IS JUVENILE MIGRATION PHENOTYPE ESTABLISHED BY RECENT STIMULI OR MUCH EARLIER IN LIFE AND CAN THEY BE AFFECTED BY HATCHERY PRACTICES?

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Juvenile Chinook salmon *Oncorhynchus tshawytscha* in the Upper Willamette River, Oregon, USA display considerable variation in downstream-movement life history tactics. Fish reared in circular tanks self-sort into surface- and bottom-oriented groups starting just after *per os* feeding begins. Morphometric analysis suggests that the surface phenotype is similar in shape to wild fall migrants and parr from downstream sites. The benthic phenotype fish are similar to wild spring migrants and fish collected concurrently up-river. Bone structure analysis of the head suggests that these differences rest with the jaw. Plasma sodium, gill Na/K ATPase and boldness analyses also revealed early effects of rearing conditions. Behavioral tests found that minute (<0.5 ^{o}C) temperature decrease results in downstream movement by various species of anadromous salmonids. Similar downstream movement was displayed by surface-oriented laboratory Chinook in the fall (concurrent with timing of the fall outmigration of wild Chinook; bottom-oriented Chinook had significantly less movement at this time. We suggest that downstream movement of juveniles soon after emergence is associated with differentiation in the expression of life history variation. This contention is also supported by movement studies in large artificial streams and in a small tributary stream. Structure in rearing tanks also affects performance and brain size. Fish reared with some simple structure had significantly larger brains, were more bold, and were better predators, than fish reared in typical hatchery troughs.