United States Department of the Interior

FISH AND WILDLIFE SERVICE

CA-NV Fish Health Center
24411 Coleman Hatchery Road
Anderson, CA 96007

Memorandum

DATE: June 29, 2026

TO: Klamath Fish Health Monitoring Team 2026

FROM: Ron Stone, Project Leader – CA-NV Fish Health Center

Executive Summary - Juvenile Chinook salmon caught in-river March 17 through June 10, 2026 exhibited 60% prevalence of infection by *Ceratonova shasta*. No parasites or tissue abnormalities were observed in fish obtained from Fall Creek State Fish Hatchery.

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 2026 outmigration season, the Center will strive to provide Quantitative Polymerase Chain Reaction (QPCR) testing of juvenile Chinook Salmon collected in a time-sensitive manner. The goal is to provide stratified estimates of *C. shasta* prevalence of infection (POI) and DNA copy number to managers on a regular basis during the 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 percentage of a group that has the condition (i.e., 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.

In 2026, a new rotary screw trap (RST) was installed at the former Iron Gate Dam site. The Center will report this location as K6 - Stateline to Iron Gate. Please note that this spatial definition may change as additional sampling sites are added in the upper river in future years.

To date in the 2026 monitoring season, QPCR testing has been conducted on fish samples collected between March 17 - June 10 from Iron Gate to Weitchpec (reaches K6–K2). The initial detection of *C. shasta* in this season occurred in fish collected on April 2 from the K4 reach. The Center has processed and analyzed 1,306 total samples, with 787 testing positive for *C. shasta* via QPCR. Prevalence of infection is 60%, and 28% (220/787) of those samples received a CS2 rating (≥3 logs of DNA, associated with mortality; True et al. 2012, Voss et al. 2022).

In addition to standardized monthly fish health monitoring and sampling, elevated juvenile Chinook Salmon mortality reported June 2 prompted Federal, State, Tribal, and University partners to increase processing and analysis of targeted diagnostic samples.

The Center processed 328 samples from May 20 to June 10 (spanning five sampling days before and after the reported mortality event) in the K6-K4 reaches. QPCR analysis revealed that 232 fish (71%) tested positive for *Ceratanova shasta*. Of these, 43% received a CS2 rating. Severity ratings for all samples are summarized in Figure 2.

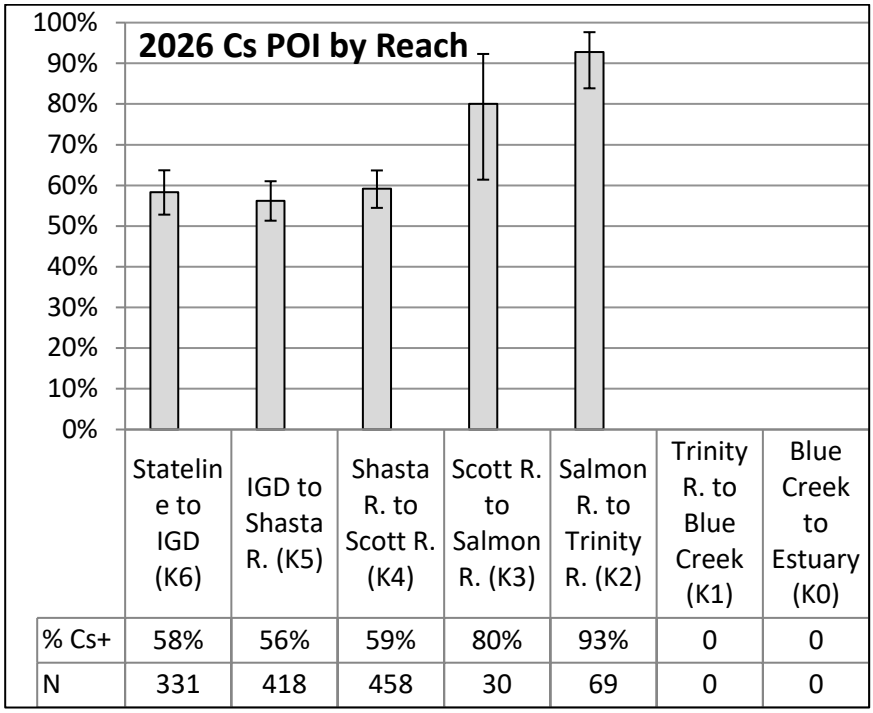
Histology samples were collected and submitted on June 10 from Iron Gate and I-5 rotary screw traps (6 and 7 fish, respectively) and Fall Creek Hatchery (10 fish). All sampled Chinook Salmon from the traps exhibited severe *C. shasta* and *Parvicapsula minibicornis* infections, while tissues from all hatchery fish appeared normal with no parasites detected (see attached pathology report).

A total of 32 hatchery fish were obtained from the K6 and K4 rotary screw traps June 2 and June 5 (19 and 22 days post-release, respectively). Preliminary QPCR results indicate POI and CS2 of 94% (30/32). However, histology samples from Fall Creek Hatchery showed no parasites and normal tissues. Furthermore, 68 hatchery fish sampled for QPCR analysis showed no detection of *C. shasta*

A total of 95 fish sampled 6/5 – 6/10 (period of elevated in-river mortality) from the K6-K4 reaches were subsampled and assayed for virological examination. Samples were processed and inoculated onto EPC and CHSE-214 cell lines 6/18/2026, no cytopathic effect (CPE) has been observed 11-days post inoculation. Samples are monitored for a total of 28d.

Table 1. Weekly-stratified prevalence of infection (POI) of *Ceratonova shasta* (*Cs*) in juvenile Chinook Salmon captured in the Stateline to Iron Gate reach (K6), Iron Gate Dam to Shasta River reach (K5) Shasta River to Scott River reach (K4) and the Scott River to Salmon River (K3), 2026.

Reach	*Date collected*	*Number sampled*	*Number Cs positive*	*Cs POI*	*DNA copy number over 3 logs*
K6	3/25	30	0	0%	n/a
	4/2	30	0	0%	n/a
	4/7	30	0	0%	n/a
	4/15	30	21	70%	7%
	4/21	30	30	100%	23%
	5/6	30	25	83%	60%
	5/11	30	29	97%	50%
	5/20	30	11	37%	17%
	5/27	18	30	60%	10%
	6/2	29	31	94%	90%
	6/9	30	30	100%	87%
K5	3/17	30	0	0%	n/a
	3/25	30	0	0%	n/a
	3/31	30	0	0%	n/a
	4/6	30	1	3%	n/a
	4/15	30	28	93%	7%
	4/21	30	29	97%	47%
	4/28	36	24	67%	47%
	5/7	30	29	97%	60%
	5/12	30	29	97%	27%
	5/20	30	14	47%	13%
	5/29	24	15	63%	21%
	6/1	34	14	41%	41%
	6/9	30	28	93%	90%
K4	3/20	30	0	0%	n/a
	3/24	30	0	0%	n/a
	4/2	30	1	3%	3%
	4/10	30	3	10%	n/a
	4/17	30	14	47%	20%
	4/24	30	28	93%	50%
	4/28	30	30	100%	47%
	5/7	60	56	93%	23%
	5/14	59	50	85%	17%
	5/29	29	15	52%	14%
	6/5	30	29	97%	63%
	6/9	10	10	100%	70%
K3	4/13	30	24	80%	10%
	TOTAL	**1306**	**787**	**60%**	**28%**



	Stateline to IGD (K6)	IGD to Shasta R. (K5)	Shasta R. to Scott R. (K4)	Scott R. to Salmon R. (K3)	Salmon R. to Trinity R. (K2)	Trinity R. to Blue Creek (K1)	Blue Creek to Estuary (K0)
% Cs+	58%	56%	59%	80%	93%	0	0
N	331	418	458	30	69	0	0

Figure 1. *Ceratanova shasta* prevalence of infection (POI) by sample reach. Percent positive by Quantitative Polymerase Chain Reaction (QPCR) testing, 3/17/2026 – 6/10/2026.

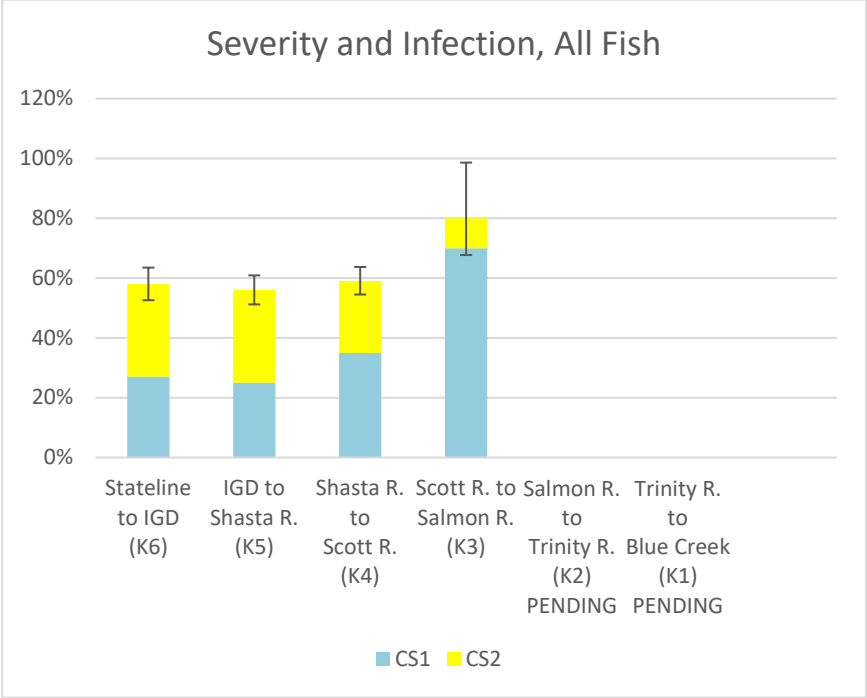


Figure 2. Prevalence of *Ceratanova shasta* infection severity (CS1 positive but less than 3 logs DNA, CS2 ≥ 3 logs DNA) by reach in juvenile Klamath River Chinook Salmon tested by QPCR 3/17/2026 – 6/10/2026; Stateline to Iron Gae Dam (K6), Iron Gate Dam to Shasta River (K5), Shasta River to Scott River (K4), Scott River to Salmon River (K3), Salmon River to Trinity River confluence (K2), Trinity River to Blue Creek (K1), and Blue Creek to Klamath River Estuary (K0).

Table 2. Reach, number of *Ceratonova shasta* (*Cs*) positive samples, total number of fish sampled, percent CS POI, CS1 and CS2 infectivity ratings by sample location proceeded to date in the 2026 sampling season.

Reach	No. Cs positive	Total No. sampled	%Cs	Cs1	Cs2
Stateline to IGD (K6)	193	331	58%	27%	31%
IGD to Shasta R. (K5)	235	418	56%	25%	31%
Shasta R. to Scott R. (K4)	271	458	59%	35%	24%
Scott R. to Salmon R. (K3)	24	30	80%	70%	10%
Salmon R. to Trinity R. (K2)	64	69	93%	64%	29%
Trinity R. to Blue Creek (K1)	**PENDING**				
Blue Creek to Estuary (K0)	**PENDING**				

Table 2. Comparison of 2025 and 2026 *Ceratonova shasta* sampling data and QPCR results March–June in Klamath River juvenile Chinook Salmon.

YEAR	Total sampled	Total positive	% POI	Over 3 logs (Cs2)
2025 (3/19/2025 – 6/11/2025)	719	405	56%	8%
2026 (3/20/2026 – 6/9/206)	1306	787	60%	28%

PATHOLOGY REPORT

U.S. Fish & Wildlife Service
CA-NV Fish Health Center
24411 Coleman Hatchery Rd.
Anderson, CA 96007

phone 530-365-4271
fax 530-365-7150

FHC Case No.**: 26-50** Submittal date: **6/10/2026**
Sample Collector**: Arcata FWO** Sample Site(s): **Fall Creek Hatchery, RST@ I-5 & Irongate**
Histological specimen examiner: **J.S. Foott**
Species **Chinook** Age**: Juvenile**

Tissues: 23 fish total dissected tissues [gill, kidney, liver, GI tract, adipose tissue]
Collection date = June 8, 2026

Fixative: Davidson (X), PREFER-ETOH ( ), 10%BF ( ), ZFIX ( ), Bouins ( )
Stains: Hematoxylin & eosin (X), PAS ( ), Iron ( ) ACID FAST ( ), Gram ( )
Block No**. 14939-14967** Block / slide deposition: **FHC**
Blood Smear (Number): **ND** Bloodsmear Stain**:** Lieshman-Giemsa ( ), DiffQuick(**)**
Clinical chemistry: **ND**

Summary:

Fall Creek Hatchery - Ponds 4 and 6

10 Chinook total, **all tissues normal and no parasites observed**

Rotary Screw trap colllections: Iron Gate (6 fish) and I-5 trap (7 fish)

All salmon with severe ceratomyxosis (end-stage *Ceratonova shasta* infection of intestine) and kidney infection by *Parvicapsula minibicornis* (associated with interstitial hyperplasia, glomerulonephritis). Gills normal with no external parasite infections (*C. shasta* trophozoites observed with lamellar blood vessels of 4 salmon).

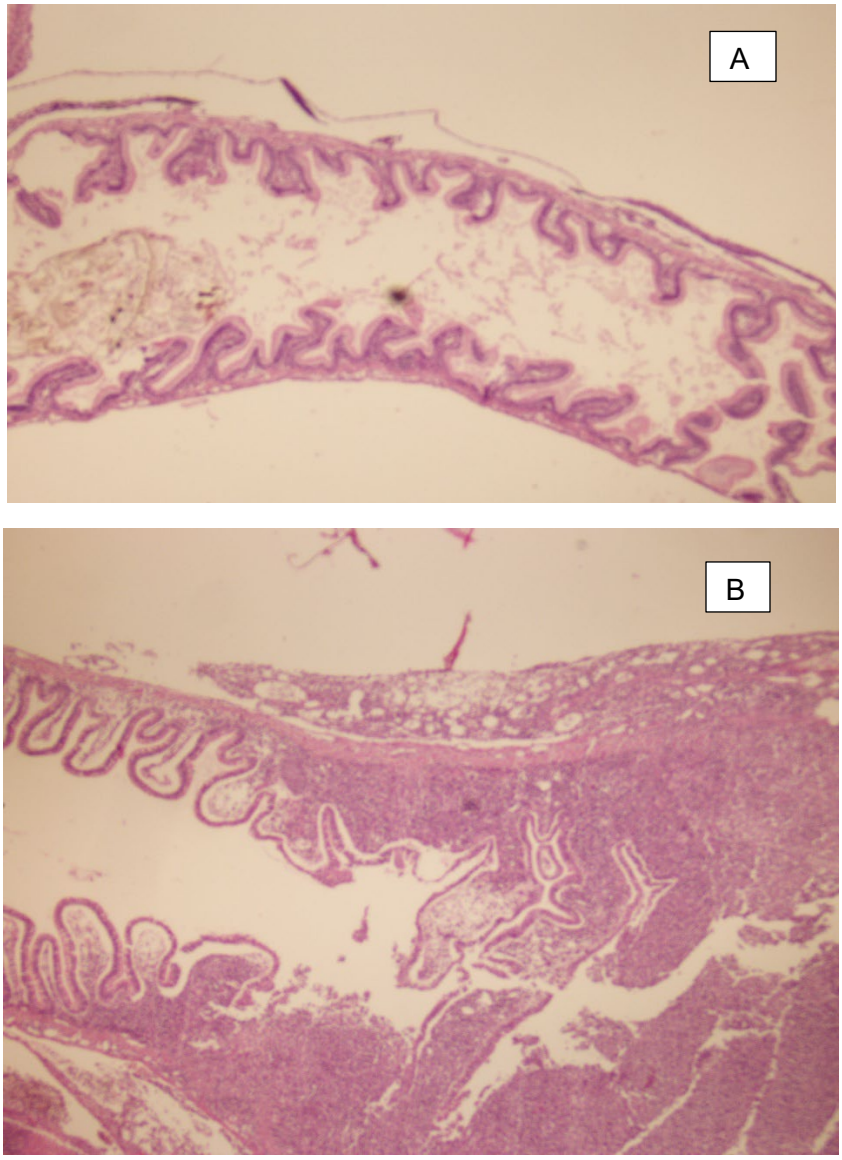


Fig. 1. (A) Normal distal intestine and (B) I-5 trap salmon with severe necrosis due to *C.shasta* (4x mag.)