United States Department of the Interior

FISH AND WILDLIFE SERVICE

CA-NV Fish Health Center
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Memorandum

DATE: June 13, 2022

TO: Nicholas Som, Statistician/Acting FAC Lead - Arcata Office USFWS

FROM: Anne Voss, Fish Biologist – CA-NV Fish Health Center

The California-Nevada Fish Health Center (Center) works collaboratively with the Service's Arcata Fish and Wildlife Office (AFWO) and the Karuk and Yurok tribes to monitor the prevalence of *Ceratonova shasta* infections in juvenile salmon in the Klamath River. The Center coordinates this annual monitoring project, provides laboratory support, and generates an annual summary report for the study. AFWO and tribal biologists are responsible for collecting fish samples for the Center.

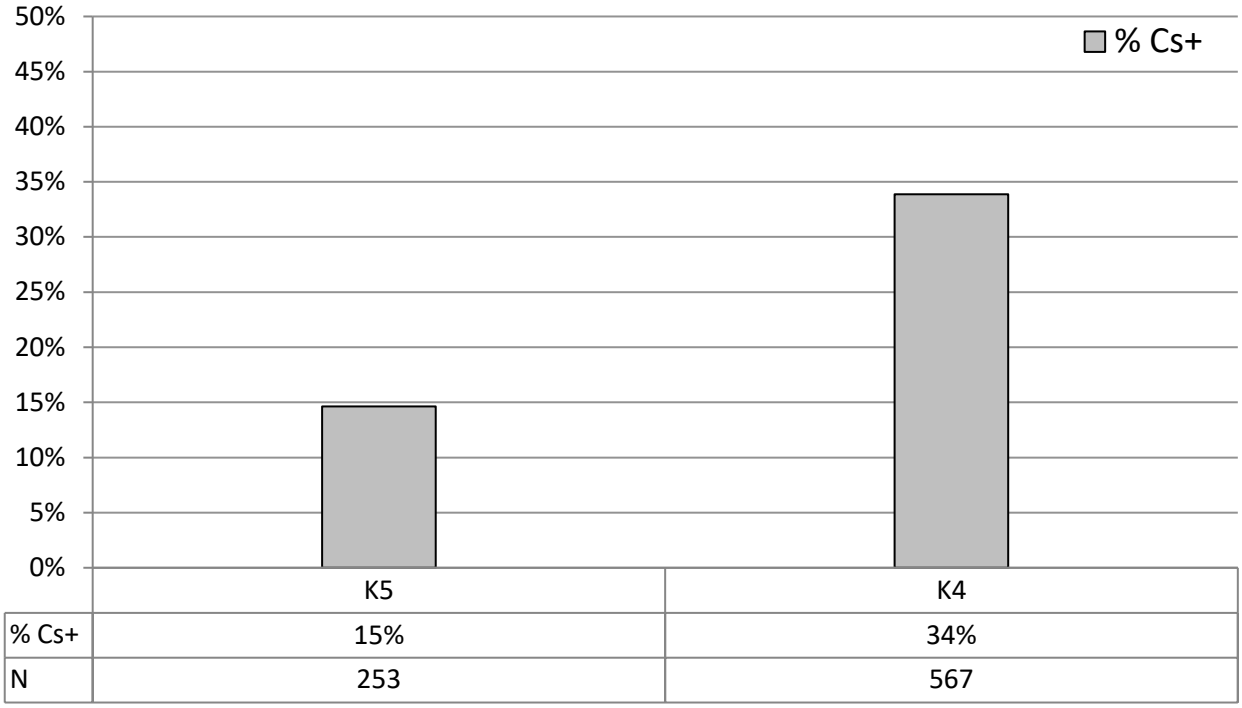
For the 2022 outmigration season, the Center will strive to provide Quantitative Polymerase Chain Reaction (QPCR) testing of juvenile Chinook salmon collected from the Shasta to Scott (K4 or "Kinsman") reach in a time-sensitive manner. The goal is to provide weekly-stratified estimates of *C. shasta* prevalence of infection (POI) and DNA copy number to managers on a weekly basis during the early outmigration season.

Prevalence of infection is the measure used in medicine and epidemiology to define individuals affected by a disease at a particular point in time, within a given sample set. Also known as Point Prevalence, it describes the proportion (percentage) of a group that has the condition (infection) at a specific point in time. The quantity of parasite DNA (DNA copy number) is provided, when applicable, to evaluate the parasite load within the fish.

To date, QPCR testing has been performed for natural fish collected from March 22 through April 12 in the Iron Gate Dam to Shasta River reach (K5) and the Shasta River to Scott River reach (K4). The first *C. shasta* detection occurred on March 29.

Iron Gate Hatchery released fish on April 12, 2022. Fish collected after this date were from the combined natural and hatchery populations where the ratio of the two populations in the weekly sample is unknown. To date, QPCR testing has been performed for fish collected from this combined population from April 19 through May 24 in the K5 reach and April 20 through May 31 in the K4 reach.

Overall, *Ceratonova shasta* has been detected in 28% (229/820) of fish tested.
All data is preliminary and subject to revision prior to the final review and annual report.



	K5	K4
% Cs+	15%	34%
N	253	567

Figure 1. *Ceratonova shasta* prevalence of infection (POI) in juvenile Chinook salmon captured in the Iron Gate Dam to Shasta River reach (K5) and the Shasta River to Scott River reach (K4). Percent positive by Quantitative Polymerase Chain Reaction (QPCR) testing.

Table 1. Weekly-stratified prevalence of infection (POI) of *Ceratonova shasta* in juvenile Chinook salmon captured in the Iron Gate Dam to Shasta River reach (K5) and the Shasta River to Scott River reach (K4).

	Iron Gate Dam to Shasta – K5 Reach					Shasta to Scott - K4 Reach				
Sample Week	*Date Collected*	*Number Sampled*	*Number Cs Positive*	*Cs POI*	*DNA copy number over 3 logs*	*Date Collected*	*Number Sampled*	*Number Cs Positive*	*Cs POI*	*DNA copy number over 3 logs*
1	3/22/2022	29	0	0%	n/a	3/22/2022	29	0	0%	n/a
2	3/29/2022 3/30/2022	30	1	3%	0%	3/29/2022	30	0	0%	n/a
3	4/05/2022	30	0	0%	n/a	4/05/2022	60	0	0%	n/a
4	4/12/2022	30	0	0%	n/a	4/12/2022	60	10	17%	2%
5	4/19/2022	30	2	7%	0%	4/20/2022	60	38	63%	0%
6	4/26/2022	30	4	13%	0%	4/26/2022	30	14	47%	0%
7	5/3/2022	14*	1	7%	0%	5/02/2022	60	33	55%	12%
8	5/10/2022	30	4	13%	0%	5/09/2022	60	38	63%	5%
9	*test results pending*					5/16/2022	64	28	44%	3%
10	5/24/2022	30	25	83%	53%	5/26/2022	60	17	28%	3%
11	*test results pending*					5/31/2022	54	14	26%	0%

* Partial testing. Test results from the remaining 16 samples from week 7 are pending.

** Fish collected in week 1 through 4 were of natural origin. Fish collected in week 5 through week 11 were from combined natural and hatchery populations. No CWTs have been collected or tested.