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FISH PATHOLOGIST REPORT

Location

Iron Gate Hatchery

Date

April 14, 2009

Species

Steelhead (*Oncorhynchus mykiss*) April release (yearling)

Ponds

A upper (Regular Diet)

A lower (Transfer Diet)

Fish Health Assessment

Transfer and Regular Diet, Pulse-Coded Radio Transmitter

Of 60 fish randomly sampled for annual disease certification (virology, whirling disease, general bacteriology, bacterial kidney disease, & external parasites), the first 40 were also assessed for over-all health condition. Twenty fish fed a "conventional" diet were sampled from upper pond A, and 20 fish fed the BioOregon "Transfer diet" were sampled from lower pond A. For simplicity, the two groups are discussed separately below, and then compared in a closing paragraph.

Regular Diet: These 20 fish scored very well and appeared in excellent health. The average weight of fish was 42.5 grams and the average length was 149.2 mm. The average length-weight condition factor was 1.1 (see raw data on accompanying Excel spreadsheet). All but 3 fish examined had perfect fins (minor dorsal fin erosion on 3) and all fish had seemingly perfect skin, gills, eyes, pseudobranchs, thymus, gastrointestinal tracts (all had food in tract), livers and kidneys. The average hematocrit (packed blood cell volume) was 50.7% (in acceptable range) and the average plasma protein concentration was 4.8 g/dL (also in acceptable range). Some mechanical error occurred while centrifuging a couple microhematocrit tubes, so those values were not available (noted as "n/a" on raw data excel sheet). The average mesenteric fat score was 1.9, indicating a proper amount of reserves. The average smolt index was 0.9 indicating that most fish examined are readying for release (3 fish scored a "2" indicating the presence of parr marks and no silvering). The overall score was 0.15 due to 3 fish with minor erosions on caudal fins, (a perfect score is 0.00). These fish appear healthy, properly developed and ready for release.

Transfer Diet: These 20 fish scored very well and appeared in excellent health. The average weight of fish was 46.7 grams and the average length was 162.3 mm. The average length-weight condition factor was 1.1 (see raw data on accompanying Excel spreadsheet). All but 3 fish examined had perfect fins (minor dorsal fin erosion on 3) and all fish had seemingly perfect skin, gills, eyes, pseudobranchs, thymus, gastrointestinal tracts (all had food in tract), livers and kidneys. The average hematocrit (packed blood cell volume) was 51.2% (in acceptable range) and the average plasma protein concentration was 5.2 g/dL (also in acceptable range). As

with the Upper Pond A fish samples, some mechanical error occurred while centrifuging a couple microhematocrit tubes, so those values were not available (noted as "n/a" on raw data excel sheet). The average mesenteric fat score was 1.5, indicating a proper amount of reserves. The average smolt index was 0.7 indicating that most fish examined are readying for release (all fish scored a "0" or a "1" indicating silvering color, darkened fins and little to no parr marks). The overall score was 0.15 due to 3 fish with minor erosions on caudal fins, (a perfect score is 0.00). These fish appear healthy, properly developed and ready for release.

Comparing the two groups. The shortfall of this comparison is small sample size. However, the fish fed the transfer diet were slightly larger and scored better in the smolt index. The manufacturer of the transfer diet (BioOregon) suggests a higher body weight per day ration for the fish, so that could account for the larger size. However, it is interesting that the larger fish did not have any more mesenteric fat, suggesting that the additional nutrients went into building tissues (in fact the larger fish scored slightly lower than the smaller fish in mesenteric fat, though both groups had ample energy reserves). Statistical significance among observed differences is unlikely due to the small sample size. No evidence of pathologic condition was evident or suspected in any fish in either group.

Every fish examined in both groups met minimal size threshold for receiving the pulse coded radio transmitter that are to be placed in 15 fish from each group. USFW and USGS biologists will surgically implant these transmitters and monitor fish movement in the Klamath River. Again, while the number of fish tagged is too small for scientific validation, this pilot project uses all resources available at this time and may still provide insight into fish movement and/or possible behavioral effects of the transfer diet.

Comments

Water temp is 48°F.

Submitted By: Mark Clifford, Ph.D., Associate Fish Pathologist, CDFG