

THE HYDRAULICS OF BENDWAY WEIRS

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Abstract: Design teams of the 21st Century must contend with multiple problems created as a result of channel migration and bank erosion. Protecting land and riverside facilities, while also improving habitat conditions for endangered species, has become a task of increasing frequency. To mitigate bend migration problems while considering industrial, recreational, biological, and environmental demands requires that innovative methods for bank stabilization be developed. One such technique is to construct transverse features designed to train flow away from channel banks. Bendway weir structures, also known as spur dikes, groins or jetties, have been successfully used to decrease bank erosion while promoting aquatic habitat and riparian vegetation. While bendway weir structures have been successfully used in many applications, quantifiable design guidance has not been readily available. Past projects utilizing bendway weirs have relied heavily on field experiences, site-specific flume studies, and engineering judgment, but have lacked general design guidelines. To accurately model flow conditions resulting from the placement of bendway weirs, an undistorted 1:12 Froude scale, hard boundary model was constructed at the Hydraulics Laboratory of the Engineering Research Center at Colorado State University. The model contained two bends, which exhibited unique geometric characteristics representative of those found in the Middle Rio Grande reach. Three-dimensional velocities and water surface profiles were recorded for a series of tests including variations of weir length, spacing, and angle. Using the data obtained from the test series, relationships relating resulting hydraulic conditions in the channel, around the weir field and in eddies between weirs have been developed.