Missouri River Watershed Coalition – Conservation Innovation Grant Project
Treatment Site Selection Report

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The Missouri River Watershed (MRW) comprises 529,350 square miles and incorporates the states of Colorado, Montana, Nebraska, North Dakota, South Dakota, and Wyoming. These states rely heavily upon the Missouri River system for economic and ecological stability. Waters of the system support and provide for agriculture, recreation, tourism, wildlife habitat, irrigation, drinking water, industry, power generation, and livestock production.

Dense non-native plant infestations choke river systems thereby restricting access for irrigation, wildlife, and outdoor enthusiasts; degrading or eliminating habitat for threatened and endangered species; and reducing the amount and quality of essential water. Two invasive plant species, saltcedar (*Tamarix* spp.) and Russian olive (*Elaeagnus angustifolia*), particularly threaten these many uses within the MRW.

The MRWC–CIG (Missouri River Watershed Coalition–Conservation Innovation Grant) project has been initiated to provide the knowledge necessary to support management of saltcedar and Russian olive in a more efficient and environmentally suitable manner over the entire MRW. This watershed-based project involves all six Missouri River states and is a pilot project for the western region and potentially the nation.

These invasive species will be removed from riparian areas on at least 103 acres to improve ecosystem structure and function and enhance agricultural productivity. Producers and landowners within the project area will be introduced to innovative conservation practices that can improve the quality and reduce the cost of grazing land restoration, enhance fish/wildlife habitat, and promote more effective long-term conservation strategies.

This multi-state project includes stakeholders from the entire MRW. However, sample collection, workshops/field demonstrations, and treatment and monitoring sites will be located in three of the MRW states.

In contrast to previous research studies, treatment areas within this project will be approximately 14 acres in size. This size provides the opportunity to both measure effects of treatment on a practical scale and the opportunity for education and technology transfer by providing demonstration plots on a practical scale that landowners can apply directly to their own situations. Larger plots were also used to allow commercial-scale treatment with equipment that would be expected to be used in "real-world" situations.

Sample areas within plots were selected to best represent treatment effects and minimize edge effects.

Site Selection
- A total of nine sites infested with saltcedar or Russian olive or both in at least three MRW states have been selected.
- To minimize contractor mobilization costs and maximize efficiency, several of the sites may be located within one general area. Sites that encompass the range of saltcedar and Russian olive infestation sizes, ages, and densities will be selected.
- Sites will not be stratified by the regulated or unregulated status of a river; rather, the river's status will be noted and taken into consideration during data analysis.

Initial Monitoring
- Detailed baseline monitoring will be performed at each site prior to any treatments. For each planned treatment area and control area, three permanent 50-meter transects will be established and geo-referenced.
- Photo points will be established to document general trends.
- Data will be collected to monitor biotic (vegetation) and abiotic (soil) resource attributes.
- Vegetation monitoring will be conducted in accordance with the *USDS-ARS Monitoring Manual for Grassland, Shrubland, and Savanna Ecosystems, Volumes I and II.*
- A suite of several protocols will be used to measure specific indicators of those attributes including canopy and basal cover, plant density, canopy and basal gap, species composition, production, plant structure, and soil stability.
- These data will provide information on ecological functionality of the site and for analysis of resource values related to wildlife habitat, livestock grazing, and soil erosion.
- Data will also be collected for litter and ground cover which will provide information on plant species composition, erosion risk, plant vigor, seedling establishment, community structure, and habitat attributes.
- Presence and density of special status species—both desirable and undesirable—will also be determined. These data will report the success of seedlings, efficacy of salt cedar/Russian olive treatment, invasion of noxious weeds, and density of desirable woody species.
- The frequency, size, and distribution of gaps between plants will be measured to evaluate wind and water erosion risk and provide input for descriptions of habitat structure.
- Production data will be measured to determine the biomass produced by each species and/or lifeform. These data provide comparison to Ecological Site Descriptions, allow analysis of at-risk communities, and will be used to evaluate habitat objectives and livestock/wildlife forage objectives.
- Vegetative structure protocols will provide data for analysis of the vertical structure of the plant community and data on the quality of visual obstruction or hiding cover for wildlife species.
- Soil testing will provide data on soil chemistry and structure changes created by removal of undesirable species and colonization by other species.

Treatments
- Sites will have defined treatment areas designed according to existing plant distribution and a defined control plot.
- While foliar treatment for phragmites is still commonly used, it is already known to have potentially significant off-target effects. Thus, it will be used in only limited amounts (~10 acres total) based on the producer's willingness to have it applied on their property and the appropriateness of the treatment for the site.
- Treatments will be implemented at the sites in the fall/winter of 2012.
- Commercially licensed contractors will be provided with treatment specifications to ensure that all treatments are performed and data collected in the same manner at each site.
- The two treatment method options will be implemented:
  - Option 1 (cut-stump of Russian olive) will consist of the mechanical cutting at the base of the tree with a variety of excavator-type apparatuses (and possibly some hand cutting with chainsaws). An immediate follow-up of triclopyr ester herbicide and a basal oil mixture will be applied to the exposed stump area of the trees.
  - Option 2 (basal bark of saltcedar) will consist of the application of a triclopyr ester or amine herbicide and basal oil mixtures to the individual plants, applying the herbicide mixture to all live stems emerging from the ground up to a height of 18 inches. Year 2 and Year 3 follow-up treatments on the re-growth will be done, applying the same herbicide mixtures as foliar applications to the individual plants displaying visible regrowth. Additional foliar herbicide mixtures may be applied as needed to address a variety of terrestrial noxious species that may exist within the individual treatment plot areas at the conclusion of Year 3.

- During the treatment work, detailed information will be collected to evaluate the economics and generate an accurate cost of each type of treatment. Volume of herbicide and bark oil, time to implement treatments, cost of operating the machinery, and costs of removing biomass (where applicable) will all be recorded. This information, in conjunction with monitoring data, will allow the calculation of return on investment for each of the treatment scenarios.

Follow-up Monitoring
- Monitoring in Year 2 and early Year 3 will consist of brief site visits and taking photos at the photo points. The purpose of this limited monitoring will be to determine if the vegetation community is moving toward or away from the desired goal. These preliminary data will determine the course of action for the end of Year 3.
- Some treatments may not succeed in moving the system toward a functioning native community (for conservation areas) or increased forage (for livestock production areas), and may result in other noxious weed problems. In such cases, funds intended for intensive transect monitoring will be diverted to additional treatments (using methods that preliminary data show to be more effective) to redirect vegetation recovery.
- In cases where preliminary data indicate initial success, the monitoring methods used for the baseline monitoring will be employed to evaluate riparian system functioning and/or suitability for livestock production.
- Monitoring data will also allow the determination of which treatment methods and time of year provide the best results. They will also demonstrate how the results vary by initial site conditions, river status (regulated or unregulated), river reach, and land use.

Data Analysis
- The percent cover of each herbaceous, shrub, and tree species will be calculated along transects. Richness will be the sum of all the species encountered. Further plant community analyses will be based on species richness and species diversity. Differences in community composition between treatments, river conditions, and land uses will be addressed.
- After preliminary data analysis, appropriate transformations will be made and additional analyses will be used to assess significant differences in community composition between sites and within site treatments. Appropriate univariate analysis will be performed for species richness, cover, and diversity to assess site differences. Linear regression will be used to assess the impacts of different treatments on community composition.