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## Relative Depth Effects on Corrugated Culvert Roughness

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### ABSTRACT

Fish passage is important to the overall health of an ecosystem. Therefore, it is important to be able to accurately predict flow conditions within a stream crossing for high and low flow periods. This paper evaluates the effect of relative water depth on the hydraulic roughness of culverts at low discharge. A 21 m long, 0.8 m diameter corrugated steel pipe with  $0.068 \times 0.013$  m annular corrugations was used. For relative depths below 0.5, Manning's  $n$  was found to increase with decreasing relative depth. An equation was developed to predict relative depths below 0.5 within a corrugated steel pipe based on the corrugation height, slope and culvert diameter. While Manning's equation does perform reasonably well, the percent difference from the measured to predicted water levels warrants the use of an additional prediction method at low flows.

### KEYWORDS

Culverts; Fish Passage; Low Flows; Roughness; Manning's Equation

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