

September 29, 2005

Troy Humphrey Montana Department of Fish, Wildlife, and Parks 930 West Custer Avenue Helena, Montana 59620

Troy;

Following is my assessment of the high priority samples you wanted checked for accuracy of data interpretation:

Skelly Gulch (#2215 and #2343)

These samples collected August 1, 2001 (2215) and September 25, 2002 (2343) were reported as appearing to have come from a non-hybridized westslope cutthroat trout population. PINE fragments characteristic of only westslope cutthroat trout were detected in the samples. With the combined sample size of 46, we have better than a 99% chance of detecting as little as a one percent rainbow trout and better than a 98% chance of detecting as little as a one percent Yellowstone cutthroat trout genetic contribution to a hybrid swarm. Thus, the conclusion this appears to be a non-hybridized westslope cutthroat trout population is sound.

James Creek (#2293)

The interpretation of this sample collected July 13, 2001 in the report was somewhat vague, but in the database it is considered hybridized with about a 96% westslope cutthroat and a 4% rainbow trout genetic contribution. The sample definitely provides evidence of hybridization with rainbow trout. PINE fragments characteristic of rainbow trout were detected at four of the six diagnostic loci analyzed that usually distinguish rainbow from westslope cutthroat trout. The rainbow trout fragments, however, do not appear to be randomly distributed among the fish in the sample (Poisson distribution; chi-square P<0.05). Rather, one fish possessed rainbow trout fragments at three loci and another two fish possessed a rainbow trout marker at one locus. The remaining six fish possessed PINE fragments characteristic of only westslope cutthroat trout at all loci

analyzed. Thus, at the time of sampling this population appears to have been a mixture of hybridized individuals and some non-hybridized westslope cutthroat trout. Conclusively determining that an individual is a non-hybridized westslope cutthroat trout in this situation, however, will be extremely problematic. This will require a large number of markers because the hybrid individuals collected were definitely later than first generation hybrids. Thus, with a relatively small number of markers many hybrids will be indistinguishable from westslope cutthroat trout. From a management perspective, therefore, based on this sample the population should simply be considered to be hybridized with rainbow trout.

Elk Creek (#2359 and #963)

The status of the sample collected August 7, 2002 (2359) was somewhat vague in the report, but the database suggests it to be hybridized with about a 98% westslope cutthroat and a two percent rainbow trout genetic contribution. The uncertainty arose from the small sample size (N=5) and the fact that a PINE fragment characteristic of rainbow trout was detected at only one of the six diagnostic loci analyzed that usually distinguish rainbow from westslope cutthroat trout. Furthermore, the 'rainbow trout' fragment was detected in only one fish. Based on this sample alone, therefore, one could not be certain whether this indicated a small amount of hybridization or it was just westslope cutthroat trout PINE variation that was indistinguishable from that usually characteristic of rainbow trout.

A previous sample collected July 28, 1994 (963) yielded very similar results to the latest sample. Allozyme analysis detected an allele usually characteristic of rainbow trout at one of the six diagnostic loci analyzed that usually distinguish rainbow from westslope cutthroat trout. Again, the 'rainbow trout' allele was detected in only one individual. Thus, the results of this sample considered by itself were also ambiguous. Considering both samples, however, it appears this population is slightly hybridized with rainbow trout as both PINE and allozyme analysis indicated the presence of a rainbow trout marker. With the combined data set, this population appears to be a hybrid swarm with about a 98% westslope cutthroat and a 2% rainbow trout genetic contribution.

Elkhorn Creek (#2342, #2718, #1056, and un-numbered)

Allozyme analysis of the samples collected from the South Fork Elkhorn Creek (collected October 4, 1994; 1056; N=2), North Fork Elkhorn Creek (October 4, 1994; un-numbered; N=8), and the confluence of the North and South forks (August 18, 1996; 2178; N=25) provided no evidence of hybridization. Thus, these samples were considered as appearing to have come from a non-hybridized westslope cutthroat trout population.

The latest sample (September 26, 2002; 2342; N=25) also collected from the confluence of the two forks suggests the genetic characteristics of the population had markedly changed since 1996. PINE analysis conclusively provided evidence of hybridization with

rainbow trout. Fragments characteristic of rainbow trout were detected at five of the six diagnostic loci analyzed that usually distinguish rainbow from westslope cutthroat trout. The fragments characteristic of rainbow trout, however, were not randomly distributed among the fish in the sample. In contrast, significantly (P<0.001) more individuals than expected by chance possessed only fragments characteristic of westslope cutthroat trout at all loci analyzed and fragments characteristic of rainbow trout at four of the six diagnostic loci analyzed (Figure 1). Furthermore, significantly fewer individuals than expected by chance possessed a rainbow trout fragment at only one diagnostic locus (Figure 1). These data suggest that when this population was sampled in 2002 it contained a mixture of non-hybridized westslope cutthroat trout and hybrids between westslope cutthroat and rainbow trout.

Considering all the samples, the data strongly suggest the Elkhorn Creek population has only recently become hybridized. The three earlier samples indicated a non-hybridized population and the most recent sample appears to have been composed of three different categories of fish: non-hybridized westslope cutthroat trout, hybrids with a mean of four rainbow trout markers, and hybrids with a mean of two rainbow trout markers (Figure 1). First generation backcrosses to rainbow trout are expected to have a mean of four rainbow trout markers per fish and first generation backcrosses to westslope cutthroat trout are expected to have a mean of two rainbow trout markers per fish. A plausible explanation for the observed data, therefore, is shortly after 1996 rainbow trout invaded the population and it is now in the process of becoming a hybrid swarm. Although the population may still contain some non-hybridized westslope cutthroat trout, conclusively identifying such individuals in this situation will be problematic. Like in James Creek, this will require a large number of markers because the hybrid individuals are definitely later than first generation hybrids. Thus, with a relatively small number of markers many hybrids will be indistinguishable from westslope cutthroat trout. From a management perspective, therefore, the Elkhorn Creek population should now simply be considered hybridized with rainbow trout.

Sincerely;

Robb Leary



Figure 1. Observed and expected number of fish based on a random distribution of rainbow trout fragments among individuals in the most recent sample from Elkhorn Creek. Hybrid index is the number of diagnostic loci at which individuals were expected or observed to possess PINE fragments characteristic of rainbow trout.