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Dispersal of Hatchery-Reared Chinook Salmon Parr following Release into Four Idaho Streams

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Abstract.—Repeated snorkel surveys were used to observe dispersal of parr of hatchery-reared chinook salmon *Oncorhynchus tshawytscha* from release sites in four mountain streams during 1994. The distribution of hatchery chinook salmon released in two streams at multiple sites was compared with the distribution of hatchery fish released in two streams at single release sites. Hatchery chinook salmon parr remained concentrated within 1.5 km of release sites through summer, but they were more evenly distributed in streams where multiple release sites were used. Densities of hatchery fish remained relatively stable following release, although there was a trend of gradual declining densities through summer and early fall.

Most hatchery-reared Pacific salmon and steelhead *Oncorhynchus* spp. produced in the Pacific Northwest are released in the spring as smolts that are ready to migrate to the ocean. Smolts are typically released directly from hatcheries with the intent that the adults will return to the hatchery in the future to be used as broodstock. Increasingly, hatchery fish have been also been used to supplement or reestablish natural salmonid stocks. In those cases, juveniles are released as smolts or presmolts into distant streams with the hope that the adult salmon will return and spawn. In such supplementation programs, juvenile salmonids are typically released from trucks or aircraft at one or two sites in target streams, and although salmonids at or near the smolt stage tend to disperse downstream quickly following release, it appears that presmolts and parr, expected to rear in streams for extended periods before migrating, tend to remain concentrated near release sites (Horner 1978; Egglishaw and Shackley 1980; Cresswell 1981; Wentworth and LaBar 1984; Hume and Parkinson 1987; Seelbach 1987; Richards and Cernera 1989). If so, survival of these hatchery fish could suffer from intraspecific competition for limited resources and by attracting predators. The situation is further complicated if target streams contain natural fish populations.

Hatchery salmonids vary behaviorally and genetically from naturally produced conspecifics (Vincent 1960; Fenderson et al. 1968; Reisenbichler and McIntyre 1977; Sosiak et al. 1979; Bachman 1984; Chilcote et al. 1986; Leider et al. 1986; Swain and Riddell 1990; Hindar et al. 1991; Mesa 1991; Waples 1991). For example, hatchery fish are typically larger and more aggressive than same-aged natural conspecifics (Vincent 1960; Fenderson et al. 1968; Swain and Riddell 1990; Mesa 1991; Peery 1995), and when released in large numbers, they may have a short-term competitive advantage over existing natural fish (e.g., Chilcote et al. 1986; Nickelson et al. 1986). But longer-term (parr-to-smolt and smolt-to-adult) survival rates for hatchery fish tend to be lower than for their natural counterparts (Miller 1954, 1958; Flick and Webster 1964; Mason et al. 1967; Flick and Webster 1976; Fraser 1981; Ersbak and Haase 1983; Piggins and Mills 1985; Hume and Parkinson 1987). So, a supplementation stocking program could result in lower survival for the existing natural populations and recently introduced hatchery fish alike. More information is needed on the behavior and dispersal patterns of hatchery-reared salmonid parr in streams if their release is to be an effective strategy for supplementing and reestablishing depleted natural stocks of salmon and steelhead in the Pacific Northwest. In this study, we monitored the dispersal of parr of hatchery chinook salmon *O. tshawytscha* after their release into four Idaho streams. We compared the relative distribution of the hatchery chinook salmon released at a single site and at multiple sites within streams.

Methods

Hatchery chinook salmon parr were released into Pete King, Squaw, White Sands, and Big Flat creeks, tributaries of the Lochsa River in the Snake

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