



United States Department of the Interior



FISH AND WILDLIFE SERVICE

CA-NV Fish Health Center
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Memorandum

DATE: July 1, 2020

TO: Nicholas Hetrick, FAC Program Lead – Arcata Fish and Wildlife Office

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* and *Parvicapsula minibicornis* 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.

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 24 through May 19 in the upper Shasta River to Scott River (K4) reach. Testing has been performed for fish collected April 14 through June 3 in the Scott River to Salmon River (K3) reach. Testing has been performed for fish collected June 2 in the Salmon River to Trinity River (K2) reach.

Natural fish collected in K4 were monitored in real time for seven weeks of monitoring, and the first *C. shasta* detection occurred the week of April 12. *Parvicapsula minibicornis* was first detected the week of April 5.

Iron Gate Hatchery released brood year 2019 Chinook salmon smolts on May 22. Results presented in the tables below do not include any fish of hatchery origin (adipose fin clipped).

Overall, *Ceratonova shasta* has been detected in 65% (417/642) of fish tested. *Parvicapsula minibicornis* has been detected in 74% (477/642) of fish tested. All data is preliminary and subject to revision prior to final review and annual report.

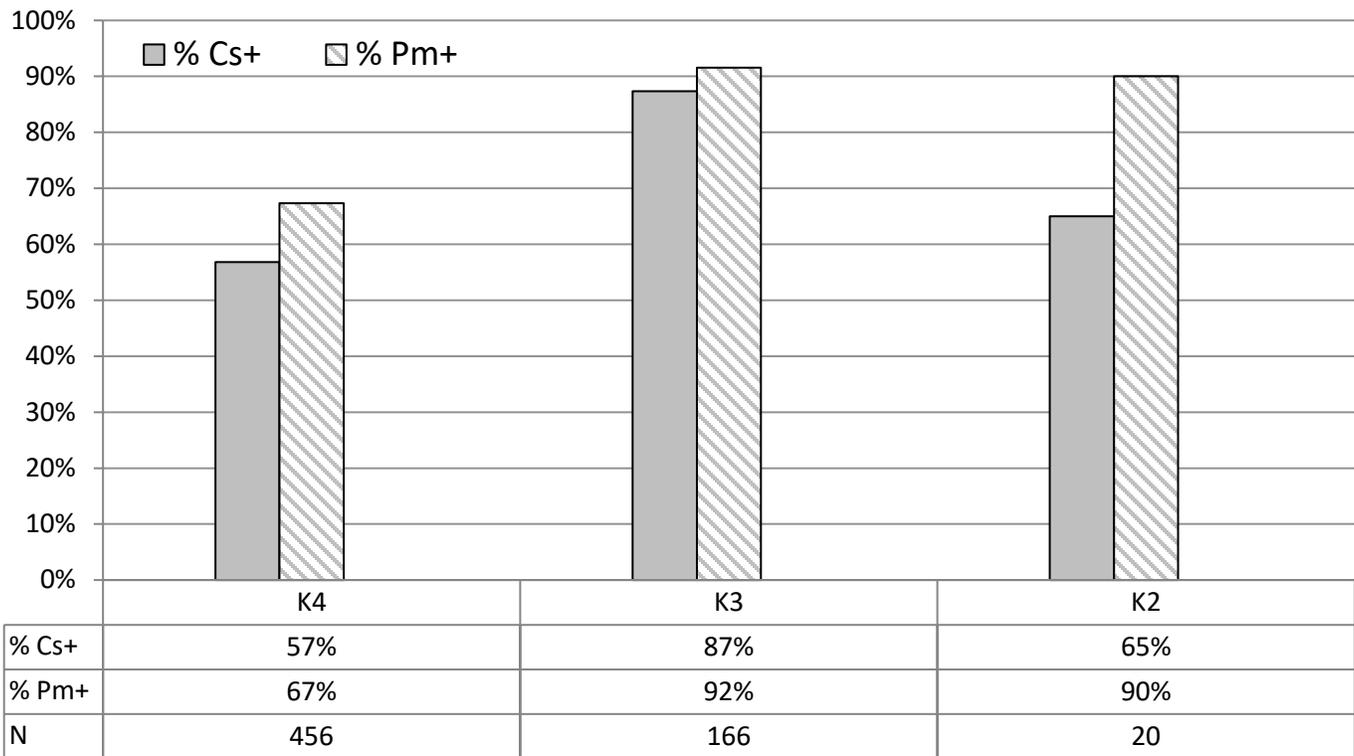


Figure 1. *Ceratonova shasta* and *Parvicapsula minibicornis* prevalence of infection (POI) by sampling reach. Percent positive by Quantitative Polymerase Chain Reaction (QPCR) testing.

Table 1. Weekly-stratified prevalence of infection (POI) of *Ceratonova shasta* in juvenile Chinook salmon captured in the Shasta River to Scott River reach (K4) and the Scott River to Salmon River reach (K3) of the Klamath River.

Sample Week	Shasta to Scott - K4 Reach					Scott to Salmon - K3 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	3/24/2020 3/25/2020	30	0	0%	n/a	Not Sampled				
2	4/01/2020	30	0	0%	n/a	Not Sampled				
3	4/07/2020	58	0	0%	n/a	Not Sampled				
4	4/14/2020	60	16	27%	0%	4/14/2020	21	14	67%	0%
5	4/21/2020	60	35	58%	5%	4/20/2020	20	18	90%	0%
6	4/28/2020	60	58	97%	55%	4/27/2020	20	20	100%	90%
7	5/05/2020	60	59	98%	90%	5/04/2020	21	21	100%	52%
8	5/12/2020	60	59	98%	43%	5/12/2020	22	21	95%	73%
9	5/19/2020	38	32	84%	21%	5/18/2020	23	23	100%	30%
10	<i>test results pending</i>					5/27/2020	19	18	95%	5%
11	<i>test results pending</i>					6/03/2020	20	10	50%	10%

Table 2. Weekly-stratified prevalence of infection (POI) of *Ceratonova shasta* in juvenile Chinook salmon captured in the Salmon River to Trinity River reach (K2) of the Klamath River. Sampling in K2 started the week of May 31 (week 11).

Salmon to Trinity – K2 Reach

<i>Sample Week</i>	<i>Date Collected</i>	<i>Number Sampled</i>	<i>Number Cs Positive</i>	<i>Cs POI</i>	<i>DNA copy number over 3 logs</i>
11	6/2/2020	20	13	65%	5%

Table 3. Weekly-stratified prevalence of infection (POI) of *Parvicapsula minibicornis* in juvenile Chinook salmon captured in the Shasta River to Scott River reach (K4) and the Scott River to Salmon River reach (K3) of the Klamath River.

Sample Week	Shasta to Scott - K4 Reach				Scott to Salmon - K3 Reach			
	Date Collected	Number Sampled	Number Pm Positive	Pm POI	Date Collected	Number Sampled	Number Pm Positive	Pm POI
1	3/24/2020 3/25/2020	30	0	0%	Not Sampled			
2	4/01/2020	30	0	0%	Not Sampled			
3	4/07/2020	58	2	3%	Not Sampled			
4	4/14/2020	60	46	77%	4/14/2020	21	10	48%
5	4/21/2020	60	45	75%	4/20/2020	20	18	90%
6	4/28/2020	60	58	97%	4/27/2020	20	20	100%
7	5/05/2020	60	59	98%	5/04/2020	21	21	100%
8	5/12/2020	60	60	100%	5/12/2020	22	22	100%
9	5/19/2020	38	37	97%	5/18/2020	23	23	100%
10	<i>test results pending</i>				5/27/2020	19	18	95%
11	<i>test results pending</i>				6/03/2020	20	20	100%

Table 4. Weekly-stratified prevalence of infection (POI) of *Parvicapsula minibicornis* in juvenile Chinook salmon captured in the Salmon River to Trinity River reach (K2) of the Klamath River. Sampling in K2 started the week of May 31 (week 11).

<i>Sample Week</i>	<i>Date Collected</i>	<i>Number Sampled</i>	<i>Number Cs Positive</i>	<i>Cs POI</i>
11	6/2/2020	20	18	90%