

How dams modify regional flow regimes across the United States

N. LeRoy Poff¹

Department of Biology, Colorado State University, Fort Collins

Brian P. Bledsoe

Department of Civil Engineering, Colorado State University, Fort Collins

Christopher O. Cuhaciyan

Department of Civil Engineering, Colorado State University, Fort Collins

Abstract. The ecological consequences of dams on free-flowing streams and rivers has become an area of active research in the last decade. The fact that individual dams alter flow regimes is well established, but the effects of dams on river dynamics relative to other types of human alteration has not been extensively studied, nor has the extent to which dams may be transforming riverine landscapes. In the United States, widespread construction of dams has greatly dampened the natural seasonal and inter-annual streamflow variability of rivers, thereby altering natural dynamics in ecologically important flows. In this presentation, we use daily streamflow data to examine how dams have modified natural flow regimes across large regions of the US that span a gradient of natural climatic variation. First, we use 43 dammed streams with pre- and post-dam daily streamflow data to show that dams have a more regionally consistent and measurable impact on natural flow regimes than do agricultural land use and urbanization. Second, for 186 dammed streams and rivers across the U.S., we ask the question of whether dams are actually *homogenizing* regional-scale differences in flow regime by overriding climatically-determined runoff patterns. We compare the historical (pre-dam) differences among regions to the current (post-dam) differences and find that dams have, indeed, reduced inter-regional differences over the 20th Century, chiefly through modification of the magnitude and timing of ecologically-critical high and low flows. The conservation implications of these results will be discussed.

¹ Associate Professor
Department of Biology
Colorado State University
Fort Collins, CO 80523
Tel: (970) 491-0649
e-mail: poff@lamar.colostate.edu