"Pathogen Risk to Bull Trout Populations and Reintroduction Efforts in the Upper Willamette Basin"

Nik Zymonas, Michael Scheu, and Michael Hogansen

ODFW – Corvallis Research Lab
28655 Hwy 34, Corvallis, OR 97333

Michael Kent, Microbiology Department,
Oregon State University
nik.zymonas@oregonstate.edu

Bull trout populations in the upper Willamette River declined in the past century, and a coordinated interagency recovery effort has been underway since the 1990s. A major component of this effort has been a reintroduction program beginning in 1993 that included head-start rearing at Leaburg Hatchery in 2007–2013. High mortality occurred among bull trout in captivity in 2013, and the surviving fish showed a high incidence of physical deformities. Furthermore, monitoring data has indicated some unexplained declines and continued low spawning abundance in the donor population. In 2014, we conducted a study to assess factors adversely affecting early survival of bull trout in the hatchery and in the donor population. This included use of x-ray imagery, necropsy, and histology to document pathogens and related changes in groups of bull trout including: the remaining fish from 2013, preserved mortalities from 2012 and 2013, specimens brought directly from the donor population in 2014, and specimens reared at Leaburg Hatchery in 2014.

Bull trout reared in the hatchery in 2013 and 2014 exhibited various skeletal deformities, such as severe kyphosis and fusion of vertebrae. Histology of these fish revealed heavy infections by metacercariae of the trematode parasite *Nanophyetus salmincola* directly associated with the lesions. In contrast, juvenile bull trout brought directly from the spawning tributary were not infected and appeared normal. To assess risk of parasites and other pathogens to bull trout in the wild, we conducted distribution surveys for *Juga* snails (the obligate first intermediate host of *N. salmincola*) and began an ongoing effort to deliver surrogate fishes and bull trout incidental mortalities to the ODFW Fish Health Laboratory at OSU. Our survey thus far has indicated that bull trout spawning and early rearing tributaries in the basin are located upstream of reaches where *Juga* snails occur. *N. salminicola* is commonly seen in other salmonid species without associated obvious skeletal deformities in watersheds that are warmer and endemic for the infection in Oregon. It is plausible that when bull trout encounter the infection that it is more pathogenic, as bull trout have not co-evolved with the parasite. Moreover, parasites such as *N. salmincola* may contribute to higher mortality among juvenile bull trout that move downstream too early. Results from our investigations hold implications for bull trout reintroduction efforts. The water supply and treatment systems used for captive rearing must effectively limit exposure to parasites such as *N. salmincola* that may periodically occur in the water supply and may survive passage through some sterilization systems.