

Stock assessment and population biology of the Copper River steelhead

Abstract: From 2001 to 2002, abundance and genetic information was collected on two of what is currently believed to be the two most significant steelhead *Oncorhynchus mykiss* stocks in the Copper River drainage, near Dickey Lake (Gulkana River drainage) and Hanagita Lakes (Chitina River drainage). Because both non-anadromous rainbow trout and anadromous steelhead occur sympatrically at the Dickey Lake spawning area, the study's scope was widened to include estimation of abundance and genetic sampling of non-anadromous rainbow trout. To facilitate within-drainage genetic relatedness, genetic samples were collected in 2003 from a sympatric population of rainbow trout and steelhead at another spawning tributary within the Gulkana River, Hunger Hollow Creek. At all locations genetic samples were collected using weirs or hook-and-line gear and abundance was estimated using mark-recapture techniques.

At Dickey Lake, 71 steelhead were captured and sampled during spring of 2001 from an estimated spawning abundance of 128 (SE = 27), and 87 steelhead were sampled from an estimated abundance of 115 (SE = 17) in 2002. Ninety-five rainbow trout were captured in 2001, but abundance could not be estimated. In 2002, 190 rainbow trout were sampled from an estimated abundance of 244 (SE = 27). At Hanagita Lake in 2001, 252 steelhead were counted through the weir from an estimated escapement of 338 (SE = 28) in 2001. In 2002, 119 fish were passed upstream between August 31 and September 27. At Hungry Hollow Creek in 2003, 63 steelhead and 81 rainbow trout were sampled.

No genetic differences were observed between steelhead and rainbow trout spawning in the same location (sympatric) in the Gulkana River and they appear to constitute a single population. In contrast, Gulkana River steelhead and rainbow trout spawning approximately 15 km apart (at the outlet of Dickey Lake and in Hungry Hollow Creek) exhibited significant genetic differences and moderate values of F_{st} (0.022). Finally, the greatest genetic differences were found when Hanagita River steelhead were compared to Gulkana River steelhead and rainbow trout.

The work conducted at Dickey Lake, Hungry Hollow Creek, and Hanagita Lakes demonstrated that their respective steelhead populations are relatively small and genetically distinct, and that within the Gulkana River genetic similarities were observed between sympatric spawning aggregations comprised of both life-history forms (steelhead and rainbow trout). Because the contribution of these stocks (both rainbow trout and steelhead) to the total returning steelhead population of the Copper River drainage is unknown, these stocks should be managed conservatively to ensure long-term sustainability in light of existing fishing pressure (commercial interception, subsistence, and sport).

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