

AN ABSTRACT OF A THESIS

MODEL ASSESSMENT OF TROUT HABITAT ENHANCEMENT WITH
BOULDER CLUSTERS IN TAILWATER OF CANEY FORK RIVER

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A calibrated 2D hydrodynamic model of a popular recreational fishing reach in the tailwater of the Caney River was employed to assess the feasibility of trout habitat enhancement with a boulder cluster field. Hydrodynamic modeling results were coupled with Habitat Suitability Index (HSI) Models to quantify relative enhancement at a flow of $174 \text{ m}^3/\text{s}$ (6140 cfs). Scenarios with alternative boulder cluster densities were simulated to obtain an optimum design density for juvenile Rainbow Trout with spanwise spacing $B=1.50D_0-1.67D_0$ and streamwise spacing $L=2.00D_0-2.33D_0$ (D_0 is the least dimension of base area of each cluster) based on the computed weighted usable area (WUA) from the coupled model output. The boulder cluster field should be located along the gravel bar approximately 80 m (262 ft) from the right bank, and occupy a 4800 m^2 (51640 sq ft) area with 240 m (787 ft) streamwise length and a 20 m (65 ft) spanwise length. The individual boulder cluster in the field would be composed of two layers of boulders, each of approximately 1 m (3 ft) in diameter. The study demonstrates a rationale methodology for designing a boulder cluster field in a tailwater that is subject to the frequent occurrence of high flows, which is a major stressor on trout. The assessment of WUA is found to be sensitive to both the weighting coefficients and the Suitability Index (SI) curves; which in turn depend on the flow discharge, trout species and life stage being considered.