Impacts of Stormwater Run-off on Salmonids in Restored Urban Streams

Jay Davis

Environmental Toxicologist
US Fish and Wildlife Service, Lacey, WA

Abstract:
Several Seattle-area streams in Puget Sound were the focus of habitat restoration projects in the 1990s. Post-project effectiveness monitoring surveys revealed anomalous behaviors (erratic surface swimming, gaping, fin splaying, and loss of orientation and equilibrium) among adult coho salmon returning to spawn in restored reaches. Affected fish died within hours, and female carcasses generally showed high rates of egg retention. Beginning in the fall of 2002, systematic spawner surveys were conducted to 1) assess the severity of the adult die-offs, 2) compare spawner mortality in urban vs. non-urban streams, and 3) identify water quality and spawner condition factors that might be associated with the recurrent fish kills. The forensic investigation focused on conventional water quality parameters (e.g., dissolved oxygen, temperature, ammonia), fish condition, pathogen exposure and disease status, and exposures to metals, polycyclic aromatic hydrocarbons, and current use pesticides. Daily surveys of a representative urban stream (Longfellow Creek) from 2002– 2009 revealed premature spawner mortality rates that ranged from 60–100% of each fall run. The comparable rate in a non-urban stream was ~1% (Fortson Creek, surveyed in 2002). Conventional water quality, pesticide exposure, disease, and spawner condition showed no relationship to the syndrome. Coho salmon did show evidence of exposure to metals and petroleum hydrocarbons, both of which commonly originate from motor vehicles in urban landscapes. The weight of evidence suggests that freshwater-transitional coho are particularly vulnerable to an as-yet unidentified toxic contaminant (or contaminant mixture) in urban run-off. Stormwater may therefore place important constraints on efforts to conserve and recover coho populations in urban and urbanizing watersheds throughout the western United States.