

## **Effects of Growth on precocious male maturation of salmon**

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Precocious male maturation is a natural life-history strategy for many salmonid species including spring chinook. However, numerous studies have indicated that the hatchery rearing environment may potentiate this developmental pathway beyond natural levels resulting in loss of anadromous adults, skewing of sex ratios in favor of females among returning adults, and negative genetic and ecological impacts on wild populations. For several years we have conducted research to characterize the physiology and development of wild and hatchery-reared spring chinook salmon in the Yakima River Basin. Gonadosomatic index (GSI) and plasma levels of the reproductive steroid 11-ketotestosterone (11-KT) were used to estimate that 35-53% of hatchery males from this program undergo precocious maturation at 1+ years of age compared with only 2.9-13% for wild fish. We recently completed a growth modulation experiment at the Yakima hatchery aimed at reducing the maturity rate. This experiment successfully produced fish with four growth trajectories based on summer/autumn growth patterns with the following size and maturity rates as of release time in April, 2003: High/High (25 g, 69%), High/Low (18 g, 58%), Low/High (18 g, 51%), Low/Low (16 g, 42%) for comparison to production fish (22 g, 53%). These data suggests that male precocity can be modulated through growth manipulation and the current production fish are being grown near a maximum rate for their water temperature (> 2X wild fish). Future experiments involving manipulation of pond timing and feed lipid content are being implemented to establish a rearing regime that produces fish large enough for tagging in the preceding autumn, but with slow enough growth to further reduce precocity levels to rates similar to wild fish. (In cooperation with YN, WDFW, BPA contract #'s 1992-022 and 2002-032).