



United States Department of the Interior



FISH AND WILDLIFE SERVICE

CA-NV Fish Health Center
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Memorandum

DATE: August 2, 2018

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

FROM: Kimberly True, Assistant Center Director – 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 and preparing fish samples for delivery to 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. Other important factors including *C. shasta* exposure dose, pathogen burden within the fish, impact on fish tissues and the rate of disease progression have to be evaluated to assess the overall disease impacts to the group of fish that are sampled.

To date, QPCR testing has been performed for natural fish collected from March 26 through June 6 in the upper Shasta to Scott (K4) reach, April 9 through June 11 in the Scott to Salmon (K3) reach, and June 4 through June 11 in the Salmon to Trinity River reach (K2). Natural fish collected in K4 were monitored in real time for the first eleven weeks of monitoring (Julian week 13-23), and the first detection occurred the week of April 22. The highest *C. shasta* POI (47%) in naturals occurred in fish collected the week of April 29 in the Shasta to Scott reach (K4).

QPCR testing of mixed origin (natural and/or hatchery) juvenile Chinook occurred following Iron Gate Hatchery release on June 8. CWTs were collected for three weeks in the Shasta to Scott reach (K4), however coded-wire tagged juvenile Chinook were difficult to locate and sample numbers were limited.

Overall, *Ceratonova shasta* has been detected in 20% (176/874) of fish tested. *Parvicapsula minibicornis* has been detected in 78% (677/853) of fish tested. All data is preliminary and subject to revision.

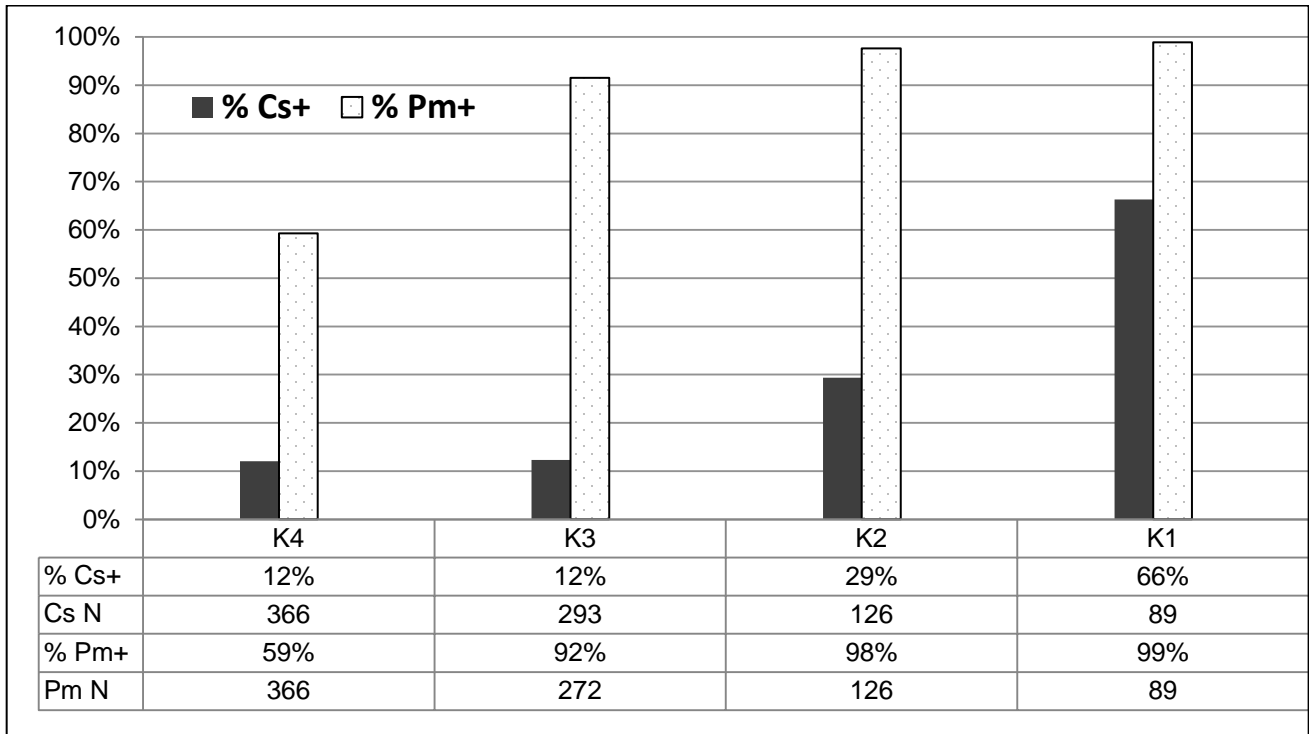


Figure 1. *Ceratonova shasta* and *Parvicapsula minibicornis* prevalence of infection (POI) by sampling reach. Percent positive by Quantitative Polymerase Chain Reaction (QPCR) testing.

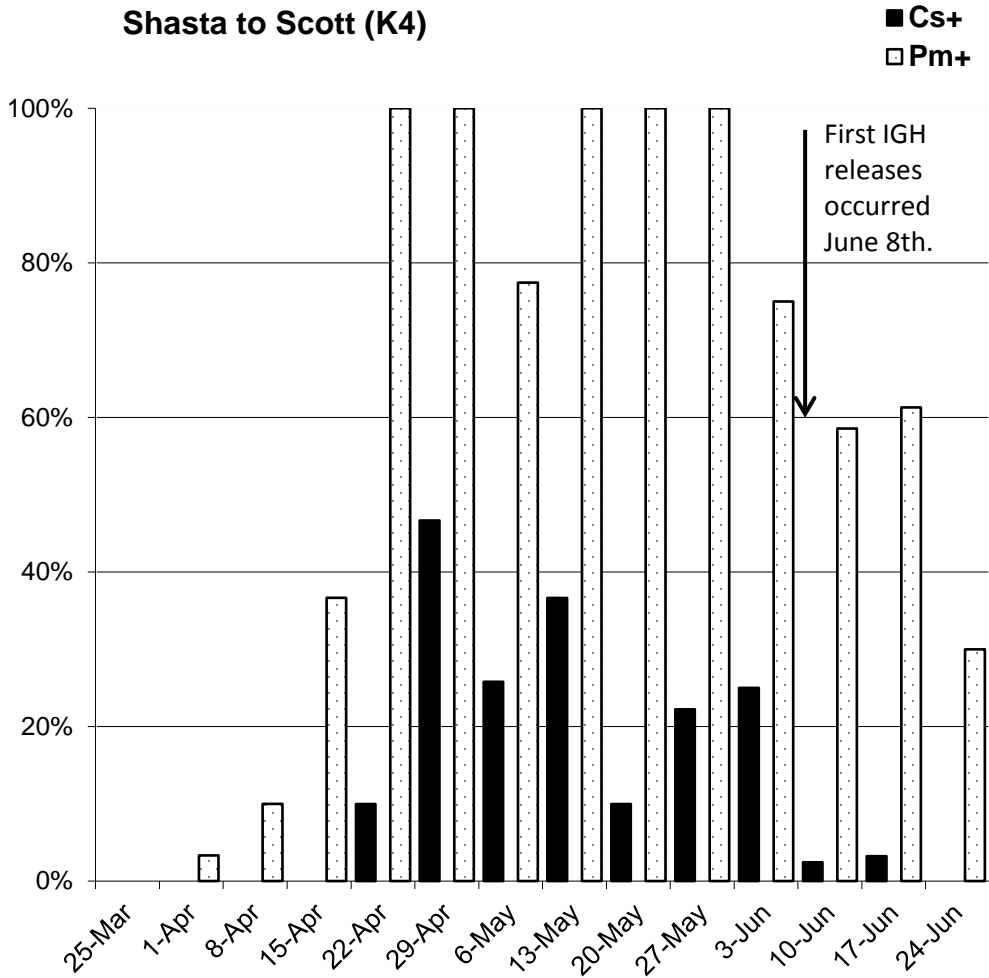


Figure 2. Weekly prevalence of *Ceratonova shasta* and *Parvicapsula minibicornis* infection in juvenile Chinook salmon captured in the Shasta to Scott (K4) reach on the Klamath River. Fish were sampled weekly from March 25 to June 24. Iron Gate Hatchery first release occurred June 8. All fish tested negative for *C. shasta* the first four weeks of sampling: the first detection occurred week of Apr 22.

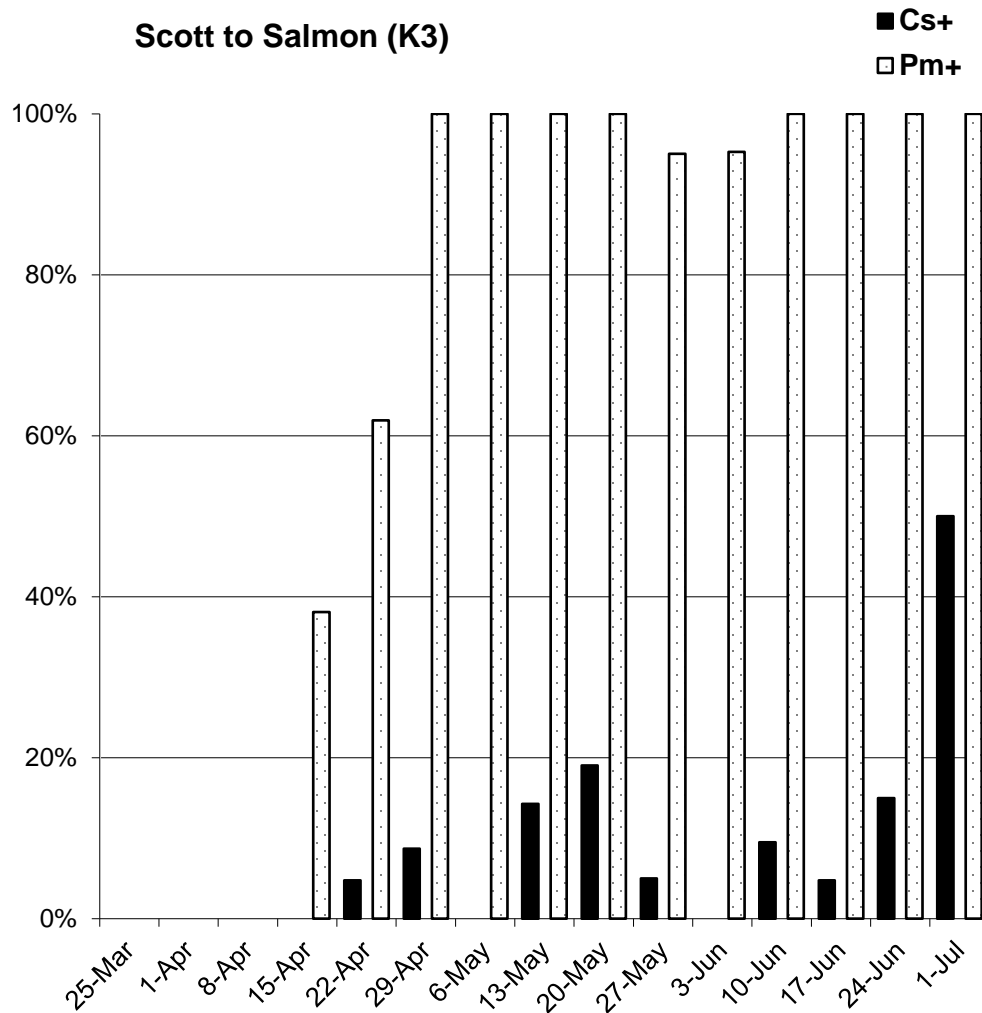


Figure 3. Weekly prevalence of *Ceratonova shasta* and *Parvicapsula minibicornis* infection in juvenile Chinook salmon captured in the Scott to Salmon (K3) reach on the Klamath River. Approximately twenty fish were sampled each week, commencing the week of April 8. The first detection in this reach occurred the week of April 22.

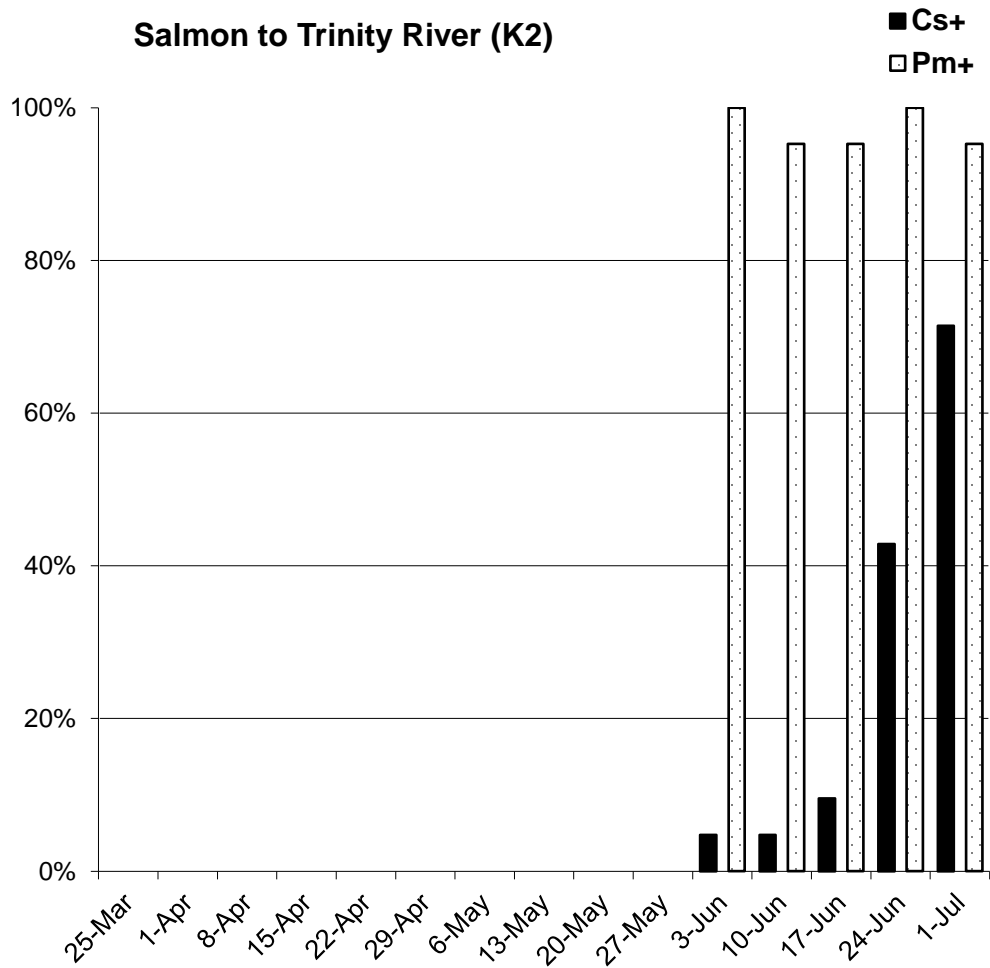


Figure 4. Weekly prevalence of *Ceratonova shasta* and *Parvicapsula minibicornis* infection in juvenile Chinook salmon captured in the Salmon to Trinity (K2) reach on the Klamath River. Approximately twenty fish were sampled each week, commencing the week of June 3.

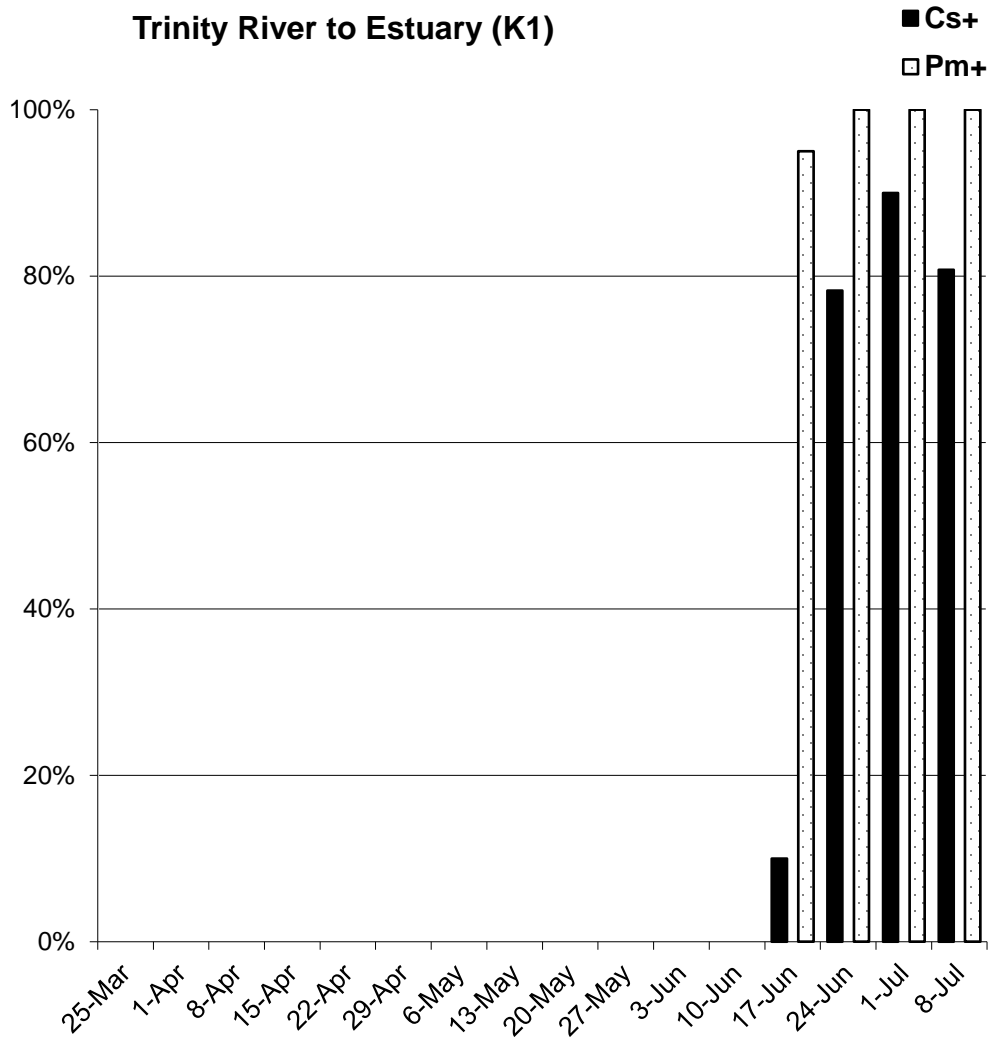


Figure 5. Weekly prevalence of *Ceratonova shasta* and *Parvicapsula minibicornis* infection in juvenile Chinook salmon captured in the Trinity to Estuary (K1) reach on the Klamath River. Approximately twenty fish were sampled each week, commencing the week of June 17.