

Fish health data trends for Trinity River chinook

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Power Point Presentation prepared by Dr. Foott is available at
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The California – Nevada Fish Health Center, in cooperation with state, tribal, and federal fisheries groups, has conducted diagnostic surveys of both juvenile and adult Chinook salmon in the Trinity and Klamath Rivers since 1991. Early work helped describe the range of parasites, bacteria, and viral agents in the population with particular emphasis placed on *Renibacterium salmoninarum* (BKD agent) and trematodes (presumptively *Nanophyetus salmincola*). Despite being quite prevalent in Trinity salmon, neither pathogen is now considered to be significant health factors for the basin. Columnaris disease (infection in the bacterium *Flavobacterium columnare*) can rapidly increase in the population as water temperatures reach a mean daily temperature of 20 to 21°C. Along with the protozoan *Ichthyophthirius multifiliis* (Ich), columnaris was a leading cause of the 2002 adult salmon kill in the lower Klamath river. Research has shown that two myxosporean parasites, *Ceratomyxa shasta* and *Parvicapsula minibicornis*, are associated with high levels of infection and disease in juvenile salmon rearing or migrating through the Klamath River. While both parasites have been detected in the Trinity River salmon the level of infection is significantly less than that found in the Klamath. The incidence of *C. shasta* infection in the Trinity River smolts migrating through the lower Klamath was markedly different between 2002 and 2006. This difference impacts on Trinity stocks. Infection data from Klamath River salmon will be discussed for comparative purposes.

Presentation notes:

It is important to understand that infection does not mean disease, as fish can show presence of infectious organisms but be asymptomatic. In the Klamath system, high temperatures and congregation aid disease development. The entire Klamath River is infectious with myxosporean parasites. Chronic exposure to actinospores can eventually overwhelm the fish's resistance. *Parvicapsula* infections are generally over 80 %. Synergisms are important; multiple infections and high temperatures can lead to high mortality after even limited exposures in the Klamath 1 -3 days. At least 1/3 of the juvenile chinook rearing and migrating through the Klamath River (above the Trinity River confluence) will have two infections and are at risk of mortality. Trinity River has low *C. shasta* and has *Parvicapsula* infection levels. Migration through the Klamath River is the primary disease risk for Trinity fish. However when Trinity River temperatures exceed 20 to 21 C, risk of columnaris and Ich infections becomes high.

Questions: Habitat of alternate host of myxosporeans, a polychaete, is variable—it is a filter feeder and needs flows with some oxygen. It may be found in fine silt or in *Chladophora* (type of algae found on rocks) that is difficult to scour. *C. shasta* and *Parvicapsula* infection in fish are not seen outside of salmonids. Prognosis for Trinity River Chinook outmigration? It can change yearly and depends on how long they spend in the Klamath River—this year looks good. Are hatchery fish a vector? Not really. Is the timing of out-migration of Trinity River fish significant? Probably not. Klamath River becomes infectious in March—though disease risks (external parasites, bacteria, and myxozoan infections) becomes more severe when daily mean temperatures exceed 21 C.