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Implementing the Pecos River WPP through Invasive Species Control and by Providing Technical and Financial Assistance to Reduce Agricultural Nonpoint Source Pollution

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Implementing the Pecos River WPP through Invasive Species Control and by Providing Technical and Financial Assistance to Reduce Agricultural Nonpoint Source Pollution

Final Report

TSSWCB Project 08-08

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List of Acronyms

BMP	Best Management Practice
CRP	Clean Rivers Program
CWQMN	Continuous Water Quality Monitoring Network
IBWC	International Boundary and Water Commission
NPS	Nonpoint Source
NRCS	United States Department of Agriculture – Natural Resources Conservation Service
PRIMS	Pecos River Information Management System
QPR	Quarterly Progress Report
SWCD	Soil and Water Conservation District
SWQMIS	Surface Water Quality Monitoring Information System
TFS	Texas A&M Forest Service
TSSWCB	Texas State Soil and Water Conservation Board
TWRI	Texas Water Resources Institute
TCEQ	Texas Commission on Environmental Quality
USDA	United States Department of Agriculture
WPP	Watershed Protection Plan
WQMP	Water Quality Management Plan

Introduction

The Pecos River Watershed Protection Plan (WPP) was developed by landowners and completed in October 2008. In November 2009, the project entitled "Implementing the Pecos River Watershed Protection Plan through Invasive Species Control (Saltcedar) and by Providing Technical and Financial Assistance to Reduce Agricultural Nonpoint Source Pollution" began implementing portions of the newly established WPP. This project focused on the highest priority implementation needs identified by Pecos River watershed landowners. It included the development and establishment of water quality management plans (WQMPs) on riparian and upland grazing lands, extending chemical treatment of saltcedar to previously unsprayed stands along the river and its tributaries, expanding the use of biological saltcedar controls across the watershed, and conducting prescribed burning on saltcedar stands in areas previously treated with aerially applied chemicals. Additional activity included in this project was administration and reporting, support and facilitation of WPP implementation as well as the continued compilation of watershed data.

The overall objective of this project is to improve the quality of the Pecos River and its watershed through practice implementation. In addition to the actions listed above, the continued delivery of pertinent educational programming was a primary goal of the project as well.

Quantitative implementation goals for this project were to complete:

- Chemical treatment of an estimated 1,775 acres of saltcedar along the main stem and tributaries of the Pecos
- Removal of debris left by saltcedar control efforts; an estimated 100 river miles (both sides of the river) or approximately 1,450 acres
- Development, certification and implementation of at least 20 WQMPs that are targeted toward improving water quality, specifically DO, and restoring desired landscape systems
- Establishment of 10 self-sustaining saltcedar leaf beetle populations across the watershed
- Continued landowner education and involvement in best management practice (BMP) implementation
- Update watershed database
- Continually update project website to enhance education and awareness of the project and watershed management

- Deliver educational programs on watershed management, BMP implementation to promote improved water quality, wildlife management, grazing management, nutrient management, etc.
- Development, publication and distribution of materials regarding project activities, meetings, and accomplishments
- Reports summarizing progress made in WQMP development and implementation, debris burning and saltcedar control (biological and chemical)

Collectively, this project was able to successfully implement portions of the Pecos River WPP. Several implementation measure goals were exceeded and have achieved much success; however, not all implementation goals included in the project workplan were met.

Pecos River near Girvin, TX in June 2008

Project Accomplishments

Project Administration

The Texas Water Resources Institute (TWRI) administered the project to ensure the successful implementation of the project through the development of project quarterly reports, hosting project coordination meetings, completing financial status reports, hosting the program website, developing the project final report, hiring a watershed coordinator and facilitating the acceptance of bids for saltcedar debris burning and selecting the contractor.

Quarterly progress reports (QPRs) were developed in coordination with project collaborators and were submitted to TSSWCB on or before the 15th day following each federal fiscal quarter. These reports are housed on the Pecos River WPP Implementation Program website. Coordination meetings and conference calls were held frequently throughout the course of this project due to its complicated nature. Between meetings, countless phone calls between the TWRI project manager/watershed coordinator and the TSSWCB project manager were held as well. Coordination meetings are documented in project QPRs.

The program website for the Pecos River Basin Assessment Program was redesigned to transition the program from the WPP development phase into the WPP implementation phase and was re-branded as the Pecos River WPP Implementation Program. The web address remained http://pecosbasin.tamu.edu and information from previous projects was imbedded within this updated website (Figure 1). During the implementation project period (November 1, 2009 to September 30, 2013), a total of 3,107 individual users visited the program website and 4,585 page visits were made.

The watershed coordinator was also hired under this task and was in place during the first quarter of the project. Initially, this person served a dual role of Pecos River watershed coordinator and the water specialist for the Far West Texas District of Texas A&M AgriLife Extension Service. In May 2012, the watershed coordinator role was assumed by the TWRI project manager who continues to hold this position.

In late 2012, the task of releasing a request for bids for prescribed burning along the Pecos River where saltcedar had been previously treated was added to the project. TWRI developed the request for proposals, received applications and selected a contractor that provided the best value for the proposed work. The bid process was completed in February 2013 and preparations for burning began in late March 2013.

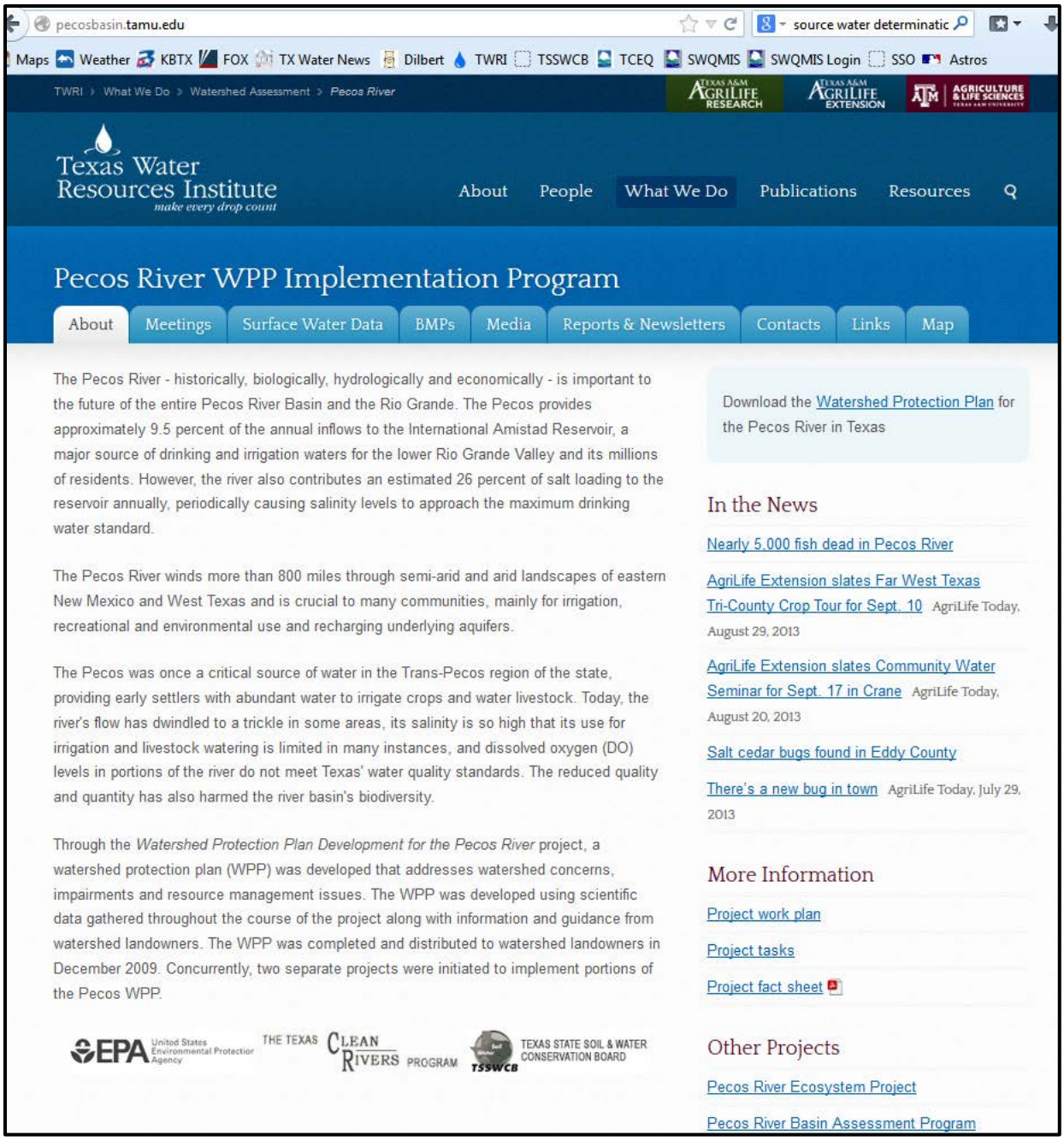

Figure 1: Screen shot of the Pecos River WPP Implementation Program Home Page

Promotion and Development of WQMPs

The Upper Pecos Soil and Water Conservation District (SWCD) worked cooperatively with Crockett, Sandhills, Trans-Pecos, Rio Grande-Pecos River, Toyah-Limpia, High Point, Devil's River, Big Bend, and Middle Concho SWCDs, the TSSWCB Hale Center Regional Office, TWRI, and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) to provide technical and financial assistance to

cooperators in the Pecos River Watershed through the TSSWCB's WQMP program. A WQMP is a site-specific plan developed through and approved by SWCDs, which includes appropriate land treatment practices, production practices, management measures, and technologies that prevent and abate agricultural and silvicultural NPS pollution that adhere to the requirements of the NRCS Field Office Technical Guide. SWCDs and NRCS provide technical assistance to producers seeking to develop a WQMP while financial assistance is often made available through various TSSWCB and NRCS programs, which provide financial incentives to producers in implementing a WQMP.

Figure 2: Watering facility and cross fencing installed through the WQMP program

District Technicians were hired at Upper Pecos and Crockett SWCDs and worked cooperatively with the entities listed above to implement the project. The Crockett SWCD technician position was vacated approximately two years into the project. At that point, the District Technician at Upper Pecos SWCD serviced the entire watershed.

Through this project, a total of 16 WQMPs were developed and implemented on approximately 197,920 acres. The BMPs installed through the WQMP program were centered on grazing management and included practices such as fencing, watering facilities, pumping plants, pipelines, and establishing water wells (Figure 2). The distribution of WQMP implementation across the watershed was split between properties adjacent to the Pecos River and those off the river (Figure 3).

To advertise for the WQMP program, the District Technician gave presentations at field days and public meetings, assisted in the development and distribution of flyers and newsletters, and supported various other tasks affiliated with the implementation of the Pecos River Watershed Protection Plan (WPP).

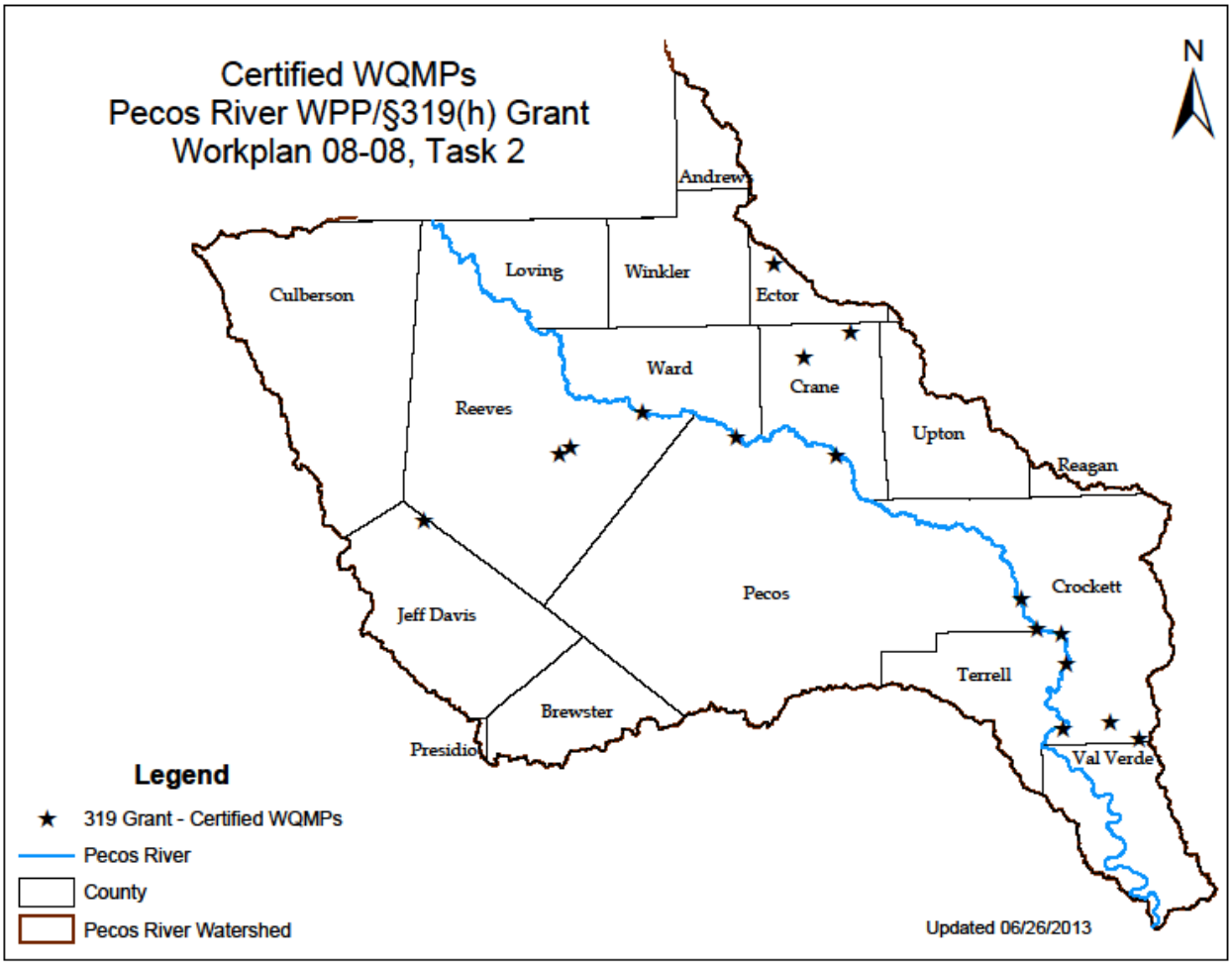

Figure 3: Distribution map showing general location of WQMPs certified through the WPP Implementation Program.

Chemical Control of Saltcedar

The WPP identified 2,158 acres of saltcedar on the main stem of the Pecos River that had not been treated and was accessible by helicopter. To the extent possible, this unsprayed saltcedar would be sprayed through this project. Based on typical treatment costs when this project was proposed, it was anticipated that 1,775 acres of saltcedear would be able to be treated.

Once funded, technicians from the Crockett and Upper Pecos SWCDs worked with landowners on the river to acquire permission to treat saltcedar through this program. During the sign up process, it was discovered that the majority of properties that had not been treated on the river were held by property owners that did not wish to treat saltcedar along their portion of the river. Much more interest was found to treat regrowth in areas where saltcedar had been previously treated or on tributaries to the river and other upland areas across the watershed. As a result of low interest along the

river, properties on tributaries to the main stem where previous spraying had not been completed were enrolled in the program. In total, approximately 4,200 acres of land were enrolled in the project-funded saltcedar spraying program.

In September 2011, spraying commenced (Figure 4) and within a matter of weeks, a total of 2,642 acres of saltcedar were treated chemically. This level of spraying fully utilized available project funds leaving approximately 1,558 enrolled acres untreated.

Figure 4: September 2011 saltcedar spraying

While this approach did not necessarily achieve the initial goal of treating all of the remaining saltcedar along the main stem of the river, critical upstream seed sources were addressed through this effort. Additionally, significant costs savings were realized through the use of a generic chemical and lower than expected fuel costs. As a result, 867 more acres than were initially planned to be treated were actually covered. Figures 6 and 7 also illustrate the relative distribution of spraying conducted across the watershed in 2011.

Biological Control of Saltcedar

To control saltcedar in areas that could not be aerially sprayed, areas along tributaries or in pockets not directly adjacent to the water body, biological control measures have been the primary treatment method and have produced excellent results. This approach has used the saltcedar leaf beetle (*Diorhabda* spp.) to repeatedly feed on the plant's leaves (Figure 5) and eventually lead to the demise of its host through continued defoliation. First released in the watershed in 2006, a total of 7 beetle colonies had been established by the time this project began. An initial goal of establishing 10 additional colonies of the saltcedar leaf beetle across the watershed on privately owned land where permission has been granted was set for this project.

The establishment of beetle populations across the watershed far exceeded the goals of the project and is having significant impacts on saltcedar across all of west Texas; however, several setbacks were experienced along the way. To date, two species of saltcedar leaf beetles have been released on the Pecos River. The species of beetle from the island of Crete, *Diorhabda elongata*, was first released on the Pecos River in 2006 at three locations and established at one site in Reeves County. This population quickly increased and by 2010 had defoliated all of the saltcedar along 11 miles of the Pecos River. A second population of Crete beetles was established in 2010; however, following

the extreme cold experienced in early February, 2011, the Crete populations could not be detected in 2011 and were presumed extinct in the Pecos River watershed.

Following this mass die-off, the Tunisian beetle (*Diorhabda sublineata*), which was considered better adapted to the Pecos River watershed than the Crete beetle based on climate models, was released at three locations in the watershed near Leon Springs, Imperial and Iraan. During 2012, the Tunisian beetles continued to expand their range on the Pecos River as well as at Toyah Creek, Balmorhea Reservoir and Leon Springs. By the end of the 2012 growing season, all visible saltcedar at the release sites was defoliated in addition to saltcedar near Mentone. Adult beetles and larvae were found on all examined saltcedar along the Pecos River near Orla and Red Bluff Reservoir with defoliation observed in certain areas. In 2012, a total of 116,000 Tunisian beetles were collected at Balmorhea Reservoir and along Toyah creek near Balmorhea and released to establish populations at 2 new sites, and to supplement 4 existing sites on the Pecos River. At the close of 2012, Tunisian leaf beetle populations were well established at ten sites on the Pecos River and had defoliated large expanses of saltcedar at each site. Beetles had dispersed from these original release sites and were present at sites both on and off the river from Iraan to Red Bluff Reservoir on the New Mexico border. Figures 6 and 7 show the distribution of release sites funded through this project while Figure 8 illustrates their current distribution in the Trans-Pecos region.

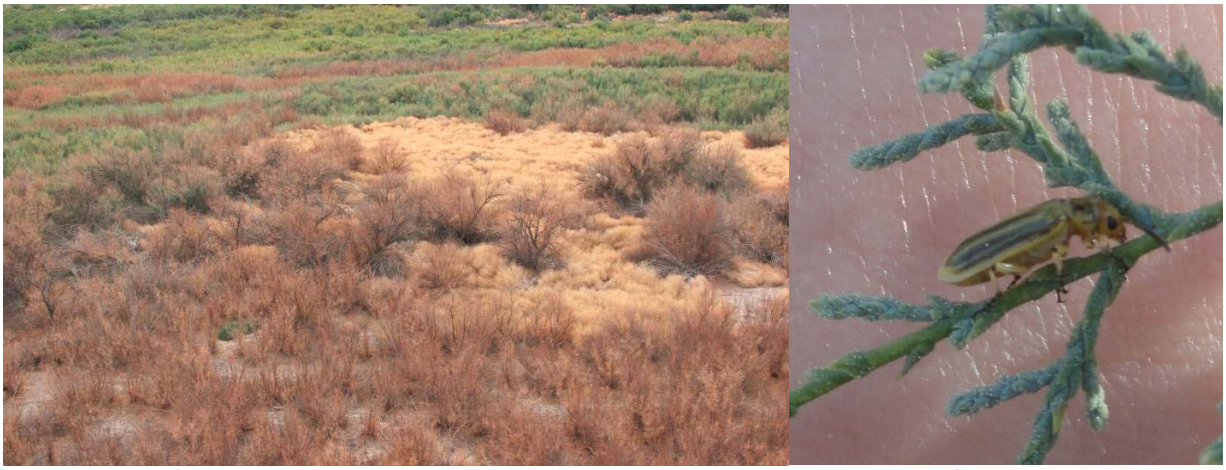

Figure 5: Defoliated saltcedar in Leon Lake and an adult saltcedar leaf beetle

Successful defoliation of saltcedar continued in 2013 as well and with the extensive distribution of beetles from their release sites, beetle collections were kept to a minimum. In some locations, beetles have been observed about 50 miles from the nearest release site and are actively migrating to new areas of saltcedar. News articles this year highlighted the rapid movement of the leaf beetle and signify its effective attack on saltcedar (http://www.currentargus.com/ci_23828232/salt-cedar-bugs-found-eddy-county; https://today.agrilife.org/2013/07/29/theres-a-new-bug-in-town/).

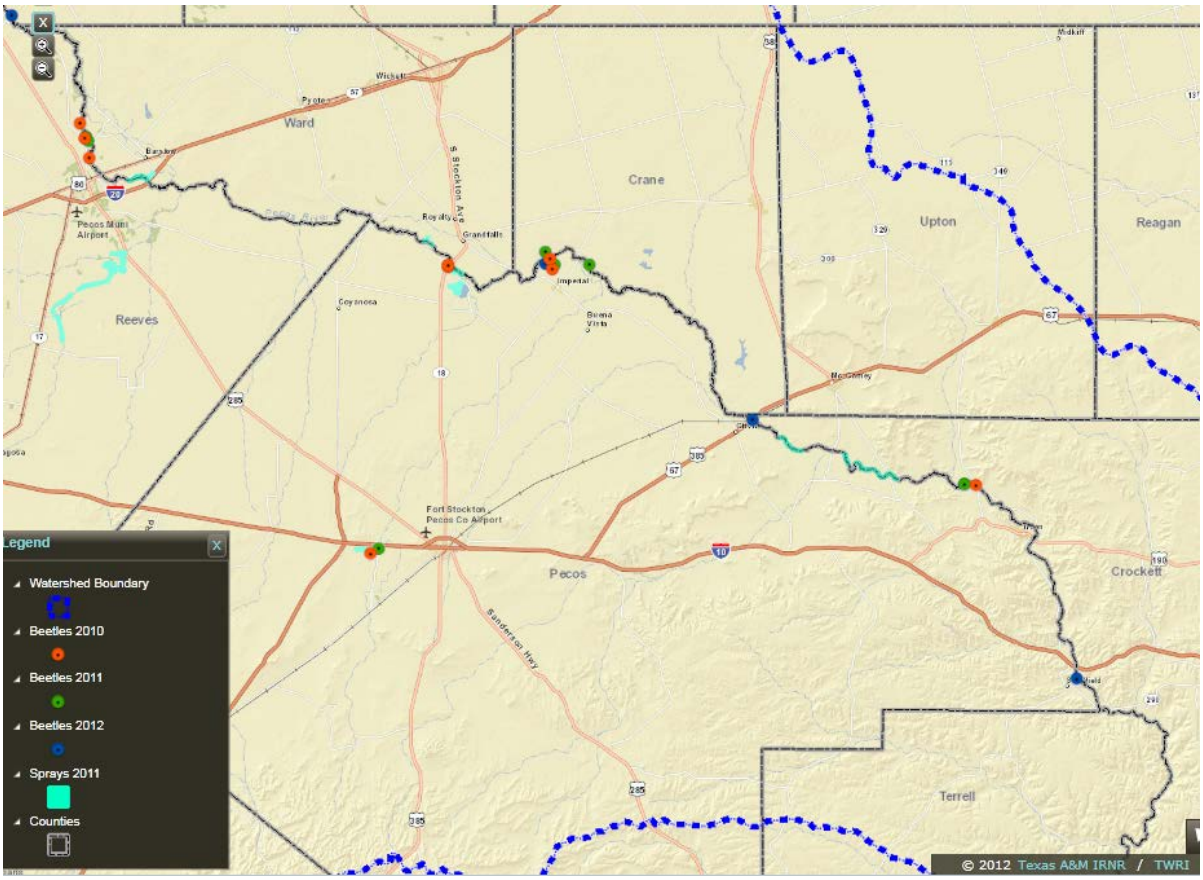

Figure 6: Saltcedar biological release sites and chemical control distribution south of I-10

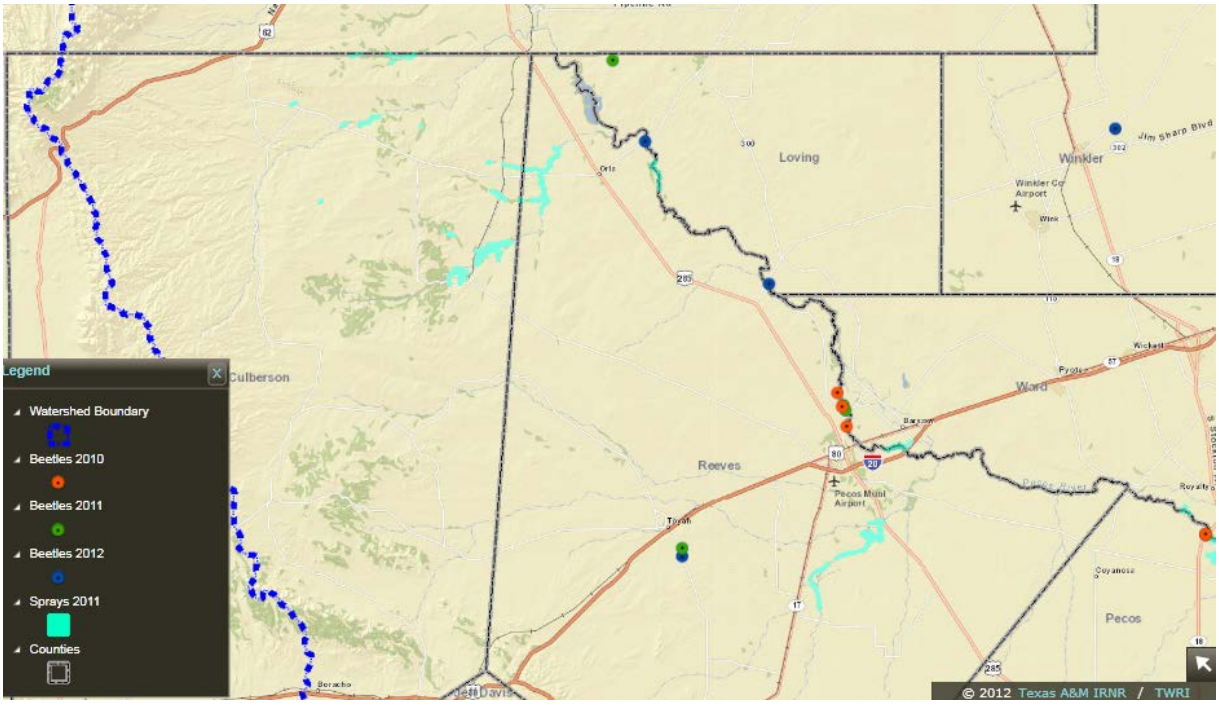

Figure 7: Saltcedar biological release sites and chemical control distribution north of I-10

Figure 8: Distribution of saltcedar leaf beetle in the Trans-Pecos region summer 2013

Prescribed Burning to Remove Saltcedar Debris

One of the highest priority concerns expressed by watershed landowners during the development of the WPP was the removal of saltcedar debris along the river following large-scale treatment with aerially applied herbicides. After saltcedar is killed it remains standing for several years or more before beginning to fall. Once fallen, debris within the high banks of the river is easily transported by the very infrequent flooding events that occur. Debris within low bank of the river is also transported downstream via irrigation deliveries. Aside from being a nuisance, this debris has the potential to clog gates on irrigation diversion dams and road crossings and could lead to infrastructure destruction. Prescribed burning, when compared to mechanical removal, was the quickest and most cost effective means to remove this debris with the least physical disturbance of the soil.

Through this project, the Texas A&M Forest Service (TFS) was originally partnered with to provide prescribed burning services. Due to unforeseen circumstances, prescribed burning was not able to be carried out by TFS burn crews as planned. As a result, a request for proposals from private burning contractors was developed and bids were sought. Due to the difficult terrain and remote location from most companies, only two bids were received. The company providing the best value was selected and commenced work in February 2013. As of May 22, 2013, prescribed fire had been applied to 35 river miles along the Pecos River (Figure 9). Burning effectiveness was very high with average dead fuel consumption at 90% or above. Figure 10 shows a typical fire scene pre, during and post burn.

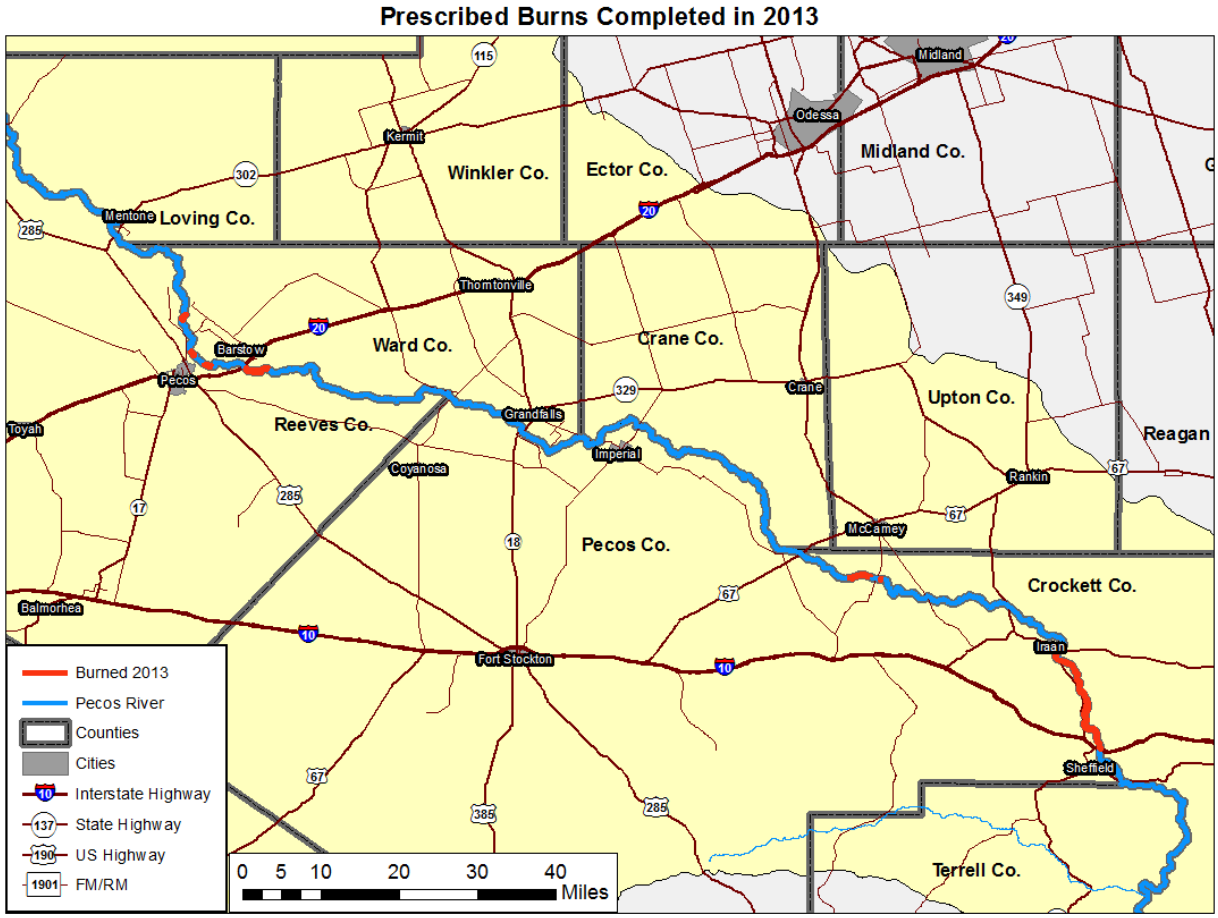

Figure 9: Areas along the Pecos River where prescribed fire was applied in 2013

Post fire impacts were also observed to provide a cursory assessment of the impacts that the prescribed fires had on the riparian ecosystems. At observed locations, grasses and forbs began to regrow within several weeks and within months good stands of ground cover had been re-established. Timely summer showers that occurred across the watershed provided the needed moisture for these plants to quickly reestablish. The

rains that did occur were also relatively low intensity and did not produce much runoff. Evidence of runoff and minor rill erosion were only observed in several locations (Figure 11).

Figure 10: Typical riparian area pre-burn, during the burn and post burn; trees living prior to the prescribed burn were not fully consumed

Not surprisingly, saltcedars that were alive prior to the prescribed fire were top killed but began to regrow from the base of the plant. What was somewhat of an unknown was the speed with which saltcedar leaf beetles would move back into the burned areas and begin to consume this regrowth. The beetles did not let us down as they were present and actively feeding on saltcedar regrowth at all locations where observations were made. Figure 12 shows a common vegetation response and saltcedar leaf beetle action on new, post-fire regrowth.

Figure 11: Minor erosion occurring at the base of the left river bank where prescribed fire was applied after a summer rain such as the one visible in the background. Prescribed fire was not applied to the right bank as the landowner did not wish to participate.

Figure 12: Common post fire observations including top-killed saltcedar with newly defoliated regrowth protruding from the base of the plant, bunch grasses and forbs re-growing following timely rains, a clump of saltcedar leaf beetles feeding on new regrowth and other active regrowth

Support and Facilitation of WPP Implementation

Facilitation of WPP implementation largely consisted of working with entities and individuals across the Pecos River watershed to provide the resources needed to effectively implement the WPP. This consisted primarily of working to secure implementation funding and providing needed or desired educational opportunities throughout the watershed. To accomplish this, multiple platforms were utilized and included semi-annual newsletters, news releases and popular press articles, direct mailings and emails, field days, public meetings, seminars, workshops and countless direct contacts. These platforms allowed for information exchange between the watershed coordinator/project personnel and watershed landowners regarding resource opportunities and resources needed. A complete listing of meeting materials, media resources developed and/or disseminated as well as project reports and newsletters are available online at: http://pecosbasin.tamu.edu and are also discussed in detail in the Pecos River WPP Update.

Watershed Data

Water quality is the primary driver behind the Pecos River WPP and its development. As a result, keeping track of water quality by evaluating available data is important for evaluating the impacts of WPP implementation. TCEQ and its Clean Rivers Program (CRP) partner, the International Boundary and Water Commission (IBWC), are the primary sources of water quality data in the Pecos River watershed. TCEQ and IBWC both collect data that is integrated into TCEQ's online surface water quality monitoring information system (SWQMIS). These data provide the needed information for assessing the river's ability to meet its designated water quality standards.

TCEQ also maintains the continuous water quality monitoring network (CWQMN) statewide and has 9 such stations in the Pecos River watershed. These stations use automated equipment to record data every 15 minutes. A separate database houses these data and is accessible from each station's dedicated webpage.

Links to these two data repositories are provided on the program website along with instructions for downloading that data.

Pecos River Information Management System

Also important in gauging implementation success is keeping track of actual implementation data. While this is often done through project reports and other documents, these are difficult to understand and not rapidly accessible. To improve information availability to interested parties, a web-based tool called the Pecos River Information Management System (PRIMS) was developed and merges WPP

implementation achievements with water quality information. The goal of this tool is to simply provide information to its users and is in no way intended for making management decisions.

PRIMS pairs readily available online mapping tools with project specific management information and displays it graphically for the user. This enables them to clearly illustrate what management practice was implemented in what general location in the watershed. PRIMS also illustrates where other existing features such as stream gages and water quality monitoring stations are across the watershed and provides links to data from those stations.

During the development of this tool, ensuring landowner privacy was of utmost concern. As a result, the ability to specifically locate where a specific practice was implemented has been removed and management is only illustrated at very large scales. Figure 13 is a screen shot of the PRIMS home page (http://pecosbasin.tamu.edu/map/) which illustrates saltcedar control efforts implemented across the watershed.

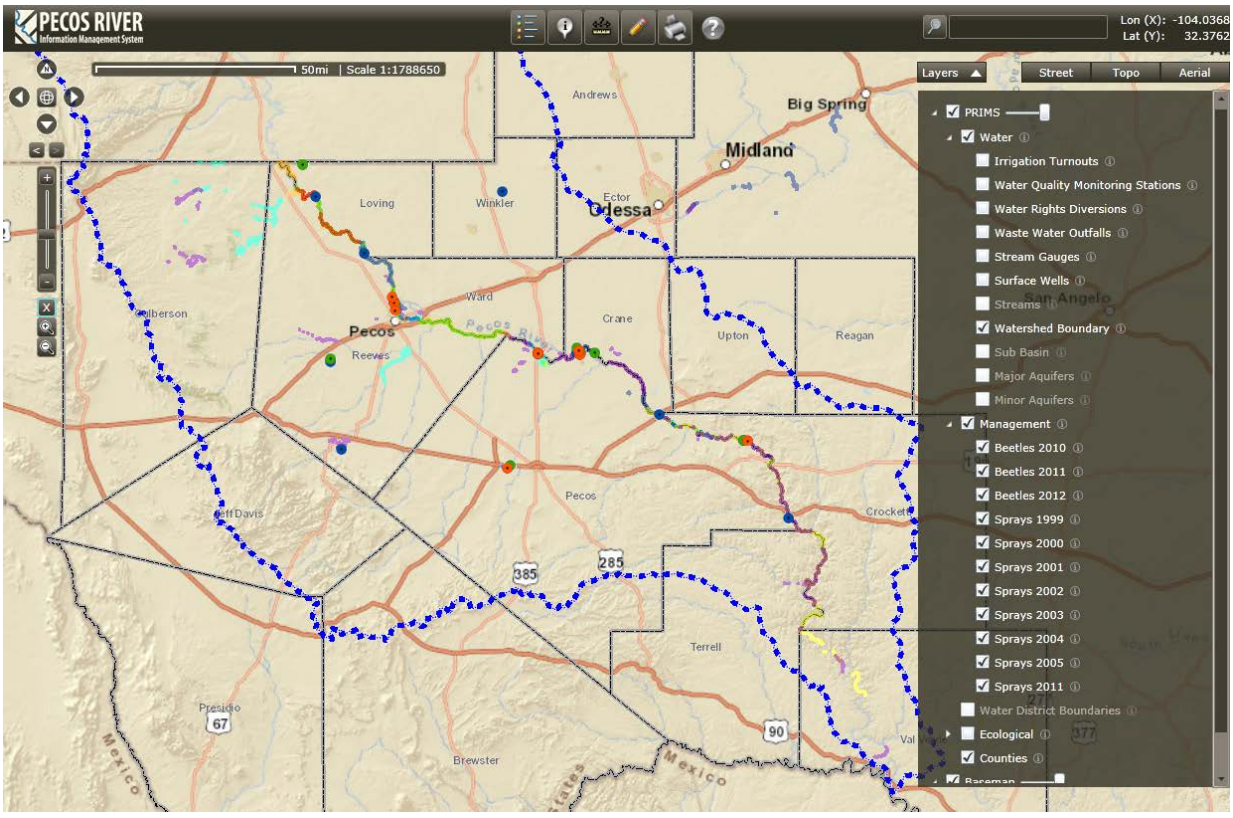

Figure 13: PRIMS homepage showing saltcedar control efforts implemented in the Pecos River watershed

Conclusions

This project focused on implementing some of the highest priority management measures selected by watershed landowners and was merely a start in achieving the ultimate implementation goals outlined in the Pecos River WPP. Collectively, this project did a reasonable job of meeting its outlined goals and objectives with some tasks exceeding planned goals and others not quite meeting them.

Saltcedar control, whether biological or chemical, as well as education and outreach met and exceeded the goals planned within this project. Support for saltcedar control remains high and education delivery through AgriLife Extension across the watershed continues to be well received and covers a variety of timely topics related to watershed resource management.

WQMP development and saltcedar debris burning did not quite meet their goals. Landowner interest in the WQMP program was not as strong as expected and debris burning was curtailed by weather, manpower availability and time. Progress was still made on each task, but not as much as planned.

Continuing to engage watershed landowners was and remains a critical component of implementing the Pecos River WPP. With the WPP and its implementation being voluntary, much of the implementation relied upon support and participation by local landowners. Meeting established implementation milestones was and will continue to be dependent upon their participation.