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Priority Water Rights and environmental Protection

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Priority Water Rights and Environmental Protection (Oral presentation)

This paper argues that priority water rights are more efficient in administering certain environmental policies than proportional share water rights, an argument that is at odds with that proposed by Howe, Schumeier and Shaw [*Water Resources Research*, 1986). The use of priority water rights is well suited for implementation of a "safe minimum standard" [Berrens et al., *Land Economics*, 1998] stream flow or to provide "assured water supplies" for municipal water [Arizona Department of Water Resources, 2001]. The rational for this argument is straightforward; prices of priority water rights traded in a water market have an implicit risk premium for non-supply. The market determines the value of this risk premium. The paper analyzes the use of a senior priority water rights assigned to protect the Bosque. The Bosque, an area of riparian habitat between the flood levies of the Rio Grande from Cochiti Dam to San Acacia, New Mexico provides significant beneficial use for the State of New Mexico. It is the only remaining "natural" riparian forest of cottonwoods left in New Mexico. The trees provide an immediate benefit by supporting the levy system through energy absorption of floodwaters. The Bosque also provides habitat to a multitude of species including endangered species. It is a basic natural resource providing for outdoor recreation and nature activities. More recently, the US Fish and Wildlife Service has designated the Bosque as critical habitat for the Rio Grande Silvery Minnow (RGSM).Yet the resources, particularly water, necessary for the Bosque's continued existence are uncertain and subject to exploitation. The habitat uses water. New Mexico no longer has low cost supply of water to satisfy existing uses and future growth. To obtain additional water, the easiest solution is to cut down the trees, destroy the habitat and channel the river. An economically efficient preservation policy in line with New Mexico's Appropriative Water Law, public welfare and water conservation policies would be to declare a senior water right for the Bosque as a beneficial use.

This paper develops a model of priority water rights in a stochastic water supply environment and then examines the use of a senior water right to provide safe minimum standard flow of water within the Rio Grande for use by the Bosque. A GIS survey of this area estimated this land area to 37,300 acres. The consumptive use of the Bosque per acre per annum has been estimated by the US Bureau of Reclamation, Albuquerque Area Office as 43.79 inches (3.65 acre feet).. Applying this consumptive use value to 37,300 acres results in a 136,145 aft total quantity of water consumptively used. In addition to the consumptive use, a continuous stream flow particularly around San Acacia is required to keep indigenous species such as endangered silvery minnow alive and well. An estimate to maintain a continuous flow is 30,000 aft of consumptive water use over what is regularly used by the river.

The value of pre 1907 senior water right to the Middle Rio Grande water has average $2065 (1996 price). Using a 4% real social discount factor, the annual return to justify such as asset in environmental use would be $81 per aft. Barrens et al. [*Journal of Environmental Management*, 2000]have estimated the value of maintaining a riparian environment at $80 annual per household ($55 for riparian environments in general and $30 for the endangered species such as the minnow). For the approximately 210,000

households in the upper Rio Grande Basin (above Elephant Butte), total annual value of maintaining riparian environment and endangered species is $16,800,000. Given the consumptive use of 166,145 aft for this purpose, water for in-stream flow and riparian maintenance has a value of approximately $100 per aft. [16,800,000 / 166,145 = $101] or $20 more than the opportunity cost of the water right. As a comparison, the value of water used in riparian habitat is greater than that in agriculture, which averages between $30 and $60 per acre-foot.