

levels of introgression where less than 50 percent of the individuals expressed at least one rainbow trout DNA marker. Given the statistical power of the authors' methods and their use of dominant genetic markers, we conclude that rainbow trout genes constituted less than 25 percent of the genes in those latter WCT populations where less than 50 percent of the individuals expressed a rainbow trout DNA marker.

In a recent unpublished report to the Service, Allendorf *et al.* (2003) reviewed results from their laboratory regarding the threshold levels of rainbow trout or YCT genetic introgression (*i.e.*, threshold percent genetic admixture) detectable by morphological criteria (*see also* Leary *et al.* 1984; Marnell *et al.* 1987; Leary *et al.* 1996). Allendorf *et al.* (2003) presented data indicating that introgressed populations of WCT with less than 20 percent of their genes derived from another taxon are morphologically indistinguishable from nonintrogressed populations with zero percent genetic admixture. They also presented data indicating that introgression exceeding 50 percent non-WCT genes in natural populations of WCT would most likely be detectable by morphological methods.

Therefore, based on the best scientific and commercial data available, we conclude that natural populations of WCT may have a genetic ancestry derived by as much as 20 percent from rainbow trout or YCT when fish in those populations express a range of morphological variation that conforms to the scientific taxonomic description of WCT. In other words, a natural population of WCT with less than 20 percent of its genes derived from rainbow trout or YCT is, most likely, morphologically indistinguishable from nonintrogressed populations of WCT with no hybrid ancestry.

As noted previously, on March 31, 2002, the U.S. District Court for the District of Columbia found that our listing determination for WCT did not reflect a reasoned assessment of the Act's statutory listing factors on the basis of the best available science. The Court remanded the listing decision to us with specific instructions to evaluate the threat of hybridization as it bears on the Act's statutory listing factors and the status of the WCT subspecies. The Court also ruled that inclusion of introgressed populations or "hybrid stock" (Court's term) as part of the WCT subspecies in our status review, based on the visually based, professional opinions of field biologists familiar with the subspecies, "was arbitrary and capricious." During the Court proceedings, we noted that the Act does not require "100 percent

genetic purity" and the plaintiffs agreed with this proposition, noting that they were not insisting on genetic purity. The Court, in effect, concurred. "Genetic purity" is not a condition for including populations or individual fish with the WCT subspecies under the Act, but the conditions for including potential "hybrid stock" with WCT may not be arbitrary and capricious.

In reconciling the dichotomy between hybridization as a threat and the potential inclusion of "hybrid stock" with WCT under the Act, one must make a clear distinction between the action (hybridization) and the outcome of that action (hybrid stock). Therefore, we must define these terms more precisely. Consequently, in response to the Court order and for the purpose of this new status review for WCT, we define "hybridization" as the direct interbreeding between two individuals that conform morphologically to different species or subspecies, including the interbreeding between individuals conforming morphologically to WCT and individuals not conforming morphologically to WCT. We further define "hybrid stock" (Court's term), or introgressed population, as a group of potentially interbreeding individuals with a genetic ancestry derived from two or more extant species or subspecies. Under these definitions, "hybridization" may represent a "natural or manmade factor affecting the continued existence" of the WCT subspecies. Similarly, introgressed populations composed of individuals not conforming morphologically to the scientific taxonomic description of WCT may be a potential hybridization threat to the continued existence of the WCT subspecies.

Conversely, in accordance with the above definition of hybridization, we do not consider populations or individual fish conforming morphologically to the scientific taxonomic description of WCT to be a hybridization threat to the WCT subspecies. Although such individuals may have genes from another taxon at low frequency, we are not aware of any information to suggest that such individuals express behavioral, ecological, or life-history characteristics differently than do WCT native to the particular geographic area. Without such changes, we expect the frequency of genes from the other taxon to remain low in the population. Therefore, we do not consider such populations as contributing to the threat of hybridization to the WCT subspecies.

Therefore, in accordance with the Court's order, we provide our scientifically-based conclusion about the extent to which it is appropriate to

include hybrid or genetically introgressed WCT populations, and populations of unknown genetic characteristics, in the WCT subspecies considered for listing. These criteria are specific to this listing determination for WCT under the Act and may not be applicable to other species or taxa.

To determine which natural populations we should consider as WCT under the Act, we used the best scientific data available (as described previously) to establish three principal criteria: (1) The population under consideration must first exist within the recognized, native geographic range of WCT (Behnke 1992; Shepard *et al.* 2003). The population must then satisfy one of the following two additional criteria to be considered WCT under the Act; (2) If all measured individuals in the population have morphological characters that are all within the scientific, taxonomically-recognized ranges of those characters for the WCT subspecies, then the population shall be considered WCT; or (3) if not all of the measured individuals have morphological characters that are within the scientific, taxonomically-recognized ranges of those characters for the WCT subspecies, then additional evidence of reproductive discreteness between individuals that conform morphologically to the WCT subspecies and individuals that do not conform morphologically to the subspecies will be examined. If the two forms are considered reproductively discrete (*e.g.*, naturally sympatric populations of native redband trout and WCT that may only occasionally interbreed), then we shall consider the population under consideration to be WCT under the Act. In making these latter determinations, we will consider the following additional information: (a) Whether rainbow (redband) trout are native to the geographic area under consideration; (b) the percent of measured individuals that do not conform morphologically to the taxonomic scientific description of WCT, including their range of morphological variation (*e.g.*, a single anomalous individual reflecting a congenital abnormality would not disqualify the population from inclusion); (c) the results of genetic tests that would indicate reproductive discreteness between the two forms; and (d) any other additional information that would assist with these determinations (*e.g.*, information on the locations and timing of spawning for each of the two forms).

Hence, our principal criterion for including potentially introgressed populations, and populations of unknown genetic characteristics, with