45.8	1	63.00	0.00	0.00	0.00	1.00	6.00	0.00	1.00	0.00
	4	3/26-3/29	2200	2430	45.6	47.1	4	24.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00
	5	4/2-4/5	1810	2290	48.7	50.9	4	88.00	0.00	0.00	0.00	0.00	0.25	0.00	0.50	0.00
	6	4/9-4/12	1430	1590	49.4	51.6	4	166.25	0.00	0.00	0.00	0.25	0.50	0.75	0.50	0.00
	7	4/16-4/19	1430	1670	49.4	52.1	4	215.25	0.00	0.00	0.25	0.00	0.00	0.50	0.75	0.00
	8	4/23-4/26	1150	1170	51.2	53.7	4	55.75	0.00	0.00	0.25	0.00	0.25	0.00	0.50	0.00
	9	4/30-5/3	1150	1160	54.6	56.8	4	57.25	0.00	0.00	0.00	0.00	0.00	0.50	1.00	0.00
	10	5/7-5/10	1130	1170	57.5	60.8	4	38.75	0.00	0.00	1.00	0.25	0.50	1.75	1.25	0.00
I-5 DNS RST	1	3/7-3/8	1230	1230	39.3	42.4	2	41.50	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00
	2	3/12-3/15	1410	1600	41.7	42.9	4	99.75	0.00	0.25	0.00	0.00	0.00	0.00	1.25	0.00
	3	3/19-3/22	1660	2170	42.2	45.8	4	60.00	0.00	0.00	0.00	0.00	8.75	0.00	0.00	0.00
	4	3/26-3/29	2200	2430	45.6	47.1	4	27.75	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.00
	5	4/2-4/5	1810	2290	48.7	50.9	4	66.25	0.00	0.00	0.00	0.00	0.00	0.00	1.25	0.00
	6	4/9-4/12	1430	1590	49.4	51.6	4	158.50	0.00	0.00	0.00	0.00	0.00	0.25	0.25	0.00
	7	4/16-4/19	1430	1670	49.4	52.1	4	140.50	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00
	8	4/23-4/26	1150	1170	51.2	53.7	4	33.25	0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00
	9	4/30-5/3	1150	1160	54.6	56.8	4	62.00	0.00	0.00	0.00	0.00	0.25	0.50	0.00	0.00
	10	5/7-5/10	1130	1170	57.5	60.8	4	34.50	0.00	0.00	0.00	0.00	0.00	0.75	0.50	0.00
I-5 Frame	1	3/8-3/8	1230	1230	39.3	39.3	1	117.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7	4/17-4/19	1430	1620	50.1	52.1	3	177.00	0.00	0.00	3.00	0.00	0.00	0.33	0.00	0.00
	8	4/23-4/26	1150	1170	51.2	53.7	4	10.50	0.00	0.00	0.50	0.00	0.25	0.00	0.00	0.00
	9	4/30-5/3	1150	1160	54.6	56.8	3	9.33	0.00	0.00	0.00	0.00	0.00	4.33	0.00	0.00
	10	5/7-5/10	1130	1170	57.5	60.8	3	2.67	0.00	0.00	0.67	0.00	0.33	0.67	0.00	0.00
Kinsman RST	1	3/8-3/8	2073	2073	42.3	42.3	1	662.00	0.00	1.00	0.00	1.00	0.00	0.00	2.00	0.00
	2	3/12-3/15	1410	2537	45.1	46.0	4	640.50	0.00	0.50	0.00	0.00	0.00	0.00	2.50	0.00
	3	3/19-3/22	2377	3462	43.7	48.6	4	268.50	0.00	0.50	0.00	0.00	3.75	0.00	2.25	0.00
	4	3/26-3/29	3095	3221	48.2	48.9	4	104.25	0.00	0.00	0.00	0.00	0.50	0.00	1.50	0.00
	5	4/2-4/5	3320	3610	49.6	52.7	4	556.75	0.00	0.00	0.00	0.75	0.25	0.00	2.00	0.00
	6	4/9-4/12	2667	2780	50.2	58.8	4	1012.50	0.00	0.00	2.00	0.25	0.50	0.00	2.25	0.00
	7	4/16-4/19	2325	2591	50.5	56.7	4	844.25	0.00	0.25	0.75	0.25	0.25	0.00	2.50	0.00
	8	4/23-4/26	1911	1998	55.0	57.6	4	139.00	0.00	0.00	1.25	0.00	0.00	0.00	3.50	0.00
	9	4/30-5/3	1888	1998	55.4	59.1	4	121.50	0.00	0.00	1.75	0.25	0.00	0.25	3.50	0.00
	10	5/7-5/10	1978	2102	58.6	63.6	4	106.25	0.00	0.00	3.75	0.25	0.25	1.75	5.00	0.00

[a] mean daily discharge range during sampling dates (discharge below IGD used for Bogus and I-5 sites; flow at Kinsman Site is Klamath River flow at Seiad minus Scott River flow)

[b] temperature recorded at time of trap check (true daily ranges from temperature loggers will become available at the end of the season)

Note: Frame net trapping at the I-5 site was temporarily discontinued Survey Weeks 2 through 6 due to flows too high for the equipment.

Table 2. In-season summary of fork lengths, compared with the last ten years, of naturally-produced Chinook and coho salmon by trap type at the Bogus, Klamathon, I-5, and Kinsman sites on the mainstem Klamath River, 2013. Note that RST = rotary screw trap and YOY = young-of-the-year.

			YOY Chinook (Natural) - Fork Length Data								YOY Coho - Fork Length Data							
		2013	2013					Last 10-years			2013					Last 10-years		
Site	Calendar Week	Sampling Dates	n	Mean (mm)	Min. (mm)	Max. (mm)	% > 55 mm	n	Years of data	Mean (mm)	n	Mean (mm)	Min. (mm)	Max. (mm)	% > 55 mm	n	Years of data	Mean (mm)
Bogus	10	Mar 6-7	60	36.7	34	39	0.0%	120	2	36.5	0	-	-	-	-	0	0	-
Frame	11	Mar 12-14	90	37.4	34	42	0.0%	592	9	37.1	0	-	-	-	-	2	1	34.0
	12	Mar 19-21	90	37.3	35	42	0.0%	968	10	37.4	0	-	-	-	-	159	4	35.3
	13	Mar 26-28	90	37.3	32	42	0.0%	893	9	37.8	0	-	-	-	-	130	5	35.0
	14	Apr 2-3	60	37.0	32	43	0.0%	960	10	37.7	37	34.2	31	36	0.0%	281	9	34.9
	15	Apr 9-11	90	37.3	34	47	0.0%	811	9	38.0	76	34.6	31	39	0.0%	349	9	34.8
	16	Apr 16-18	90	38.4	33	48	0.0%	910	9	38.5	65	35.0	31	38	0.0%	665	9	35.0
	17	Apr 23-25	90	41.0	35	54	0.0%	906	10	40.6	25	34.2	32	44	0.0%	485	10	36.1
	18	Apr 30-May 2	90	40.1	38	68	4.4%	958	10	43.2	10	36.1	34	43	0.0%	499	9	36.8
	19	May 7-9	90	41.9	35	69	3.3%	766	10	44.4	5	38.2	34	49	0.0%	306	8	39.9
Klamathon	11	Mar 14	11	38.4	36	43	0.0%	41	2	40.3	0	-	-	-	-	0	0	-
Seine	12	Mar 20	7	37.1	36	39	0.0%	146	8	38.4	0	-	-	-	-	0	0	-
	13	Mar 28	22	37.6	35	40	0.0%	135	7	40.4	0	-	-	-	-	0	0	-
	14	Apr 4	30	39.9	37	43	0.0%	118	7	40.5	0	-	-	-	-	1	1	42.0
	15	Apr 11	30	42.8	36	50	0.0%	189	7	40.3	0	-	-	-	-	0	0	-
	16	Apr 17	30	44.8	36	62	6.7%	167	7	41.1	0	-	-	-	-	0	0	-
	17	Apr 25	30	47.0	37	62	6.7%	196	9	44.3	0	-	-	-	-	0	0	-
	18	May 2	30	49.5	38	61	13.3%	217	8	48.2	0	-	-	-	-	2	1	46.5
	19	May 9	12	49.2	46	57	8.3%	183	8	48.1	0	-	-	-	-	0	0	-
I-5	10	Mar 6-7	30	37.8	35	40	0.0%	30	1	37.8	0	-	-	-	-	0	0	-
RST's	11	Mar 12-14	90	37.6	32	41	0.0%	294	8	37.2	0	-	-	-	-	0	0	-
	12	Mar 19-21	90	37.9	35	42	0.0%	362	9	38.2	0	-	-	-	-	0	0	-
	13	Mar 26-28	76	38.1	34	44	0.0%	494	8	37.9	0	-	-	-	-	4	2	37.2
	14	Apr 2-4	90	39.3	35	51	0.0%	559	8	38.5	0	-	-	-	-	8	2	35.3
	15	Apr 9-11	90	43.0	33	55	0.0%	550	8	39.3	0	-	-	-	-	7	4	35.6
	16	Apr 16-18	90	45.2	36	64	8.9%	598	8	40.6	2	33.5	32	35	0.0%	29	7	34.6
	17	Apr 23-25	90	47.6	35	65	14.4%	545	8	43.6	2	33.5	32	35	0.0%	24	6	35.5
	18	Apr 30-May 2	90	47.8	36	71	20.0%	465	8	48.2	0	-	-	-	-	2	2	36.0
	19	May 7-9	90	50.2	37	77	20.0%	505	7	50.3	4	45.3	35	54	0.0%	19	6	43.3
I-5	11	-	0	-	-	-	-	191	6	37.8	0	-	-	-	-	0	0	-
Frame	12	-	0	-	-	-	-	504	9	37.7	0	-	-	-	-	20	4	34.0
	13	-	0	-	-	-	-	477	8	38.4	0	-	-	-	-	52	6	35.8
	14	-	0	-	-	-	-	510	8	39.0	0	-	-	-	-	69	7	35.3
	15	-	0	-	-	-	-	492	6	39.5	0	-	-	-	-	111	6	35.2
	16	Apr 17-18	60	42.8	35	57	3.3%	623	7	40.7	4	34.3	33	37	0.0%	169	7	35.4
	17	Apr 23-25	40	44.0	34	57	5.0%	461	7	42.8	2	32.5	32	33	0.0%	95	7	35.5
	18	Apr 30-May 2	20	45.5	37	65	10.0%	448	8	43.7	0	-	-	-	-	110	6	39.4
	19	May 7-8	5	39.8	37	46	0.0%	249	8	47.8	1	41.0	41	41	0.0%	48	3	38.2
Kinsman	11	Mar 12-14	70	39.6	34	52	0.0%	245	8	39.8	0	-	-	-	-	0	0	-
RST	12	Mar 19-21	90	42.3	34	56	1.1%	429	9	41.9	0	-	-	-	-	4	2	35.3
	13	Mar 27-28	90	46.3	38	62	8.9%	532	7	44.1	0	-	-	-	-	29	2	36.1
	14	Apr 2-4	90	45.5	32	66	6.7%	623	9	46.6	0	-	-	-	-	43	7	35.8
	15	Apr 9-11	90	48.4	35	70	13.3%	567	9	47.1	7	35.6	34	37	0.0%	46	6	35.3
	16	Apr 16-18	90	52.6	35	73	27.8%	624	9	51.7	0	-	-	-	-	87	5	33.5
	17	Apr 23-25	90	50.5	36	71	15.6%	587	10	52.7	5	38.8	37	42	0.0%	20	5	37.9
	18	Apr 30-May 2	89	55.0	38	82	36.0%	475	8	59.9	6	41.3	34	48	0.0%	24	6	39.8
	19	May 7-9	90	56.6	35	97	53.3%	604	9	59.1	9	47.0	37	57	11.1%	76	8	45.0

Note: Frame net trapping at the I-5 site was temporarily discontinued Survey Weeks 2 through 6 due to flows too high for the equipment.

Table 3. In-season summary of clinical signs of disease in young-of-the-year Chinook salmon by site at the Bogus, Klamathon, I-5, and Kinsman sites on the mainstem Klamath River, 2013.

						Belly Condition			Gills				
										Color		Condition	
	Calendar	Sampling	Weekly Mean	Water Temp. (F) [b]		Sample	Distended		Sample	Pale or Worse		Eroded or Fungal	
Site	Week	Dates	Flow (cfs) [a]	Min	Max	Size	n	%	Size	n	%	n	%
Bogus	10	Mar 6-8	1269	39.7	41.1	51	0	0.0%	0	-	-	-	-
	11	Mar 12-14	1541	41.5	42.2	90	0	0.0%	0	-	-	-	-
	12	Mar 19-21	1860	41.0	45.5	90	0	0.0%	0	-	-	-	-
	13	Mar 26-28	2240	46.7	47.1	90	0	0.0%	0	-	-	-	-
	14	Apr 2-3	2066	50.1	50.5	60	0	0.0%	0	-	-	-	-
	15	Apr 9-11	1526	52.1	52.5	90	0	0.0%	2	0	0.0%	0	0.0%
	16	Apr 16-18	1544	51.0	52.1	90	0	0.0%	4	0	0.0%	0	0.0%
	17	Apr 23-25	1171	53.7	54.5	90	0	0.0%	19	1	5.3%	0	0.0%
	18	Apr 30-May 2	1156	55.5	57.7	90	0	0.0%	7	3	42.9%	1	14.3%
	19	May 7-9	1161	57.9	60.9	90	0	0.0%	13	1	7.7%	0	0.0%
Klamathon	11	Mar 14	1541	42.8	42.8	11	0	0.0%	0	-	-	-	-
	12	Mar 20	1860	42.0	42.0	7	0	0.0%	0	-	-	-	-
	13	Mar 28	2240	48.2	48.2	22	0	0.0%	0	-	-	-	-
	14	Apr 4	2066	-	-	30	0	0.0%	0	-	-	-	-
	15	Apr 11	1526	53.0	53.0	30	0	0.0%	10	0	0.0%	0	0.0%
	16	Apr 17	1544	53.7	53.7	30	0	0.0%	12	0	0.0%	0	0.0%
	17	Apr 25	1171	55.5	55.5	30	0	0.0%	19	0	0.0%	0	0.0%
	18	May 2	1156	55.7	55.7	30	0	0.0%	24	0	0.0%	0	0.0%
	19	May 9	1161	60.9	60.9	12	0	0.0%	12	1	8.3%	0	0.0%
I-5	10	Mar 7-8	1269	39.3	42.4	30	0	0.0%	0	-	-	-	-
	11	Mar 12-14	1541	41.7	42.9	89	0	0.0%	0	-	-	-	-
	12	Mar 19-21	1860	42.2	45.8	90	0	0.0%	0	-	-	-	-
	13	Mar 26-28	2240	45.6	47.1	72	0	0.0%	0	-	-	-	-
	14	Apr 2-4	2066	48.7	50.9	90	0	0.0%	9	0	0.0%	0	0.0%
	15	Apr 9-11	1526	49.4	49.6	90	0	0.0%	35	0	0.0%	0	0.0%
	16	Apr 16-18	1544	49.4	50.3	150	0	0.0%	56	0	0.0%	1	1.8%
	17	Apr 23-25	1171	51.2	51.6	117	0	0.0%	74	0	0.0%	2	2.7%
	18	Apr 30-May 2	1156	54.6	56.8	109	0	0.0%	59	0	0.0%	1	1.7%
	19	May 7-9	1161	57.5	59.1	95	0	0.0%	61	0	0.0%	1	1.6%
Kinsman	10	Mar 8	2114	42.3	42.3	0	-	-	0	-	-	-	-
	11	Mar 12-14	2366	45.1	46.0	68	0	0.0%	10	0	0.0%	0	0.0%
	12	Mar 19-21	2798	43.8	48.6	90	0	0.0%	27	0	0.0%	0	0.0%
	13	Mar 26-28	3045	48.7	48.9	90	0	0.0%	47	0	0.0%	0	0.0%
	14	Apr 2-4	3410	51.3	52.7	90	0	0.0%	45	0	0.0%	0	0.0%
	15	Apr 9-11	2831	50.2	58.8	90	0	0.0%	64	0	0.0%	0	0.0%
	16	Apr 16-18	2481	50.5	56.7	90	0	0.0%	84	0	0.0%	0	0.0%
	17	Apr 23-25	1973	55.0	57.6	90	0	0.0%	81	6	7.4%	1	1.2%
	18	Apr 30-May 2	1946	55.4	56.3	90	0	0.0%	89	7	7.9%	0	0.0%
	19	May 7-9	1994	58.6	60.3	90	2	2.2%	89	25	28.1%	3	3.4%

[a] discharge below IGD used for Bogus, Klamathon, and I-5 sites; flow at Kinsman Site is Klamath River flow at Seiad minus Scott River flow

[b] temperature recorded at time of trap check/seine (true daily ranges from temperature loggers will become available at the end of the season)

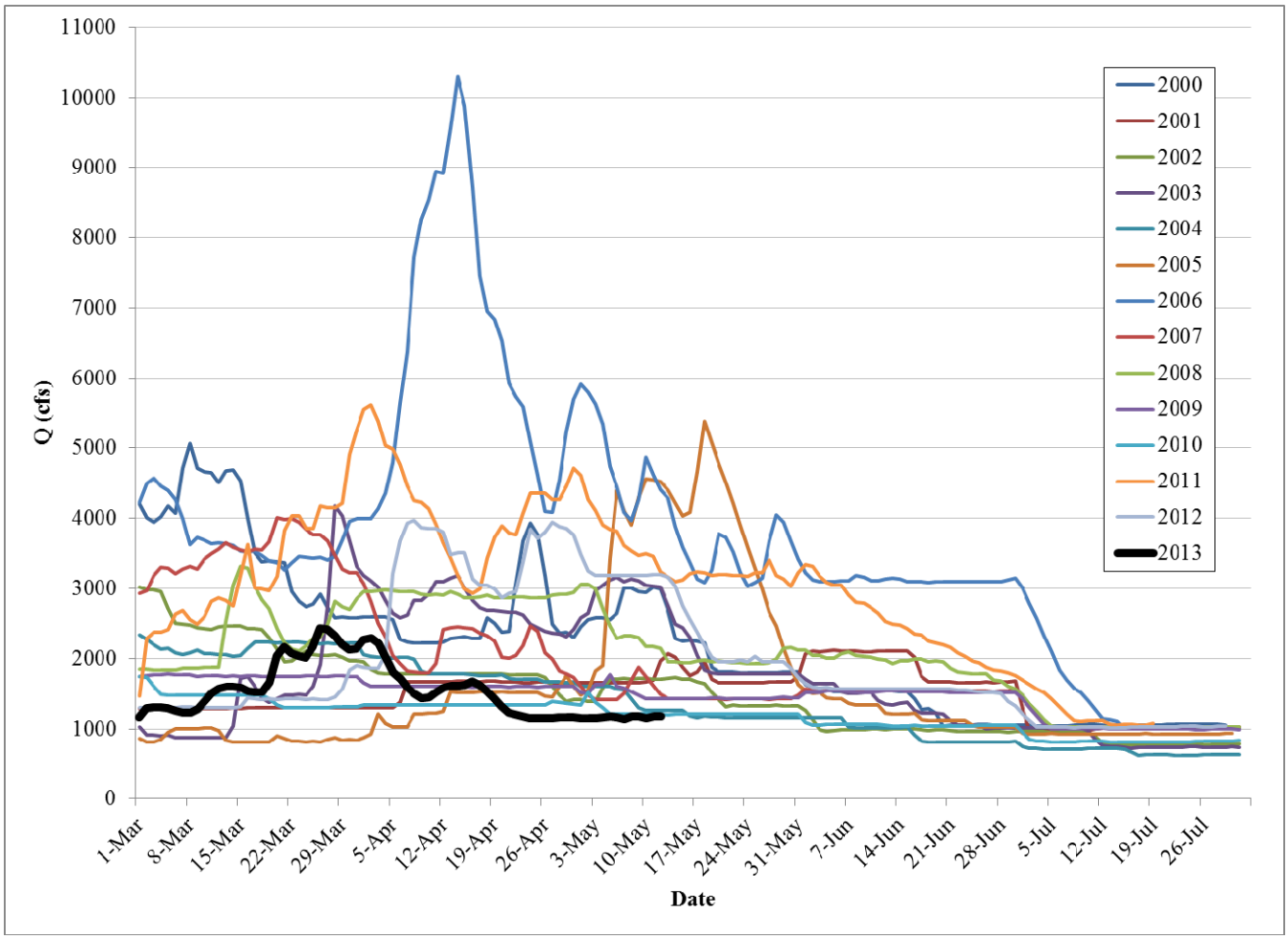

Figure 1. Daily mean discharge below Iron Gate Dam, Klamath River (USGS Gaging Station 11516530) from March through July, 2000 to 2013.

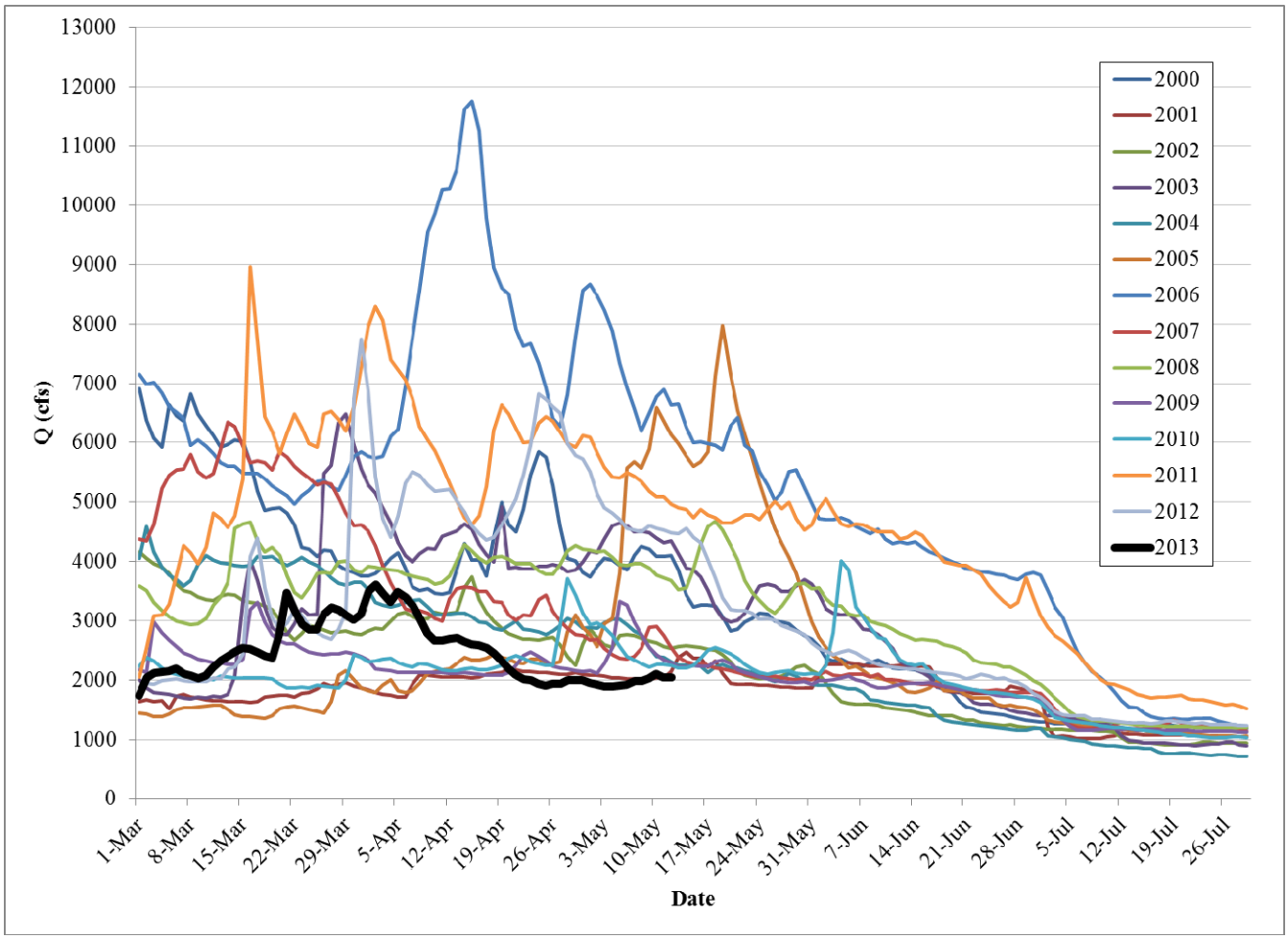

Figure 2. Klamath River daily mean discharge at the Kinsman Trap Site from March through July, 2000 to 2013. Flow measurements are not available at this location. Therefore Klamath River flow near Seiad Valley, CA (USGS Gaging Station 11520500) minus flow from the Scott River near Fort Jones, CA (USGS 11511950) is used as a surrogate.