FRONT RANGE INFRASTRUCTURE RESOURCES PROJECT
Biological Resources

Woody Riparian Communities

Riparian (streamside) vegetation communities are of interest in the context of the Front Range Infrastructure Resources Project (FRIRP) because they are often a focal point for conflicting societal demands. The cottonwoods and willows comprising these communities are structurally complex compared to the surrounding landscape and support diverse assemblages of mammals, birds, reptiles, and amphibians. However, riparian areas are also primary sites for water development, agriculture, grazing, sand and gravel mining, and recreation, each of which may limit other uses. Direct and indirect impacts of these activities have led to exploration of new opportunities and techniques for restoring disturbed riparian habitats and to greater concern for some of the scarce species that inhabit them.

Riparian Restoration

Cottonwoods and willows produce abundant wind-borne seeds adapted to germinate on disturbed patches of bare, moist soil in full sunlight. Cottonwoods in particular are intolerant of shade and germinate poorly in plant litter; they rarely become established under an existing stand of trees. Successful recruitment of these species also requires that germination sites be safe from subsequent floods and ice scour, at least for a few years, and that roots be able to make contact with the subsurface water table during the first year of growth to prevent drought mortality. In the past, spring and early summer flood flows created these disturbance patches along Front Range rivers. In cooperation with the city of Fort Collins and Western Mobile, Inc., U.S. Geological Survey (USGS) scientists are examining an approach to reclamation of sand and gravel pits that uses hydrologic manipulation to mimic the effects of flooding to produce appropriate germination sites.

The 17-ha WREN pit (named for a broadcasting company that once owned the property) is located adjacent to the Cache la Poudre River in east-central Fort Collins (fig. 1). Water seeps into the pit from the river, and a drain culvert and screw gate on the opposite side allow control of water levels. Western Mobile prepared the site according to a plan provided by the city of Fort Collins. Side-slopes were reduced from their after-mining condition, the floor was sloped gradually toward the drain, and two small islands were constructed near the middle of the pit. Nearly all existing vegetation was removed or covered by these operations.

We simulated a natural hydrograph by filling the pit with water and conducting a series of annual drawdowns during natural seedfall (fig. 2). We gradually lowered the water level (about 1 cm/day) to provide a fringe of moist soil suitable for germination of cottonwood and willow seeds. We repeated this process at successively lower elevations for 3 years, in each case raising the spring water level back to approximately the lowest elevation at which establishment occurred in the previous year before initiating the drawdown. While judgments about the ultimate success of this project in producing mature trees will not be possible for several years, woody vegetation is developing well. The city of Fort Collins has now purchased the WREN pit as part of its natural areas program.

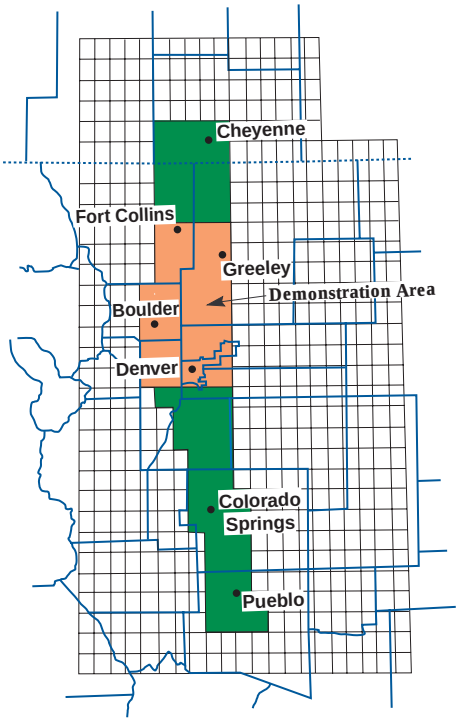

Figure 1. *Map showing location of Fort Collins in relation to FRIRP study area and demonstration area.*

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Figure 2. *The WREN pit, filled and ready for drawdown.*

Saltcedar Control

Concurrent establishment of saltcedar, an undesirable non-native species, was a problem during our work at the WREN pit. In Colorado, saltcedar disperses seed somewhat later, but for a longer period of time, than does cottonwood. This difference in dispersal, coupled with the fact that saltcedar seeds are very small and therefore contain few energy reserves, means that saltcedar seedlings usually remain smaller than cottonwood seedlings through the first growing season. During our first year of work, we reflooded the pit to try to eradicate a severe infestation of saltcedar seedlings, attempting to control water levels such that most of the saltcedar seedlings were completely inundated but the larger cottonwood seedlings were not. This control effort appeared to be successful; most saltcedar seedlings were killed, and many cottonwood seedlings survived. We subsequently began a controlled experiment, using pot-grown cottonwood and saltcedar seedlings, to examine further the effects of both fall and spring flooding (fig. 3).

Preble's Meadow Jumping Mouse

One species that is found almost exclusively in heavily vegetated riparian areas is the Preble's meadow jumping mouse (*Zapus hudsonius preblei*), a subspecies recently listed as threatened by the U.S. Fish and Wildlife Service (fig. 4). It is presently known to occur in seven counties along the Front Range of Colorado and in two counties in Wyoming. Historical records indicate that it was formerly present in a few additional counties in both States. Habitat loss and degradation caused by agricultural, residential, commercial, and industrial development are believed to imperil its continued existence.

Figure 3. *Flooding mortality of cottonwood and saltcedar seedlings is being studied in a controlled experiment.*

Figure 4. *Preble's meadow jumping mouse.*

Much of the remaining habitat for the mouse occurs in areas with known or potential sand and gravel resources, which are being mapped as part of the Front Range Infrastructure Resources Project. We are also cooperating with the Colorado Division of Wildlife to develop detailed maps of riparian vegetation in parts of the Front Range and with the Colorado Natural Heritage Program to compile data on locations where the mouse has been trapped. We will combine this information in a geographic information system to analyze the relationship between mouse locations, riparian vegetation, and sand and gravel resources. We will work closely with other scientists who are studying the mouse to determine how best to use these data to identify areas of potential mouse habitat. Data on specific habitat requirements of the mouse may also be useful in developing guidelines for reclaiming sand and gravel pits to benefit this threatened species.

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