



United States Department of the Interior



FISH AND WILDLIFE SERVICE

CA-NV Fish Health Center
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Memorandum

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TO: Bill Pinnix, Supervisory Fish Biologist - Arcata Office USFWS
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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 fish collected from March 22 through June 7 in the upper reaches between Iron Gate Dam and the Scott River (K5 and K4 reaches). Testing has been performed through the end of April for fish collected between the Scott River and the Trinity River confluence (K3 and K2 reaches). 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. Sampling in K5 and K4 concluded the week of June 5.

Overall, *Ceratonova shasta* has been detected in 30% (336/1113) of fish tested. All data is preliminary and subject to revision prior to the final review and annual report.

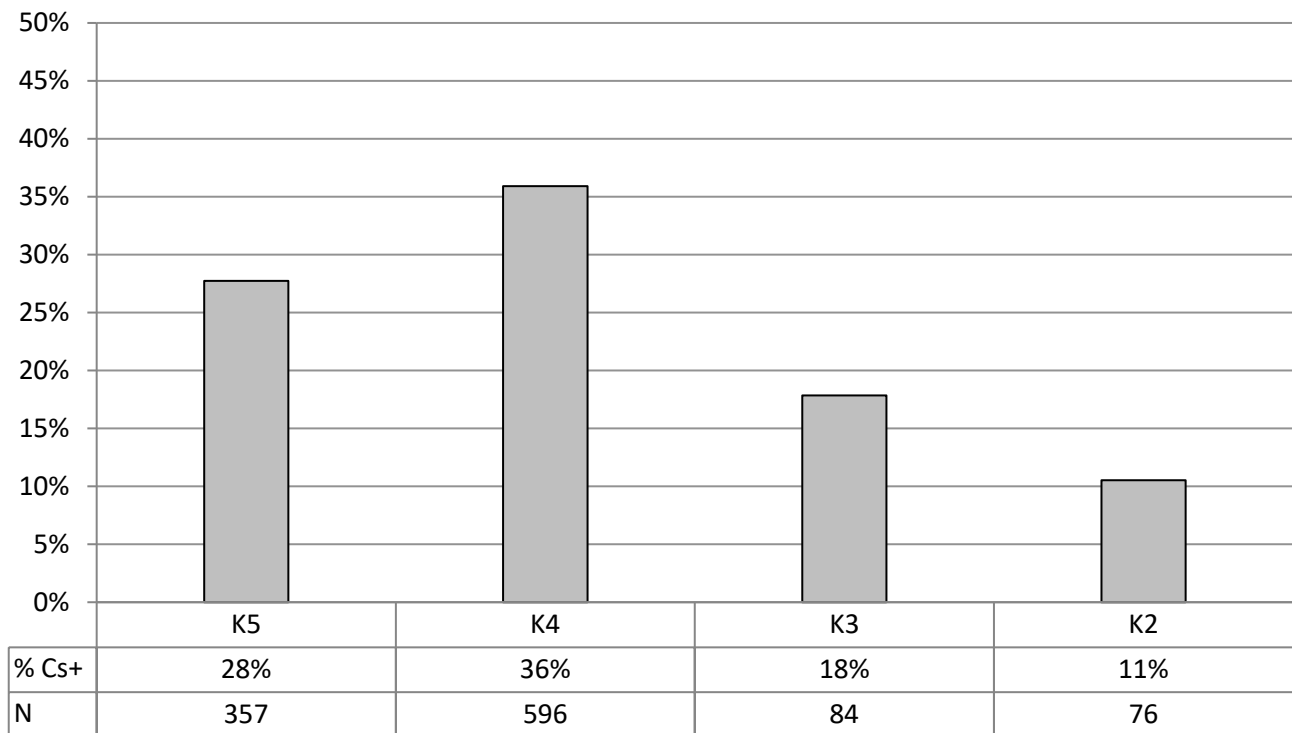


Figure 1. *Ceratonova shasta* prevalence of infection (POI) in juvenile Chinook salmon. K5 - Iron Gate Dam to Shasta River. K4 - Shasta River to Scott River. K3 - Scott River to Salmon River. K2 - Salmon River to Trinity River. Percent positive by Quantitative Polymerase Chain Reaction (QPCR) testing.

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).

Sample Week	Iron Gate Dam to Shasta – K5 Reach					Shasta to Scott - K4 Reach				
	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	5/03/2022	30	4	13%	0%	5/02/2022	60	33	55%	12%
8	5/10/2022	30	4	13%	0%	5/09/2022	60	38	63%	5%
9	5/17/2022	28	21	75%	14%	5/16/2022	64	28	44%	3%
10	5/24/2022	30	25	83%	53%	5/26/2022	60	17	28%	3%
11	6/01/2022	30	22	73%	30%	5/31/2022	54	14	26%	0%
12	6/07/2022	30	16	53%	17%	6/06/2022	29	22	76%	0%

* Fish collected in week 1 through 4 were of natural origin. Fish collected in week 5 through week 12 were from combined natural and hatchery populations. No CWTs have been collected or tested.

Table 2. Weekly-stratified prevalence of infection (POI) of *Ceratonova shasta* in juvenile Chinook salmon captured in the Scott River to Salmon River reach (K3) and the Salmon River to Trinity River reach (K2).

Sample Week	Scott to Salmon – K3 Reach					Salmon to TR – K2 Reach				
	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	<i>no fish collected</i>					3/24/2022	19	0	0%	n/a
2	<i>no fish collected</i>					3/31/2022	20	0	0%	n/a
3	4/05/2022	21	0	0%	n/a	<i>fish collected but not tested due to poor tissue quality</i>				
4	4/11/2022	21	3	14%	0%	4/13/2022	20	3	15%	0%
5	4/18/2022	22	1	5%	0%	<i>no fish collected</i>				
6	4/26/2022	20	11	55%	10%	4/27/2022 4/28/2022 4/29/2022	17	5	29%	12%

* All K2 samples tested to date were collected at the Weitchpec rotary screw trap.