

## **Effects of Growth Rate Modulation on Age at Maturity of Redfish Lake Sockeye Salmon Captive Broodstock**

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In general, hatchery rearing conditions tend to discourage the expression of inherent variation in life history and developmental strategies typical of wild salmonids. Hatchery fish reared according to a predetermined time-and-size of release program grow faster and emigrate earlier than wild fish, with potential effects on age at maturity, reproductive investment, and ultimately, the genetic representation of a cohort in succeeding generations.

Wild Redfish Lake sockeye salmon reside in freshwater for 1-2 years and must reach a minimum size of 2.8 g in May for smoltification to occur. Maturing adults return after 1-3 sea-winters, and male precocity has not been reported. By contrast, sockeye salmon reared in freshwater at NMFS facilities in Washington have exhibited high rates of precocious male maturation, approaching 50-80% in some years. Age-at-maturity data collected since 1991 suggests that male precocity is related to size in May, approximately 5 months post-ponding.

In addition, studies with chinook and Atlantic salmon suggest that a maturation “decision window” exists during early winter when growth rate reduction prevents maturation during the subsequent fall. Male fish appear particularly sensitive to growth restriction (via reduced feed availability) during this critical period. Conversely, maintaining relatively high rates of growth tends to favor early maturation.

At present, the NMFS sockeye rearing program is being adaptively managed to address early maturation concerns related to rapid early growth. Preliminary results of studies on the relationship between growth history during the early phases of freshwater rearing, age-at-maturation, and reproductive success of captive Redfish Lake sockeye salmon broodstocks are discussed.