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Incidence and Causes of Physical Failure of Artificial Habitat Structures in Streams of Western Oregon and Washington

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North American Journal of Fisheries Management 12: 182-197, 1992

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Abstract. -In recent years an increasing share of fishery management resources has been committed to alteration of fish habitat with artificial stream structures. We evaluated rates and causes of physical impairment or failure for 161 fish habitat structures in 15 streams in southwest Oregon and southwest Washington, following a flood of a magnitude that recurs every 2-10 years. The incidence of functional impairment and outright failure varied widely among streams; the median failure rate was 18.5% and the median damage rate (impairment plus failure) was 60%. Modes of failure were diverse and bore no simple relationship to structure design. Damage was frequent in low-gradient stream segments and widespread in streams with signs of recent watershed disturbance, high sediment loads, and unstable channels. Comparison of estimated 5-10-year damage rates from 46 projects throughout western Oregon and southwest Washington showed high but variable rates (median, 14%; range, 0- 100%) in regions where peak discharge at 10-year recurrence intervals has exceeded 1.0 m³ s⁻¹ km². Results suggest that commonly prescribed structural modifications often are inappropriate and counterproductive in streams with high or elevated sediment loads, high peak flows, or highly erodible bank materials. Restoration of fourth-order and larger alluvial valley streams, which have the greatest potential for fish production in the Pacific Northwest, will require reestablishment of natural watershed and riparian processes over the long term.