

# Upper Gila Riparian Restoration Planning: Background & Purpose

By Bruce Orr and Glen Leverich, Stillwater Sciences



Figure 1. Dense tamarisk stands along the upper Gila River near Safford, AZ. Photo by Tom Dudley (U.C. Santa Barbara).

The Gila Watershed Partnership has just embarked on an exciting project to develop a comprehensive plan for strategic riparian restoration along the upper Gila River in Graham County. Led by a team of nationally recognized ecologists and hydrologists, and supported through a generous grant from the Walton Family Foundation's Freshwater Initiative Program, the project includes several key studies intended to better understand vegetation, wildlife, and hydrology of the flood-prone, ecologically sensitive river corridor. The primary goal of the project is to promote recovery of native riparian vegetation for a variety of reasons, including providing habitat for wildlife, such as the southwestern willow flycatcher (*Empidonax traillii extimus*), reducing wildfire and flood threats, conserving groundwater, and maintaining a more aesthetically pleasing river-riparian corridor. Meeting this goal will involve development of a restoration framework that maximizes the likelihood of creating sustainable native riparian vegetation in a cost-effective manner, while simultaneously building the capacity of

the local community to support and participate in achieving restoration success. Satisfying this goal will also enable sustained survival of the endangered southwestern willow flycatcher (and other sensitive riparian and aquatic wildlife) and potentially lead to its de-listing based on quantitative evidence of species recovery.

Like many relatively unregulated riverine systems in the southwest, the upper Gila River and its major tributaries are sensitive to natural and man-made stressors, including flooding, invasion by non-native plants (Figure 1 and 2), wildfire, encroachment by development, and various land-use practices. The riparian corridor is thus under constant pressure as it responds to these ongoing perturbations. A key new concern in the watershed is the anticipated arrival of the tamarisk leaf beetle (*Diorhabda carinulata*), introduced into the western states north of 38°N latitude for biological control of tamarisk (salt cedar; *Tamarix ramosissima* and *T.*

parviflora)(Figure 3). The leaf beetle has now expanded its range and has led to widespread defoliation of tamarisk-dominated habitats in many southwestern watersheds, including the Virgin River (Figure 4) which supports Critical Habitat for the flycatcher. While the tamarisk leaf beetle is not currently present within the Gila watershed, it is likely to arrive in the foreseeable future and have impacts to tamarisk similar to those seen in other watersheds. There are numerous benefits to tamarisk suppression via biocontrol (e.g., ground-water conservation, riparian habitat recovery, fire risk reduction), but short-term negative consequences are also possible, such as defoliation during flycatcher nesting resulting in loss of protective cover. In addition, without some active efforts to restore native vegetation, there is a strong risk that as tamarisk declines due to the biocontrol it will be replaced by other invasive non-native weeds.

It is important to begin planning now for the arrival of biocontrol in the Safford Valley for two main reasons. The first is that populations of the leaf beetles are currently present to the east (upper Rio Grande), north (San Juan and Little Colorado Rivers) and west of this region (Virgin River/Lake Mead), and beetle establishment in 2012 below Hoover Dam marks their arrival into the Lower Colorado River Basin. Beetle dispersal distances greater than 40 miles over mountain ranges have been reported and, furthermore, unregulated releases of beetles have occurred in many areas: both the *D. carinulata* of the western region and other *Diorhabda* species introduced in Texas. The second reason is that the evolution of physiological ability of *D. carinulata* to establish farther south than the original insects would tolerate has recently been documented (by science team member Tom Dudley and his colleagues), so it is likely that the leaf beetle is, or will soon be, capable of establishment at 33°N in the Safford Valley.



**Figure 2. Dense tamarisk stands lining the upper Gila River near Ft. Thomas, AZ. Photo by Bruce Orr (Stillwater Sciences).**

Flooding through the upper watershed is another concern of land-use and restoration planners due to the dramatic changes that have taken place along the river corridor. The river has experienced several notable floods that have scoured vegetation and dramatically shifted the river pathway. The flood records reveal a relatively quiescent period during the first half of the 20th century, followed by a period of larger, more frequent flood events since the late 1960s. This recent hydrological condition reinforces the importance of considering flood dynamics in any restoration planning effort on the upper Gila River.

Our science team includes ecologist Bruce Orr and geomorphologist Glen Leverich of Stillwater Sciences, who will carry out an “Ecohydrological Assessment” to identify suitable restoration locations and methodologies. Biologists Tom Dudley and Kevin Hultine from U.C. Santa Barbara and Desert Botanical Garden, respectively, will survey vegetation and biocontrol conditions to create a unique, valuable baseline prior to beetle expansion into the Safford Valley area. They will also assist the Gila Watershed Partnership with their new cooperative program for local propagation of native plants for



**Figure 3. Numerous tamarisk leaf beetles (*Diorhabda carinulata*) feeding on tamarisk branches along the Virgin River near Littlefield, AZ. Photo by Tom Dudley (U.C. Santa Barbara).**



**Figure 4. Example of tamarisk defoliation on the Virgin River near Littlefield, AZ. Top view of green, lush tamarisk before biocontrol in June 2010, and bottom view of brown, defoliated tamarisk after biocontrol one month later. Photos taken by Tom Dudley (U. C. Santa Barbara).**

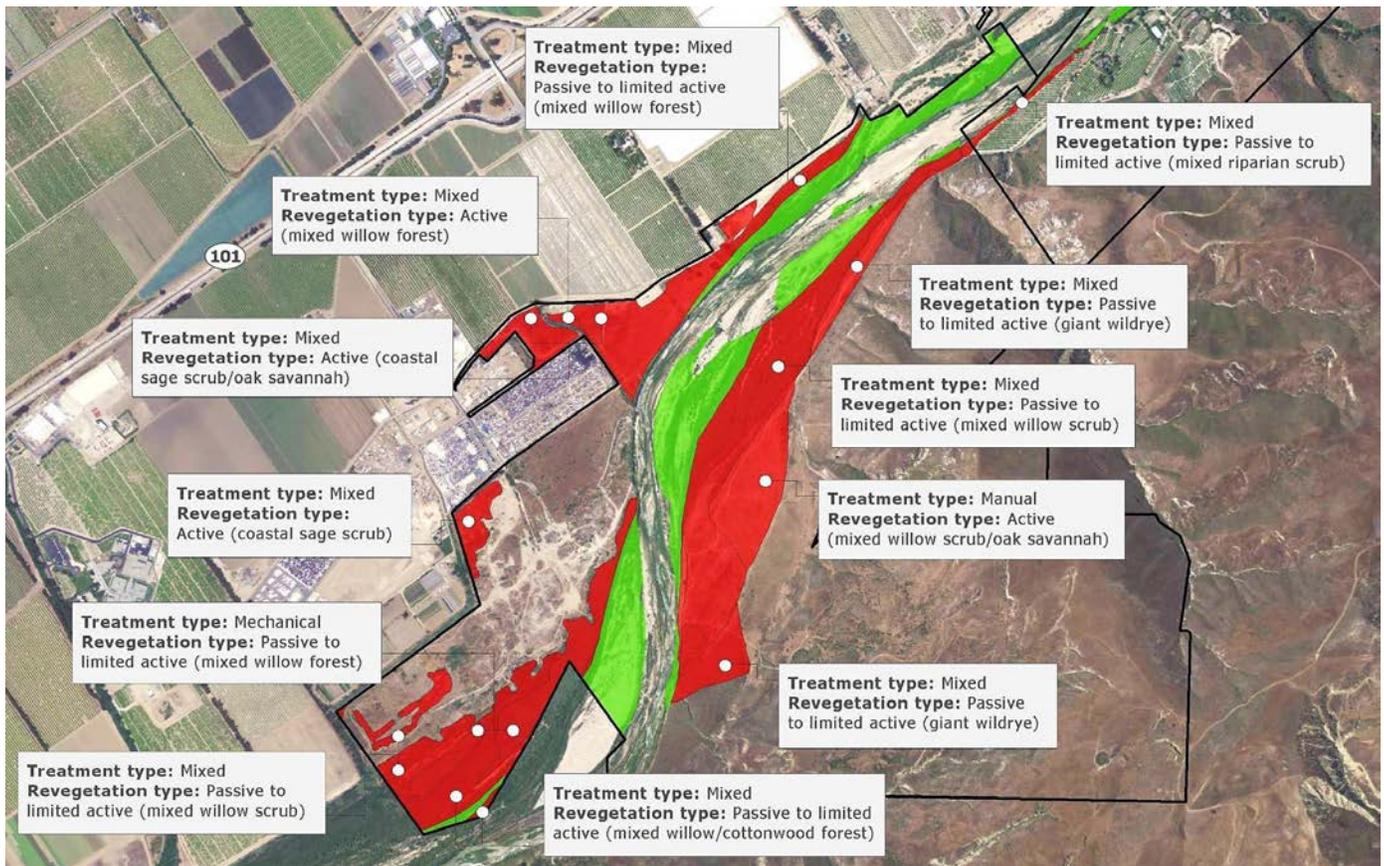
restoration purposes. Matt Johnson and Jim Hatten from the Northern Arizona University and USGS will estimate potentially suitable flycatcher habitat based on existing conditions and following expansion of the beetle into the Safford Valley area. Finally, remote sensing products that will serve nearly all study elements were collected in fall 2012 by Utah State University's Remote Sensing/GIS Laboratory, including high-resolution air photos, topography, and vegetation classification.

Our ecohydrological approach is the project's core component as it will systematically identify suitable locations along the river corridor for long-term, sustainable, cost-effective riparian restoration based on ecological and hydrological factors. The approach will utilize some of the excellent geomorphic maps produced by the Bureau of Reclamation during their study from the early 2000s. The first step is identification of the "Flood Reset Zone" based on the most frequently disturbed portions of the river corridor (where active restoration should generally be avoided). Next, characterization of dominant vegetation types identifies those areas dominated by native species (Figure 5), versus tamarisk or other non-native, invasive

species. Through synthesis using computer-based mapping combined with other project data, including soils, groundwater, and flycatcher habitat potential, a final map will be produced showing suitable sites along the entire Safford Valley reach. The map and associated report will include recommendations on factors such as: (1) active versus passive restoration (i.e., whether active planting of native vegetation is required for a particular area, or if natural recruitment processes alone should be sufficient to re-establish willows and other native vegetation); (2) whether weed treatment is likely to be required; and (3) which types of native vegetation might



**Figure 5. A recent riparian restoration site on the Upper Gila River near Duncan, AZ that involved tamarisk removal and native revegetation. Photo by Glen Leverich (Stillwater Sciences).**



**Figure 6. Example restoration planning map created by Stillwater Sciences for a high priority restoration site on the semi-arid Santa Clara River in southern California, highlighting appropriate invasive-vegetation treatment and native revegetation strategies along the river corridor.**

be most appropriate in areas with particular concerns, such as risk of wildfire.

The project will depend a great deal upon discussions with stakeholders and landowners in the Safford area to collaboratively develop restoration strategies for high priority implementation sites. The project will conclude with strategic planning maps (Figure 6) to provide a foundation for subsequent development of a River Corridor Restoration Implementation Plan by the Gila Watershed Partnership and interested stakeholders.



**Upper Gila River near Safford, AZ. Photo by Bruce Orr (Stillwater Sciences).**

# Project and Program Status Report

## **AWPF and USFW Partners Eagle Creek Riparian Restoration at Filleman Crossing Project –**

Souder, Miller & Associates has completed the 404 permit application and submitted it to the Army Corps of Engineers in November of 2012. The U.S. Fish and Wildlife Service is currently working with Souder Miller's biologists to make some changes to the biological evaluation. Hopefully, we will be able to proceed in late spring.

**ADEQ Education Master Watershed Steward Program, Phase II –** GWP's "Ecology of the Gila River" through Eastern Arizona started its spring semester course in mid-January. Among the enrolled students are several members of the local agriculture community, which has recently been shaken by the first "zero allocation" of Gila River diversion water to the Gila Valley Irrigation District in modern history.

Bill Brandau continues to shape the course to be as relevant as possible to area residents, who are now faced with an 18<sup>th</sup> year of drought with no relief in sight. On February 7, U of A climatologist Mike Crimmins presented a series of maps and graphs illustrating the causes and results of such weather phenomena as El Nino and La Nina. Dr. Crimmins also showed that while our region gets rainfall in roughly the same cycles as have been established by tree ring studies for the last 1,000 years, rising temperatures result in more evapotranspiration and less actual precipitation and snowpack storage. "People who came to this area in the 1980's, when we were in the last wet period, have trouble understanding that that's not what is normal here all the time," Dr. Crimmins remarked.

The course's field project for "citizen scientists" has several volunteers scanning Google Maps images of the upper Gila watershed to detect signs of failed dams or dikes that may be contributing significant amounts of sediment to the Gila River.

**The AWPf Gila River Water Conservation Education Program –** We have plans for moving forward again in early March.

## **The BOR Graham County Fairgrounds Project –**

All the toilets have been installed. They are in the process of installing the urinals. The faucets will be installed as soon as urinals are completed. Sprinkler parts are being ordered this week to begin being installed as soon as shipment comes in.

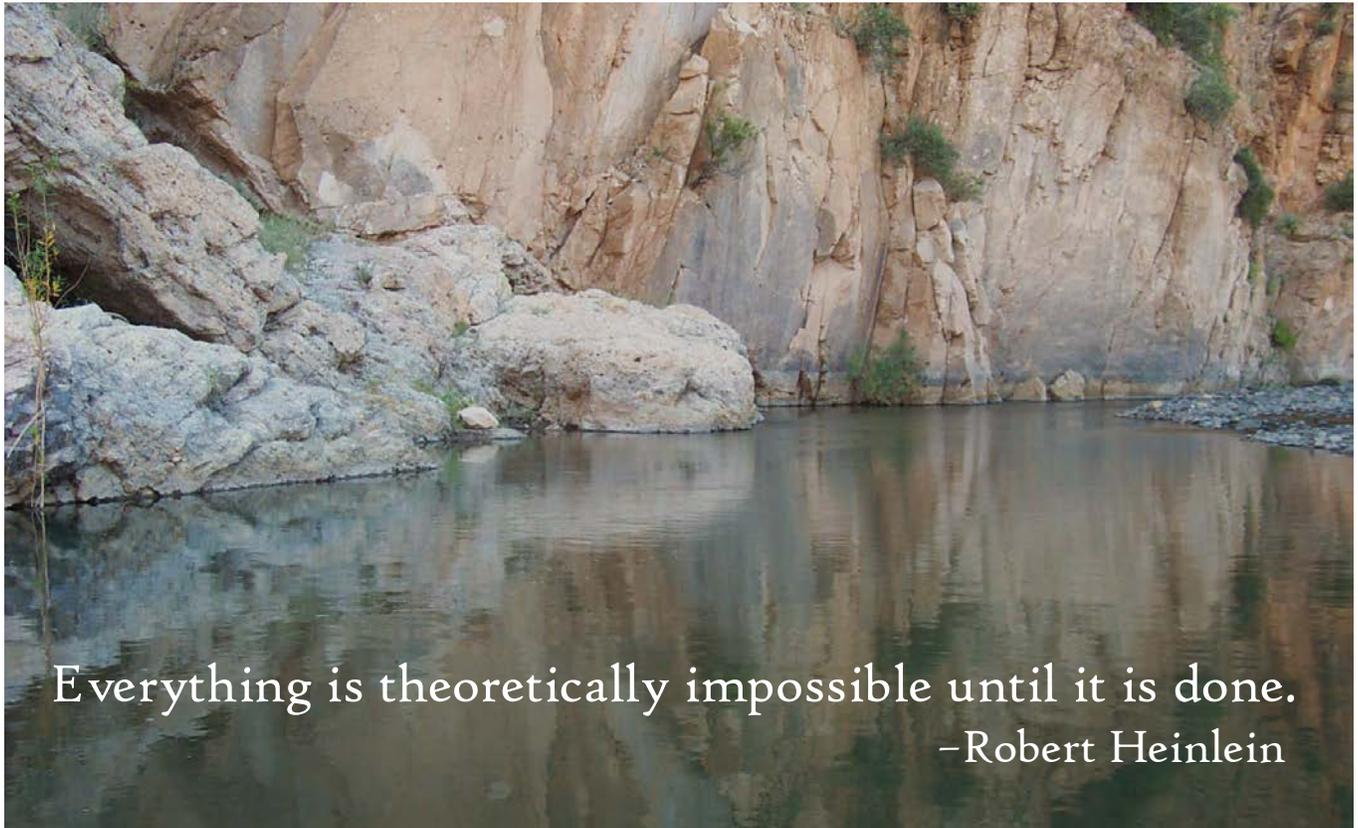
## **The Walton Family Foundation Upper Gila Watershed Riparian Restoration Project –**

We have been working with our partners in the native plant nursery, the Safford BLM, and Eastern Arizona College in preparation for a native plant nursery to be located at the EAC campus at Discovery Park. The native plants will be used in our restoration activities on the Gila River, which will begin early to mid-year in 2014. We are advertising for a plant propagation manager, and we have already found some possible candidates. We have completed our memorandum of understanding with EAC, and we are anticipating starting the assembly of the greenhouse, and installing the shade houses, in the early spring.

**ADEQ Clifton Restroom Facility –** In response to the results of a previously-completed ADEQ grant project, we have applied for funding for a permanent restroom facility to be located at the gateway to the recreation areas on the San Francisco River. The restroom will reduce the *E.coli* that has resulted from the large numbers of people recreating along the San Francisco River, where there are no public restrooms. Although we are working on some changes to our application at ADEQ's request, the grant appeared to have been favorably received and we are hoping that the grant will be awarded in April.

**The AWPf Apache Grove Project –** Mr. Barney, the landowner for the Apache Grove project, is having some issues with regrowth of the tamarisk, as well as other non-native species cropping up.





Everything is theoretically impossible until it is done.  
-Robert Heinlein

## Calendar of Events

**Wednesday, February 13 2013 at 7 p.m.** – Bruce Orr will be talking about their company, Stillwater Sciences, and their unique approach to understanding rivers through the integration of geomorphic and biological processes.

**Wednesday, March 13, 2013 at 7 p.m.** – Rob Spath, from the Southwest Conservation Corps will talk about new opportunities for youth in our community.

## Our partners include:

Arizona Department of Agriculture	Eastern Arizona College
Arizona Department of Environmental Quality	Farm Bureau
Arizona Department of Transportation	Freeport McMoRan Copper and Gold Inc.
Arizona Department of Water Resources	Graham County
Arizona Game and Fish Department	Greenlee County
Arizona Geological Survey	Gila Valley Irrigation District
Arizona State Land Department	Natural Resource Conservation Service
Bureau of Land Management	University of Arizona Cooperative Extension
City of Safford	University of Arizona NEMO Project
Town of Thatcher	U.S. Fish and Wildlife Service
Town of Pima	U.S. Forest Service – Apache
Town of Clifton	Sitgreaves and Coronado Forests
Town of Duncan	U.S. Bureau of Reclamation
Gila Valley NRC	And many community members

## Get involved in your watershed

For more information, contact Jan Holder at the Gila Watershed Partnership, 711 S. 14th Avenue, 85546, 520-419-0374, email-watershedholder@gmail.com