# The Effect of Permeable Pavements on Danio rerio

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The purpose behind this research was to investigate whether different permeable pavements can change the composition of the stormwater that flows through it, through exposure to zebrafish embryos. The four pavements that were used were asphalt with no fiber (ANF), asphalt with fiber (AWF), concrete with no fiber (CNF), and concrete with fiber (CWF). It is unclear whether the permeable pavements provide chemical treatment of surface stormwater runoff or whether they contribute toxic chemicals to effluent water. Treatment influents and effluents were analyzed for water quality and zebrafish toxicity. The five measurements used to test sublethal indicators were the zebrafish embryo length, eye area, pericardial area, periventral area, and angle of the head. Results showed that permeable pavements alter the stormwater negatively, since the influent had the most developed embryos compared to the stormwater that was passed through any permeable pavement core. Overall, the most developed zebrafish group was influent, followed by ANF, CWF, AWF, and CNF. The influent was the least damaging to the zebrafish embryos, with the average head angle of the zebrafish being 121 degrees, compared to the controls 130 degrees. Even though the influent was the most developed, it still was not close to a normally developed zebrafish embryo. Of the permeable pavements, ANF had the most developed embryos, with the average pericardial area being 0.0198 mm^2, the closest to the control groups average 0.0196 mm^2. The least developed zebrafish embryos were CNF, with the average area of the zebrafish eye being 0.0255 mm^2, compared to 0.0516mm^2 of the control group. This data shows that permeable pavements alone are not a viable solution to solving the problem of stormwater runoff.

**Awards Won:**