

# **Arkansas Watershed Mapping & Inventory Summary Report, January 2008**



**Cucharas River near Walsenburg— mixed tamarisk, willow, cottonwood,  
and upland native species**

**Prepared by  
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Arkansas Watershed Invasive Plant Plan  
Based on surveys performed 2005-2007**

## **Tamarisk Mapping & Inventory Summary Arkansas Watershed (January 2008)**

**Inventory Background & Objectives** – In 2005 and 2006, the Tamarisk Coalition performed an inventory of tamarisk infestations on the Arkansas River and Purgatoire River watersheds and their main tributaries for the Colorado Water Conservation Board (CWCB). In 2007, the Tamarisk Coalition completed a supplementary inventory of tamarisk for the entire Arkansas Watershed in Colorado as outlined in the ArkWIPP plan. The purpose of this work was to establish and implement an inventory protocol that would be economical to perform and would provide a clear understanding of the extent of the tamarisk problem. These inventory/mapping protocols (attached) proved to be successful and were used in 2006 and 2007 to identify tamarisk throughout the remainder of the state.

**Inventory Approach** – Inventory and mapping were coordinated with the U.S. Geological Survey's (USGS) efforts to establish a national on-line database conforming to the weed mapping standards developed by the North American Weed Management Association. The basic approach utilized existing aerial photography, satellite imagery, and local knowledge available from counties, river districts, soil and water conservation districts, state agencies, Army Corps of Engineers, National Resources Conservation Service, USGS, CSU, and The Nature Conservancy. This information was then "ground-truthed" by a 2-man team to confirm infestation density, maturity, height, accessibility, presence of native species, and miscellaneous site characteristics. GPS data and digital photo records were taken and shapefiles were developed using GIS. Over **1,633** miles of main stem river, major tributaries, and major reservoirs were surveyed using this approach. The starting point for the Arkansas River was the Upper Arkansas area near Salida, and for the Purgatoire River it was Trinidad Reservoir dam. This constituted the river mainstem mapping efforts. Additionally, mapping efforts were expanded in 2007 to include all major infested tributaries, reservoirs, wetlands, canals, and dry land stands in the Arkansas watershed. This information, in the form of shapefiles and attribute data, has been transformed into a digital GIS database which soon will be available on the USGS invasive species website, [www.niiss.org](http://www.niiss.org).

**Finding** – The inventory data for the Arkansas Watershed is presented in Tables 1 through 4, which are attached. Table 1 presents the general mapping data; whereas, Table 2 provides estimates on current and future water losses associated with the tamarisk infestations and the estimated costs for tamarisk control and revegetation. Tables 3 and 4 provide detailed information on each infested area (shapefiles) and its unique attributes. The water losses and cost estimates are based on the most recent research and statistical analysis available through the USDA, NOAA, USGS, CSU, National Invasive Species Council, Tamarisk Coalition, and others. The following represents the major findings (Note: values presented below are rounded from Tables 1-4:

1. The Arkansas River from the headwaters to the CO/KS state line has approximately **31,000** total acres of tamarisk infestation with an average density (canopy cover) of **52%**. Because the Arkansas River tends to be a broad floodplain river, its tamarisk infestations are wide averaging over **1,000** feet with a maximum width of nearly one and a half miles near John Martin Reservoir.
2. The Purgatoire River has both broad floodplains and a narrow canyon section. As a result, it has significant areas of infestation (**9,250**) but has a relatively low average density of **29%**. Purgatoire River tributaries are also lightly infested with **26%** average density and approximately **750** acres of total infested area.
3. The related waterways for the Arkansas River have almost **26,000** acres of tamarisk infestation. This includes major tributaries, canals and reservoirs. The average density for all of these areas is approximately **27%**.
4. The Arkansas watershed contains over **67,000** acres of land infested with tamarisk, with an average density of **33%**.
5. Current water losses are based on the amount of water tamarisk is using under observed densities minus the water that would be used by native plants. Figure 1 represents the differences in vegetative cover with and without tamarisk and illustrates tamarisk occupying an area much greater than the riparian zone which typically would support cottonwoods and willows, also phreatophytes. The significant water losses occur as tamarisk occupies upland areas within the floodplain that would normally have dryland xeric vegetation such as grasses, sage, rabbit brush, etc. These uplands of the Arkansas and Purgatoire rivers and their tributaries typically exceed 50% of the tamarisk infested areas. Based on these conditions, the estimates of current water losses above and beyond what native vegetation would use are:
  - a. Arkansas River = **48,000** acre-feet per year.
  - b. Arkansas River major tributaries and reservoirs = **20,000** acre-feet per year.
  - c. Purgatoire River = **8,000** acre-feet per year.
  - d. Purgatoire River major tributaries = **600** acre-feet per year.
6. Future water losses assume an infilling of the existing infestation areas that will likely occur over the next several decades based on similar conditions observed in other states (NM, UT, and NV). Future water losses from infilling only (no expansion from existing infested areas) are estimated to be:
  - a. Arkansas River = **93,000** acre-feet per year.
  - b. Arkansas River major tributaries and reservoirs = **76,000** acre-feet per year.
  - c. Purgatoire River = **27,000** acre-feet per year.

d. Purgatoire River major tributaries = **2,000** acre-feet per year.

7. Costs for tamarisk control and revegetation are based on current work being performed by the National Invasive Species Council on an economic model that incorporates *Integrated Pest Management* practices with planning, design, control, revegetation, monitoring, and maintenance activities. Estimated costs are summarized in Table 5:

Table 5: Economic summary

River	Total Costs*	Average Cost per Acre Treated*	Average Cost per Acre-foot of Water Preserved*	Average Cost per Mile*
Arkansas River	\$45,000,000 (±\$10,000,000)	\$1,500	\$950	\$162,000
Arkansas R. Tributaries & Reservoirs	\$20,000,000 (±\$2,000,000)	\$800	\$1,000	\$21,000
Purgatoire River	\$8,000,000 (±\$1,000,000)	\$870	\$1,000	\$45,000
Purgatoire R. Tributaries	\$600,000 (±\$80,000)	\$810	\$1,100	\$2,000

\* Rounded values from Tables 2

8. If tamarisk control and revegetation occurs on any of these river or tributary sections, the water lost to the atmosphere through evapotranspiration will be preserved within the groundwater and/or surface water regimes. It is unknown at this time, without further research, when and if these waters would be available for beneficial uses.
9. The costs of water retained within the hydrologic system of approximately \$1,000 per acre-foot should be compared to the value placed on the purchase of senior water rights because tamarisk is always using water even during a drought.
10. The method used to develop this inventory information is predicted to identify 85 to 90 percent of tamarisk within the Arkansas watershed. The remaining percentage represents small pockets of infestations that are scattered throughout the region. Because these outlying infestations are not included in the cost development, a contingency of approximately 20% should be added to these cost values to account for their identification and remediation.