Hybridization of Coastal Cutthroat and Steelhead/Rainbow Trout on Vancouver Island, British Columbia: Characterization of Environmental Factors

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Coastal cutthroat (*Oncorhynchus clarki clarki*) and steelhead trout (and/or rainbow trout) (*Oncorhynchus mykiss irideus*) have undergone a major decline throughout western North America over the past two decades. Research has established, as recent as 1985, that these trout can, and do, hybridize in nature. Hybridization between these species is known to contribute to cutthroat and steelhead population vulnerability, but has received minimal consideration. Little is known about the factors that influence the level of hybridization although it has often been assumed that habitat loss and reduced water quality may contribute to the mating barrier breakdown. We sampled 38 sympatric populations of coastal cutthroat and steelhead/rainbow trout to determine the level of hybridization across Vancouver Island, BC (VI). Sample locations were chosen to represent a range of environmental factors thought to affect species reproductive isloation: (1) anthropogenic parameters known to be associated with disrupting the integrity of aquatic systems (i.e. urbanization, timber harvesting, road development, supplementation); (2) streams that have a mixture of anadromous and resident life-history influence from one, or both, species; and (3) streams with only resident life-history types. DNA was extracted from individuals (min. N = 28; max. N = 38) at all locations and screened using 7 diagnostic co-dominant species markers and one mitochondrial DNA-based marker. We found that hybridization is occurring rapidly throughout VI and that hybridization levels vary extensively among populations (0% to 86%). In order to investigate the environmental correlates potentially associated with this mating barrier breakdown, we utilized a GIS to model and extract watershed/streamshed level effects at each sample location. By means of multivariate regression analysis, we will determine the environmental parameters associated with variation in hybridization. Documenting hybridization among populations of coastal cutthroat and steelhead/rainbow trout is valuable to fisheries managers charged with discerning alternative pure strains for broodstock hatchery programs. From a species conservation perspective, it is imperative to identify the factors involved in breaking this species barrier, as continued hybridization events will further deplete already threatened populations.