

# Investigating Welfare Refinements in Zebrafish Husbandry

*Claire Allen*

Refining zebrafish husbandry through environmental enrichment (EE) is widely recognised as a critical element in upholding the welfare component of the 3Rs. While zebrafish clearly prefer social housing and natural environments, effective EE must provide genuine enriched experiences without anthropomorphising or compromising scientific validity. We currently believe that research zebrafish, when not actively undergoing procedures, should receive five essential life experiences: being together in a mixed-sex shoal; optimal lighting that includes defined night/day cycles ideally with fading "sunrise/sunset" transitions; live food to promote natural foraging and hunting behaviours; a good, clean, and consistent supply of water; and the visual presence of a natural substrate image (preferably gravel) placed beneath the tank. We have begun to investigate these recommendations with a large-scale systematic preference study. This research evaluates several key variables, including the presence of physical enrichments, visual escape cues, barren versus enriched perceived environments and the effect of visible neighbouring shoals, with the goal of providing an evidence-based foundation for refining zebrafish housing protocols.