

Experimental tests of eggs-tinction! Shortages of adults or egg-laying habitat cause oviposition failure for aquatic insects in dammed and undammed rivers. (#91)

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For organisms with complex life cycles, shortages of females or egg-laying (oviposition) habitat can limit egg densities, recruitment of offspring and abundances of later life stages. Hence, the determinants of oviposition success may be critical for understanding how human activity impacts stream ecosystems. Many aquatic insects require clean, emergent rocks that project from streams as places to land and lay eggs. In undammed rivers, high nutrient loads and low summer flows can result in dense growths of algae on rocks (algal encrustment) which may inhibit oviposition. Downstream of dams, water impoundment may intensify algal encrustment or strand rocks above the waterline, potentially limiting oviposition and subsequent larval recruitment.

Regular surveys (2018-2021, five dammed and undammed rivers) in the Murrumbidgee Catchment, NSW, recorded widespread oviposition failure during summer, despite presence of adult insects (Hydrobiosidae) in all rivers. Algal encrustment was observed at all sites, so this mechanism was identified as a potential inhibitor of oviposition. We tested whether oviposition was limited by insufficient adults or habitat via field experiments that removed algae from rocks, with concurrent trapping of adults. We predicted that eggs would be laid exclusively on clean habitat. In undammed rivers, eggs were laid exclusively on clean habitat, thereby showing that algae inhibited oviposition. In the dammed river, zero eggs were found despite significant habitat supplementation (~2000 clean, emergent rocks across eight sites). Captured adults in the dammed river were scarce relative to the undammed rivers, hence oviposition failure may have been caused by shortages of adults, habitat or both. These results illustrate that oviposition failure can occur when egg-laying habitat is lost due to human activity. However, successful oviposition may also require periods when habitat and adults are concurrently abundant.