



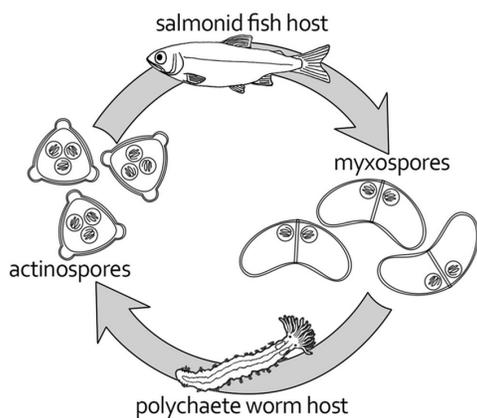
# Fish Health Assessments

## *In the Klamath River*

### Overview

The Klamath River flows nearly 300 miles from its headwaters in Oregon to the Pacific Ocean in California and hosts the third largest run of Pacific salmon in the continental United States. A species of parasite, *Ceratonova shasta*, lives in the Klamath River.

*C. shasta* lives in a host called a polychaete, a type of bristleworm. When the polychaete becomes infected with the parasite, it releases certain types of spores (actinospores) into the water. The actinospores can infect juvenile or adult salmon. Within salmon, *C. shasta* spores develop into another type of spore (myxospore). When diseased fish die, myxospores are released back into the water. At this point, the polychaetes take up *C. shasta* spores again and the life cycle continues.



Life cycle of *C. shasta*. Credit: Gadi Piriatskiy, Weizmann Institute of Science



Biologists check gills on juvenile Chinook Salmon for possible signs of infection. Credit: USFWS

*C. shasta* is native to the Klamath River, but recent infection patterns reveal higher rates than would be expected in a natural environment. Infections progressing to disease cause loss of intestinal cell function. Disease outbreaks can occur in conditions of environmental stress (high temperatures, low flows). The polychaetes that *C. shasta* depend on live on the bottom of the river and thrive in slower flow environments. Current theories are that environmental changes (flow regulation due to dams, etc.) favor the parasite's life cycle.

### How We Help

The Arcata Fish and Wildlife Office leads and participates in several *C. shasta* monitoring programs. One such monitoring effort occurs each spring, when biologists collect fish samples from juvenile salmon outmigrant traps on the mainstem Klamath River. These samples are sent to the U.S. Fish and Wildlife Service's California-Nevada Fish Health Center for disease analysis.



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Objectives of the analysis are to examine parasite prevalence in juvenile salmon during the spring outmigration period, and to compare the infection frequency to previous years to monitor long-term trends.

The Arcata FWO and partners research and compile data in order to:

- Refine understanding of complex disease issues
- Respond to tribal technical assistance requests
- Inform decision makers
- Create decision support tools in order to inform management actions

## Assessment

The Klamath Fish Health Assessment Team was formed in 2003, to provide early warning and a coordinated response in an effort to avoid disease related fish kills in the Klamath River.

The Arcata FWO is one of 17 organizations, including tribes, state and federal agencies, and others which participate in KFHAT. Partners monitor river conditions that could lead to increased incidences of disease, primarily focusing on *C. shasta* in the



Juvenile Chinook Salmon exhibiting a bloated abdomen, a clinical sign of infection of *C. shasta*.  
Credit: USFWS

spring and *Ichthyophthirius multifiliis*, a common freshwater fish disease, in the fall during adult spawning runs.

## Accomplishments

The Arcata FWO has initiated and participated in a wide range of fish health activities, including:

- Development of a National Conservation Training Center Fish Kill Investigation training and certification
- Participation in the Klamath Fish Health Assessment Team
- Conducting collaborative adult and juvenile fish health studies

- Coordinating the Annual Klamath Fish Health Workshop
- Producing decision support tools, such as the Stream Salmonid Simulator, which includes a disease sub-model, and a model to predict where polychaete habitat is located

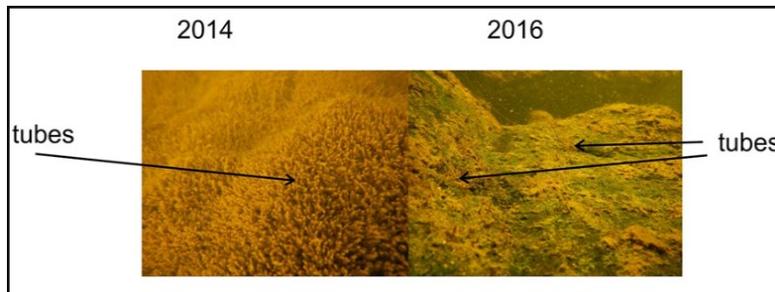
## For More Information

Published reports:

<https://www.fws.gov/arcata/fisheries/reports/Display.html>

KFHAT:

<http://www.kbmp.net/collaboration/kfhat>



Split screen picture of a polychaete colony on a specific rock in the mainstem Klamath River taken in 2014 (left) and in 2016 (right) following the March 2016 peak release of 11,200 cfs from Iron Gate Dam (Som et al. 2016).