



Klamath River Outmigrant Monitoring Update – March 24, 2014

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 (CA/NV FHC) 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 S³ (Stream Salmonid Simulator) Chinook salmon production model, among others.

Monitoring this season began on February 18, 2014 at three sites on the mainstem Klamath River 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. Monitoring will continue until all wild and hatchery juvenile Chinook salmon have moved downstream of the study area.

Supplemental migration timing and magnitude and fish size data are also collected by weekly depletion seining at the Klamathon (Copco-Ager) Bridge crossing (“Klamathon Seine 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 trap and seine 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 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 (Figure 2) from March through July 2000 to 2014 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 discharge 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 non adipose fin-clipped (No Clip) and adipose fin-clipped (AD Clip) Chinook salmon and steelhead and non-maxillary clipped (No Clip) and left maxillary-clipped (LM Clip) coho salmon by trap at the Bogus, I-5, and Kinsman trap sites on the mainstem Klamath River, 2014. Note that RST = rotary screw trap, UPS = upstream, DNS = downstream, and YOY = young-of-the-year.

Trap	Survey Week	Sample Dates	Q (cfs) ^a		Water Temp. (F) ^b		Trapping Days	Chinook (<i>O. tshawytscha</i>)			Coho (<i>O. kisutch</i>)			Steelhead (<i>O. mykiss</i>)			
			Min	Max	Min	Max		YOY			Age 1 +			Age 1 +			
								No Clip	AD Clip	Age 1+	YOY	No Clip	LM Clip	YOY	No Clip	AD Clip	
Bogus Frame	1	2/19-2/21	1120	1240	40.8	41.3	3	21.67	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00	0.00
	2	2/26-2/28	983	1150	42.8	43.7	3	84.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3	3/4-3/7	1030	1060	44.2	45.3	4	501.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4	3/11-3/14	1150	1680	46.2	46.4	4	767.75	0.00	0.00	0.75	0.00	0.00	0.00	0.25	0.00	0.00
	5	3/18-3/21	1730	1880	46.9	48.7	4	591.25	0.00	0.00	6.00	0.00	1.75	0.00	0.00	0.00	0.00
I-5 UPS RST	2	2/28-2/28	1410	983	43.1	43.1	1	15.00	0.00	0.00	0.00	0.00	0.00	0.00	2.00	0.00	0.00
	3	3/4-3/7	1030	1060	43.5	47.3	4	22.00	0.00	0.00	0.00	0.25	0.00	0.00	0.75	0.00	0.00
	4	3/11-3/14	1150	1650	46.4	47.1	2	67.00	0.00	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00
	5	3/18-3/21	1730	1880	46.5	48.0	4	17.00	0.00	0.25	0.00	0.25	29.00	0.00	0.50	0.00	0.00
	5	3/18-3/21	1730	1880	46.5	48.0	4	17.00	0.00	0.25	0.00	0.25	29.00	0.00	0.50	0.00	0.00
I-5 DNS RST	2	2/28-2/28	1410	983	43.1	43.1	1	12.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3	3/4-3/7	1030	1060	43.5	47.3	4	38.50	0.00	0.00	0.00	0.00	0.00	0.00	0.50	0.00	0.00
	4	3/11-3/14	1150	1650	46.4	47.1	2	87.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	3/18-3/21	1730	1880	46.5	48.0	4	95.75	0.00	0.00	0.25	0.00	14.25	0.00	0.50	0.00	0.00
	5	3/18-3/21	1730	1880	46.5	48.0	4	95.75	0.00	0.00	0.25	0.00	14.25	0.00	0.50	0.00	0.00
I-5 Frame	1	2/20-2/21	1160	1240	40.6	40.8	1	3.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Kinsman RST	2	2/27-2/28	1410	1673	45.1	46.9	2	112.50	0.00	0.00	0.00	6.00	0.00	0.00	2.50	0.00	0.00
	3	3/4-3/7	1918	2717	46.9	48.6	4	524.25	0.00	0.25	0.00	4.00	0.00	0.00	5.50	0.00	0.00
	5	3/18-3/21	2390	2515	47.5	50.1	4	1134.50	0.00	0.00	0.00	1.50	0.50	0.00	1.50	0.00	0.00



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, 2014. Note that RST = rotary screw trap and YOY = young-of-the-year.

Site	Calendar Week	2014 sampling dates	YOY Chinook (natural) - fork length data							YOY coho - fork length data							
			2014				Last 10-years			2014				Last 10-years			
			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
Bogus Frame	8	Feb 19-20	39	35.1	29	40	0.0%	39	1	35.1	0	-	-	-	0	0	-
	9	Feb 27	30	37.1	32	40	0.0%	30	1	37.1	0	-	-	-	0	0	-
	10	Mar 4-6	90	37.7	32	42	0.0%	210	3	36.9	0	-	-	-	0	0	-
	11	Mar 11-13	90	36.9	31	42	0.0%	592	9	37.1	0	-	-	-	2	1	34.0
	12	Mar 18-20	90	37.5	32	43	0.0%	938	10	37.4	10	34.0	32	35	0.0%	116	4
Klamathon Seine	10	Mar 6	1	37.0	37	37	0.0%	2	2	39.5	0	-	-	-	0	0	-
	11	Mar 13	30	39.4	35	42	0.0%	71	3	40.0	0	-	-	-	0	0	-
	12	Mar 20	30	39.4	35	45	0.0%	176	9	38.5	0	-	-	-	0	0	-
I-5 RST's	10	Mar 4-6	90	38.2	30	43	0.0%	120	2	38.0	0	-	-	-	0	0	-
	11	Mar 11	29	38.8	34	43	0.0%	310	8	37.2	0	-	-	-	0	0	-
	12	Mar 18-20	90	38.6	35	46	0.0%	422	9	37.9	0	-	-	-	0	0	-
I-5 Frame	8	Feb 20	3	37.7	37	39	0.0%	3	1	37.7	0	-	-	-	0	0	-
	9	-	0	-	-	-	-	0	0	-	0	-	-	-	0	0	-
	10	-	0	-	-	-	-	0	0	-	0	-	-	-	0	0	-
	11	-	0	-	-	-	-	131	5	37.6	0	-	-	-	0	0	-
	12	-	0	-	-	-	-	384	8	37.5	0	-	-	-	18	3	33.7
Kinsman RST	9	Feb 27	30	37.4	33	41	0.0%	30	1	37.4	0	-	-	-	0	0	-
	10	Mar 4-6	90	37.6	33	50	0.0%	104	2	38.9	0	-	-	-	0	0	-
	11	Mar 12-13	60	40.0	33	49	0.0%	286	8	39.7	0	-	-	-	0	0	-
	12	Mar 18-20	90	41.4	31	64	2.2%	508	9	41.6	0	-	-	-	4	2	35.3

Note: Frame net trapping at the I-5 site was temporarily discontinued Calendar Weeks 9 through 12 due to flawed sets and 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, 2014.

Site	Calendar Week	Sampling Dates	Weekly Mean Flow (cfs) ^a	Water Temp. (F) ^b		Belly Condition			Gills				
				Min	Max	Sample Size	Distended		Sample Size	Color		Condition	
							n	%		n	%	n	%
Bogus	8	Feb 19-20	1130	40.8	41.1	12	0	0.0%	0	-	-	-	-
	9	Feb 27	1149	43.3	43.3	24	0	0.0%	0	-	-	-	-
	10	Mar 4-6	1040	44.2	45.3	77	0	0.0%	0	-	-	-	-
	11	Mar 11-13	1399	46.2	46.4	62	0	0.0%	0	-	-	-	-
	12	Mar 18-20	1807	46.9	48.7	82	0	0.0%	0	-	-	-	-
Klamathon	10	Mar 6	1040	-	-	1	0	0.0%	0	-	-	-	-
	11	Mar 13	1399	47.3	47.3	25	0	0.0%	0	-	-	-	-
	12	Mar 20	1807	52.0	52.0	29	0	0.0%	1	0	0.0%	0	0.0%
I-5	8	Feb 20	1130	40.8	40.8	2	0	0.0%	0	-	-	-	-
	10	Mar 4-6	1040	43.5	47.3	79	0	0.0%	0	-	-	-	-
	11	Mar 11	1399	46.4	46.4	26	0	0.0%	0	-	-	-	-
	12	Mar 18-20	1807	46.5	48.0	88	0	0.0%	4	1	25.0%	0	0.0%
Kinsman	9	Feb 27	1755	46.9	46.9	27	0	-	0	-	-	-	-
	10	Mar 4-6	2245	48.0	48.6	90	0	0.0%	5	0	0.0%	0	0.0%
	11	Mar 12-13	2965	45.3	47.1	60	0	0.0%	12	3	25.0%	0	0.0%
	12	Mar 18-20	2495	47.5	49.1	90	0	0.0%	25	1	4.0%	0	0.0%

^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)

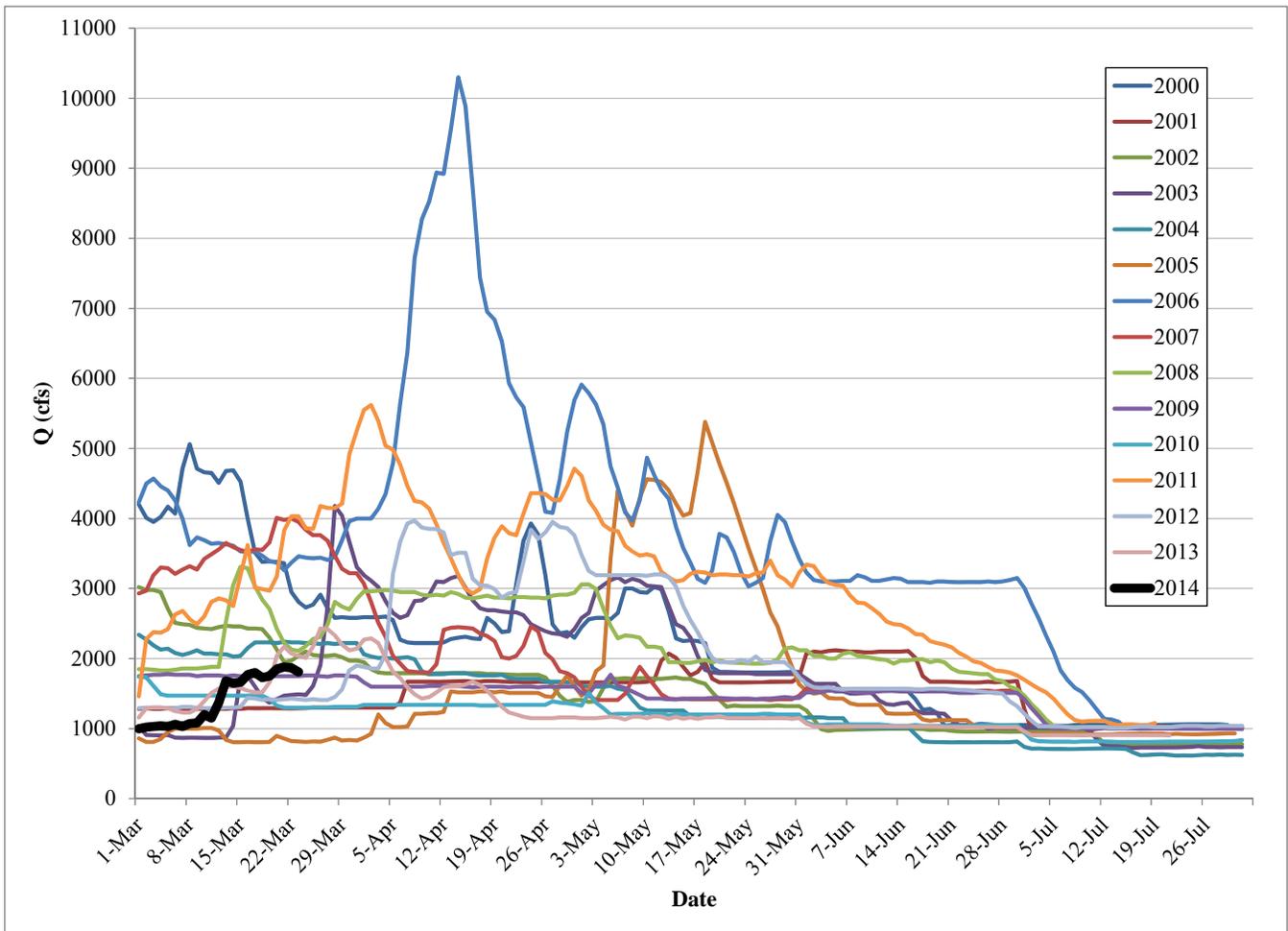


Figure 1. Daily mean discharge below Iron Gate Dam, Klamath River (USGS Gaging Station 11516530) from March through July, 2000 to 2014.

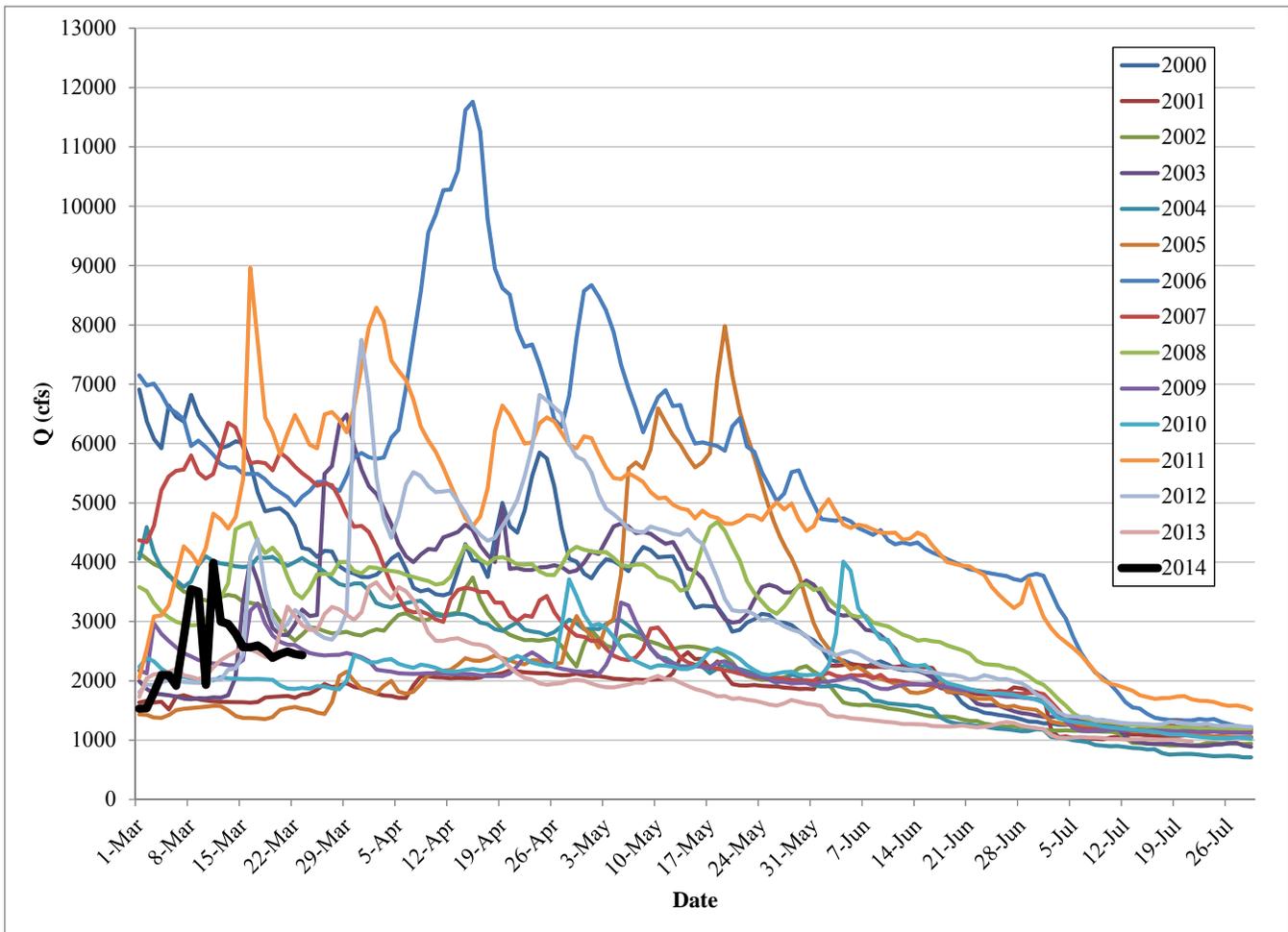


Figure 2. Klamath River daily mean discharge at the Kinsman Trap Site from March through July, 2000 to 2014. Flow measurements are not available at this location. Therefore Klamath River flow near Seiad Valley, CA (USGS Gaging Station 11520500) minus flow from the Scott River near Fort Jones, CA (USGS 11511950) is used as a surrogate.