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Final Report

Debris Accumulation at Bridge Crossings: Laboratory and Field Studies

Introduction

The accumulation of large woody debris presents problems for the hydraulics of flow through bridge openings that could lead to increased risks of flooding, local scour, and even bridge failure. The present work is concerned with single-pier debris accumulation at bridge crossings, which is studied with the aid of laboratory experiments and field observations. Laboratory experiments were performed in a systematic study of the effects of velocity and depth on accumulation at a single pier using wooden dowels and twigs as model logs. Motivated by a feature of one of

the field sites (on the Eel River), the effect of the presence of a model sand bar was also examined. Preliminary experiments with a type of debris deflector have been conducted. Field studies were based on video monitoring at two field sites in Indiana, the SR59 south crossing of the Eel River, and the SR63 southbound crossing of the Big Vermillion River. Digital video recordings of images obtained using multiple cameras have been made since December 2001 at the Eel River site, and include one season where a sizeable debris pile has developed.

Findings

The draft report describes the issues arising in the design of both the laboratory and the field study, and reports on results so far obtained. A surprisingly strong effect of flow depth has been found in the laboratory, and, to some extent, observations in the field can be interpreted in light of this effect. Analysis of the recorded video images at the Eel River site has yielded qualitative

conclusions regarding debris movement in rivers, the rate of development of debris piles, and the performance of debris deflectors. Based on these results, tentative recommendations are made with respect to the factors that should be taken into account in the siting and hydraulic design of bridge crossings.

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