

## Arkansas River Tamarisk Mapping & Inventory Summary

**Inventory Background & Objectives** – In 2005-2006, the Tamarisk Coalition completed an inventory of tamarisk infestations on the Arkansas River and Colorado River watersheds and their main tributaries for the Colorado Water Conservation Board (CWCB). 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 proved to be successful and are being used in 2006 to identify tamarisk throughout the remainder of the state.

**Inventory Approach** – Inventory and mapping were performed during the summer and fall of 2005 and coordinated with the U.S. Geological Survey's (USGS) efforts at establishing a national on-line database which would conform to the weed mapping standards developed by the North American Weed Management Association. The basic approach was to use existing aerial photography and 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, accessibility, presence of native species, and several other site characteristics. GPS data and digital photo records were taken and shape files were developed utilizing GIS capabilities at Mesa State College. Over 270 miles on the Arkansas River from the CO/KS state line to Pueblo Dam were surveyed using this approach. This information, in the form of shape files and characteristics 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).

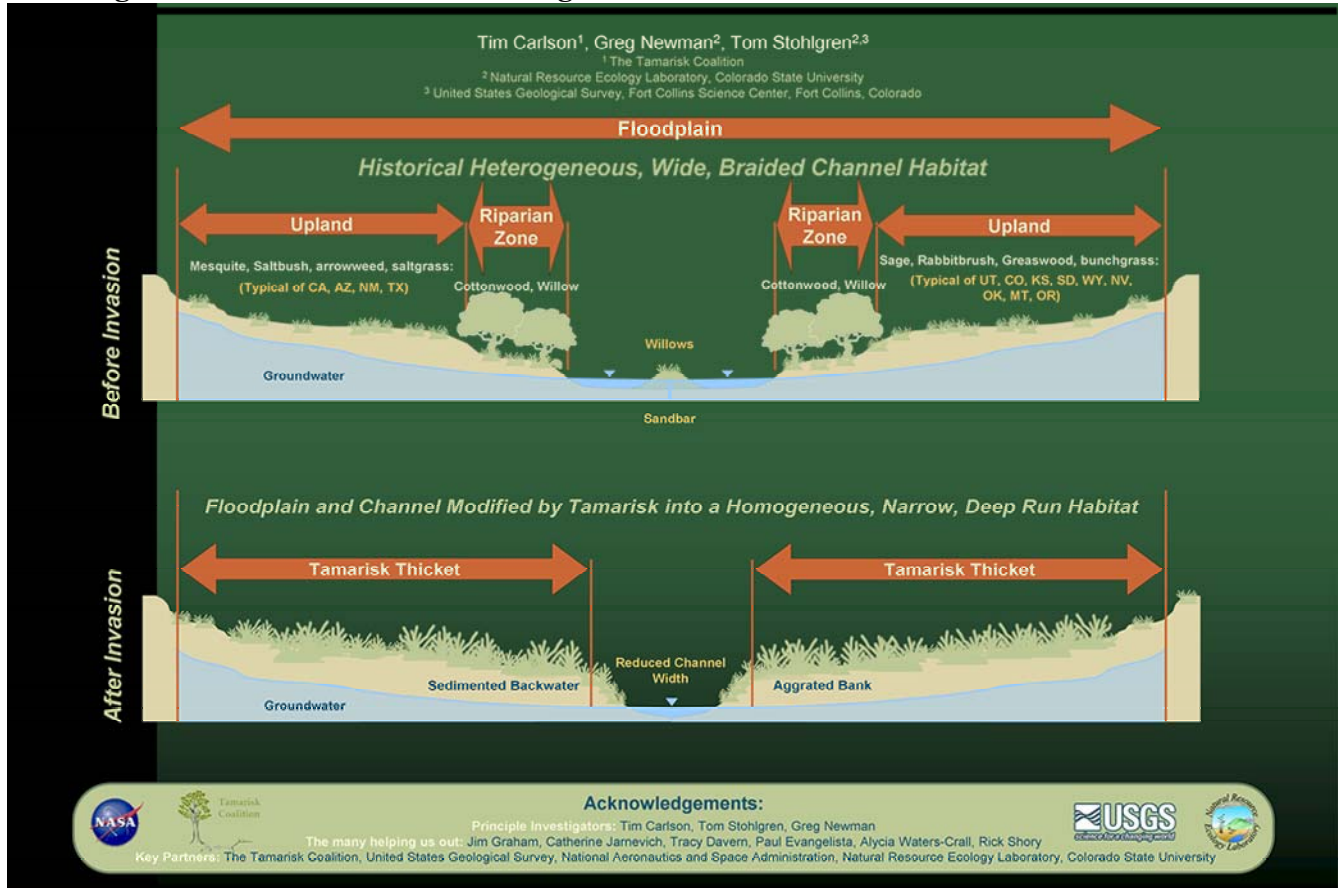
**Finding** – The inventory for the Arkansas River and its major tributaries is presented in Tables 1 through 4 (included in folder "Arkansas River and Tributary Data Tables 1-4" as an Excel file). Table 1 presents the general mapping data; whereas, Tables 2 provides information on estimated current water 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 and its unique attributes. These 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 our findings:

1. The Arkansas River from the CO/KS state line to Pueblo Dam has 29,000 total acres of tamarisk infestation at approximately 54% average density.
2. The major tributaries and reservoirs of the Arkansas River had an additional 15,000 acres of infestation with an average density of approximately 28%.
3. Current water losses are based on the amount of water tamarisk is currently 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 how tamarisk will occupy 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. Based on the percentage of upland tamarisk infestations along the Arkansas River and it's

major tributaries, the estimates of current water losses above and beyond what native vegetation would use are:

- a. Arkansas River from CO/KS state line to Pueblo Dam = 47,000 acre-feet per year.
- b. Tributaries and Reservoirs = 12,000 acre-feet per year.

Figure 1: Tamarisk Induced Changes in Channel Structure and Associated Habitats



4. 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 from CO/KS state line to Pueblo Dam = 85,775 acre-feet per year.
  - b. Tributaries = 44,000 acre-feet per year.
5. 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. This information is contained in the folder titled “Options for Non-Native Phreatophyte Control” as a PDF file. Estimated costs for the Arkansas River and its tributaries within the study area are:

Economic summary

River	Total Costs*	Average Cost per Acre Treated*	Average Cost per Acre-foot of Water Preserved*	Average Cost per Mile*
Arkansas River	\$44,100,000	\$1,500	\$950	\$220,000
Tributaries & Reservoirs	\$12,200,000	\$830	\$1,000	\$53,000

\* Rounded values from Tables 2 (included in folder “Arkansas River and Tributary Data Tables 1-4” as an Excel file)

6. If tamarisk control and revegetation occurs on any of these river or tributary sections, the water lost to the atmosphere through evapotranspiration will be saved and will remain within the groundwater and/or surface water regimes.
7. 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.
8. The method used to develop this inventory information is predicted to identify 85 to 90 percent of tamarisk within the Colorado River 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, approximately a 20% contingency should be added to these cost values to account for their identification and remediation.