Introduction

The cottonwood (poplar) forests that line the river valleys of the western prairies and mountain foothills are aesthetically and recreationally valuable, and particularly rich wildlife habitats (USDA Forest Service 1977). However, although historically abun-dant, these forests have been declining rapidly. It is estimated that three-quarters of the cottonwood forests in the American southwest have already been lost (Johnson and Haight 1984). The decline of these woodlands has prompted the World Wildlife Fund, Canada to designate riparian cottonwood forests as one of North America’s most threatened ecosystems (Canadian Parks and Wilderness Society 1990).
One negative impact on the cottonwoods that is already widespread and continu-ally increasing is that due to damming and water diversion. Several recent studies have independently revealed the decline of riparian cottonwoods downstream from dams (reviewed in Rood and Mahoney 1990). In extreme cases, forest decline can be abrupt and almost complete (Stine et al. 1984, Rood and Heinze-Milne 1989, Snyder and Miller 199 1).
Cottonwoods grow in sand-gravel soils no more than 4 m above the water level in river valleys 20 to 50 m deep and 0.3 to 3 km wide. The soil water table closely tracks the river level (Mahoney and Rood 1991b), and it has been argued that forest decline downstream from some dams is a consequence of insufficient flows during the