The effects of Pulse Flooding on Early Successional Vegetation

by Morgan A. King

Riparian vegetation is an important component when looking at the effects of pulse flooding. The only clear objective of the 2004 November pulse flood was to input sediment into the Colorado River. Because the 1996 flood was more planned out, and the same riparian vegetation issues remain, I will assume the objectives were similar. The two main objectives for the 1996 flood were to; 1) scour vegetation from sandbars, and 2) remove some tamarisk which is an invasive weed. The 1996 results were that vegetation was buried, not scoured away which resulted in rapid re-growth due to high decomposition rates and high nutrients in soil. Tamarisk seedlings faced some mortality due to the flood, but mature adults were not effected. Four months post-flood event, the effects of sediment input has effected riparian vegetation.

Each sandbar was effected differently by the pulse flood, but this paper assesses the effect on RM 123 L riparian vegetation. Sediment was collected on sandbars as seen by cross sections of sand on the banks. By reviewing pre-flood photographs, this flood did not scour vegetation, but similar to the 1996 flood, sediment was trapped by vegetation and deposited. Some juvenile plants may have been effected, but mature willows, tamarisk, and seepwillows did not seem to suffer. Because of the specific shape of this sandbar, sediment was deposited only below the 40,000 cfs water line, which was at the edge of the sandbar. The majority of this sandbar is at or above the 40,000 cfs level. This lead to debris being collected and deposited by thick riparian vegetation as low water levels passed by plant communities.

Some riparian vegetation responded positively to the 2004 flood between the 20,000 and 40,000 cfs water fluctuation zone. As seen at RM123 L, red willow and horsetail seedlings have re-sprouted and are dominant. Tamarisk seedlings were not seen. These are expected results for red willow because it has a faster growth rate and seedling establishment as compared to tamarisk under harsh water conditions. Horsetails seemed to be well established before (as seen by old photographs) and was found closer to the rivers edge where tamarisk are unable to withstand anaerobic conditions for long periods. Thus, in the seedling stage, willows are a superior competitor to tamarisk as

seen by the dominance in the sedimentation zone. The flood did not remove vegetation but encouraged rapid re-growth at this site.

In the next community, at or above the 40,000 cfs level, the flood showed little effect. This community is mature tamarisk shrub woodland, scattered with seepwillows and perennial grasses and herbaceous plants. Because the flood level was not high enough or at a magnitude to overflow the sandbar, this community acted as a sieve trapping floating debris brought by the Colorado River. Branches and plant litter were found on the upstream edge of plants. This does not seem to have any effect because herbaceous grasses and plants have grown back and covered the floor of this plant community. The only thing that may be effecting these communities is wind moving sediment post-flood by either covering up or unearthing small seedlings.

Four months after the 2004 November flood, the effect at RM 123 L sandbar was similar to the effects of the 1996 pulse flood results. Sediment scoured little vegetation, but instead was entrained by established vegetation. This vegetation responded by decomposing and re-growing on open sandbars. Mature tamarisk were too well established in this site to be negatively effected. The depths of the floods increased litter on top of woody shrub communities which could increase nutrients and cause even further growth of riparian vegetation. Although willows seem to be able to out compete tamarisk in the seedling stage, they may be confined to the flood fluctuation zones where tamarisk were not established before.