

Warning! That BIG smolt may be a tiny adult: prevalence, causes and consequences of Chinook salmon minijacks.

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Over the past decade our research has revealed that approximately 10-50% (depending population and brood year) of the male fish from several Columbia River spring and summer Chinook hatchery programs mature precociously at age-2 (commonly referred to as minijacks) rather than the more typical age 3-5 for this species. Instead of migrating to the ocean for long-term rearing and growth, minijacks remain in headwater streams or undertake a short-term migration downstream, turn around, and attempt to migrate back upstream to complete the maturation process. On the spawning grounds they employ a sneaking strategy to fertilize eggs during spawning events between anadromous pairs. Age of maturation in salmon is influenced by genetic, biotic, and abiotic factors including emergence time, energy stores, size and/or growth rate at specific times of year. Studies in salmonids have shown that maturation for each age class is physiologically initiated approximately 10-12 months prior to spermiation and growth rate during this period significantly influences the physiological “decision” to mature in a given year. Hatchery growth profiles are not well matched to that of wild fish, suggesting that rearing practices are a key component of the altered life-history pattern. Furthermore, evidence suggests that "supplementation" programs that aim to bring local wild broodstock in to hatchery programs appear to be particularly susceptible to producing high minijack rates. Changes in the life-history composition of salmon populations are undesirable in supplementation and production hatcheries, potentially resulting in loss of returning anadromous adults, biased gender ratios, and negative genetic and ecological impacts on native species. Laboratory and production scale experiments aimed at more closely matching growth profiles of wild fish have met with mixed success in that growth regimes that suppress early maturity often produce smaller fish at release. Release of smaller smolts typically results in lower rates of survival to adulthood. Future studies are aimed at reconciling the trade-offs between matching the “wild-like” phenotype, and the survival advantages gained through larger body size at release in salmon hatchery programs.

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