Pecos River Basin Assessment Program
FY04 CWA Section 319(h)
TSSWCB Project No. 04-11

Quarter no. 4 From 7/01/05 Through 9/30/05

I. Abstract

This report summarizes the progress made during the first year of the project.

II. Overall Progress and Results by Task

Task 1: Basin Assessment

Subtask 1.1 – *Aerial Photography, Delineation, and Characterization (Investigator: Dr. Charles Hart)*

Aerial imagery of the Pecos River from Grandfalls to the confluence of the Pecos and Rio Grande (214 river miles) was captured and processed under contract by Aerial Imagery Services. Using these images, the amount of acreage infested with saltcedar was delineated in ArcView. The images also differentiate between different densities of saltcedar.

Saltcedar acreages were overlaid on existing files to determine the area of saltcedar-infested acreage that had not been treated with herbicides through 2004. The analyses show that 1,827 acres of saltcedar have not been treated to date.

The purchased imagery was copied and supplied to task leaders. The aerial photographs were used to delineate watersheds throughout the Pecos basin, and to identify tributaries that will be sampled in this study.

(100% complete)

Subtask 1.2 – *Historical Water Quality, Irrigation Delivery, Rainfall, Red Bluff Lake Levels, and Groundwater Monitoring (Investigator: Mike Mecke)*

Work on this subtask has focused on obtaining background documents that provide historical information about the Pecos basin. Most of these reports have been posted to the project website in the links section. These reports include the following:

- Fisheries reports (published by TCEQ).
- Biology and data on rare and threatened species of the Rio Grande border region (USGS).
- Groundwater quality and hydrogeology reports (Texas Water Development Board)
- Irrigation surveys (TWDB)
- Data on Balmorhea Springs (Bureau of Reclamation)
- List of impaired waters (EPA)
- A map of the Pecos basin from its source waters to its confluence with the Rio Grande has been developed.
- A natural resources evaluation report (from the Texas Parks and Wildlife Department),
- Information on the Pecos alluvial aquifer and stream gage data (both from the United States Geological Survey),
- Maps and cross-sections of the Pecos alluvial aquifer and the draft of the Far West Regional Water Plan (both from the Texas Water Development Board),
- Information about water rights for the Pecos River in Texas (from the Texas Commission on Environmental Quality),
- Reports about irrigation systems in Balmorhea, Texas, and Carlsbad, New Mexico (from the United States Bureau of Reclamation), and
- Economic issues associated with preserving habitat for the Silvery Minnow in the Pecos River system (from the United States Fish and Wildlife Service).

(25% complete)

Subtask 1.3 – *Aquatic Life and Habitat Inventory (Investigator: Wayne Belzer)*

- Project leaders have discussed the details of this task with collaborators from the Texas Commission on Environmental Quality and the United States Geological Survey.
- Inventories of aquatic life and riparian and terrestrial habitats are scheduled to begin on the upper reach of the Pecos River in 2006. This will coincide with a similar assessment being done on the lower end of the river by the USGS. The majority of funding for this subtask is being provided by the Clean Rivers Program.

(5% complete)

Subtask 1.4 – ***Identify and Characterize the Volume and Quality of Tributaries and Springs (Investigator: Wayne Belzer)***

- Potential tributaries for study were identified using aerial photography and digital topographic maps.
- TCE and IBWC personnel met to discuss potential sampling methodologies. A tentative plan of action was established.
- Historical flow and water quality data regarding Pecos River tributaries was studied. The list of sampling sites was refined according to their potential for contributing measurable salts to the river.
- Sediment samples were collected at these sites and sent to a lab for analysis.
- Funding and direction for this subtask are being shared with the International Boundary and Water Commission Clean Rivers Program.

(25% complete)

Subtask 1.5 – ***Identify and Characterize Saline Water Sources Entering the Pecos River (Investigator: Dr. Seiichi Miyamoto)***

- A literature review and list of references was completed and distributed to project leaders and posted to the project website.
- Three sets of water samples were collected from the Pecos River at 9 locations and sent to a lab for analysis. Lab analyses were funded by the Rio Grande Basin Initiative.

- The preliminary analysis of Texas Clean Rivers Program data suggests that there is a considerable inflow of salts into the Pecos River downstream of the city of Pecos.
- Analysis of USGS flow and salinity data from 11 major gauging stations along the Pecos River basin indicates (1) the dissolution of evaporites from the Permian age is the major source of salt in the river, (2) most of the salt loadings into the Pecos River in Texas occur upstream of Red Bluff Reservoir in New Mexico, and (3) high flow events in the Pecos River still occur often enough to ensure that excessive levels of salinity are not found along riverbanks of the region. The analyses are described in a draft report, “Reconnaissance Survey of Salt Sources and Loading into the Pecos River.”

(90% complete)

Subtask 1.6 – *Simulate Flow and Salinity of the Pecos River for Evaluating River Management Options (Investigator: Dr. Seiichi Miyamoto)*

- The research team has analyzed flow and salinity data from the Pecos River and compared this information to salinity levels in Amistad International Reservoir. A draft report, "Influence of Tributaries on the Salinity of Amistad International Reservoir," has been developed and is now being reviewed.
- Efforts have been made to implement computer modeling activities, including collecting background data about groundwater conditions, rainfall, evaporation, and vegetative conditions. The project will also model the salinity of the Pecos River, and will calibrate and validate modeling results.

(20% complete)

Subtask 1.7 – *Economic Modeling of the Pecos River Basin and Assessment of Saltcedar Control Activities (Investigator: Bill Thompson)*

- Data for irrigated and dryland crop production budgets were collected.
- Production budgets for dryland cotton, furrow-irrigated cotton, pivot-irrigated cotton and alfalfa, drip-irrigated cotton and pecans, and flood-irrigated pecans and alfalfa have been developed.
- Historical data about agricultural water use in irrigation districts in the basin was collected
- Information was obtained from onsite visits to three irrigation districts downstream of Red Bluff Dam. The irrigation data will be compared to historical data on the amounts of water released from Red Bluff.

(8% complete)

Task 2: Educational Programming

Subtask 2.1 - *Publish Written Informational Materials to Educate Private Landowners, Stakeholders, and Policy Makers about the Pecos River basin and the Effects of Saltcedar (Investigator: Texas Cooperative Extension)*

- An article about the Pecos Basin project was published in Ranch and Rural Living magazine.
- Oral interviews were conducted on-site with several residents of the region to gain their understanding of how conditions in the Pecos Basin have changed over time. These interviews will be used to develop a fact sheet that presents information about how water use and water quality in the basin have evolved since the beginning of Anglo-American settlement in the 1800s. The fact sheet will describe:
    - Water conditions in the region before Anglo-American settlement,
    - The evolution of farming, irrigation, and ranching in the basin and the impacts of these activities on water use,
    - Current water use trends, and
    - The future outlook for water resources and water use in the basin.

- A brochure that presents an overview of the project was developed by staff from Texas Cooperative Extension and the Texas Water Resources Institute. A total of 2,000 copies of the brochure were printed and this publication is being distributed throughout the basin.
- Project leaders cooperated in the development of a news story that was published in several newspapers throughout the basin. The article provided general information about the project and asked readers to participate in an online survey.
- All project publications are posted and available on the project website.

(40% complete)

Subtask 2.2 – ***Educational Meetings of Interested Parties for Input and Organizational Support (Investigator: Texas Cooperative Extension)***

Project personnel have presented the project to stakeholder groups and water resources professionals at the following events:

- Two Nature Conservancy meetings at the Independence Creek Preserve.
- The Texas Clean Rivers Program annual meeting in Midland, Texas.
- The Rio Grande Basin Initiatives Conference in Alpine, Texas.
- The Pecos River Advisory Committee monthly meeting in Monahans, Texas.
- Texas Cooperative Extension workshops for ranchers and landowners in Rankin, Monahans, and Ozona.
- Local radio station interview in Pecos, Texas.
- Pecos River Basin County Officials Meeting in Fort Stockton, Texas. County Officials and stakeholders throughout the basin were invited to attend this meeting, with the goal of getting input and fostering local governmental support for Pecos River projects currently in progress. Attendees were presented a synopsis of all projects, and then asked for their opinions on several issues related to the Pecos River. The questions and resulting answers were as follows:

  (1) How does the health of the Pecos River affect counties within its basin?
    - ♦ Economy of the area
    - ♦ Fish and Wildlife
    - ♦ Recreation
    - ♦ Mosquitos

- Adjacent counties
- Quality of water going south
- Water quantity
- Economic development
- Tax base
- Public access

(2) What are practical goals that the project could strive for?
- Future municipal uses
- Community pride
- Fresh water trees
- Agriculture – promoting smaller operations
- Grasses and vegetation
- Education
- Livestock

(3) What obstacles must be overcome for complete restoration of the Pecos River?
- Money – funding
- Salinity
- Lack of communication
- Need inter-governmental agreements
- Time
- Lack of population density
- Lack of cooperation of landowners
- Political power
- Lack of public education
- Personal opinions
- Lack of common goals
- Lack of clear vision
- Lack of public involvement

(4) How can county governments become involved and assist the project, and how can the project improve communications?
- Include the Pecos River in county budget allocations
- Increase public access for county recreation
- Include in regional water plans
- More community involvement from the state down south
- Political clout comes from a unified voice
- Pursue county governments coming together
- Pursuing economic and environmental issues
- Show public benefit
- Private landowners becoming more involved

Offices and organizations in attendance were:

- Pecos County Judge
- Pecos County Commissioner
- Congressman Henry Bonilla representative
- Senator Madla representative
- Pecos River Compact Commissioner
- City of Fort Stockton
- City of Grandfalls
- Pecos County WID #2
- Upper Pecos SWCD #213
- Ward County WID #2
- Reeves County WID #2
- Pecos Valley RC&D
- Red Bluff Reservoir
- Texas Department of Agriculture
- Texas Forest Service
- Texas Cooperative Extension
- Texas Agricultural Experiment Station

A web-based survey was developed to gather stakeholder perceptions of water resources challenges in the Pecos River basin. Postcards were mailed to 565 landowners along the Pecos River, newspaper articles were published, and a radio interview was conducted to encourage participation in the survey. A paper copy of the survey was also sent to county officials located in the basin. Survey results are being made available on the web site.

County	No. of Responses
Crane	9
Crockett	6
Culberson	3
Loving	6
Pecos	16
Reeves	6
Terrell	6
Upton	1
Ward	15
Val Verde	9
None	1
Total	51
County Officials	6

Survey responses by county

(25% complete)

Subtask 2.3 – *Develop a Website for Dissemination of Information (Investigator: Texas Cooperative Extension, Texas Water Resources Institute)*

- The project website, http://pecosbasin.tamu.edu, has been developed. It includes a user-friendly version of the project work plan, project documents, biographical sketches of project leaders, and links to related information. Ongoing activities and project updates are posted to the website.

(80% complete)

Task 3 – Establish a Monitoring Program

Subtask 3.1 – *Develop a QAPP for Sampling Protocol (Investigator: Wayne Belzer, Clint Wolfe, Kevin Wagner)*

- A draft of the QAPP has been developed, and is in the review process. The final version will be submitted to the Environmental Protection Agency for approval.
- A separate QAPP drafted by IBWC personnel has been approved by the Texas Commission on Environmental Quality. This will cover Clean Rivers Program work being done on subtasks 1.3 and 3.2.

(60% complete)

Subtask 3.2 – *Water Quality Monitoring, including Total Dissolved Solids (TDS), Total Suspended Solids, Potential Hydrogen (pH), Dissolved Oxygen (DO), and Electrical Conductivity (EC) (Investigator: Wayne Belzer)*

- Routine water quality samples are collected at established locations along the Pecos River as part of the IBWC Clean Rivers Program.

(30% complete)

Subtask 3.3 – *Quantity and Fate of Water Salvage as a Result of Saltcedar Control (Investigator: Dr. Charles Hart, Dr. Zhuping Sheng, Alyson McDonald)*

- Thirteen additional boreholes have been excavated and sampled. Three of the boreholes are being used to monitor the piezometric surface, which can provide more detailed information about the direction of groundwater flow. The piezometric surface monitoring data will also provide insights about how flows in the river are correlated to groundwater flows in the alluvial aquifer and floodplain.
- Six additional monitoring wells were installed.
- Rock Ware software and a HydroLab flow meter were purchased
- Land surface and piezometric surface measurements were made in January and March 2005 and preliminary analyses of these data have been conducted.
- Soil permeability tests have been initiated.
- Two staff gauges were installed and water quality was measured in monitoring wells and the Pecos River in January and August 2005.

- In March 2005, flow measurements were conducted using a release of water from Red Bluff Reservoir.
- Additional profile data were collected to provide information to have a better understanding of temporal and spatial variations of interaction between surface water and groundwater.
- Preliminary measurements of hydraulic conductivity were performed at the Texas Agricultural Experiment Station laboratory in El Paso.
- The research team had planned on measuring the flow of the river during the third quarter. However, the flows of the river have been unusually swift (between 200 and 400 cubic feet per second or cfs), while the equipment used in this study can only measure flows of 55 cfs or less. Similarly, conditions in the river basin have not allowed the sampling of water quality in boreholes to be carried out. The best conditions to conduct borehole tests are those in which the river is rapidly rising or falling and that has not been the case at the field sites used in this part of the study.

River flow measurement using sonic FlowTrac

Collecting water levels and water quality data from a monitoring well

River flow measurement at Pecos River study site

- A study site on the Pecos River with shallow groundwater wells containing pressure transducer data loggers was maintained to estimate water loss on a one-mile reach of river infested with saltcedar, as compared with an adjacent one-mile reach where saltcedar has been chemically treated.
- Some funding for this task was provided by the Rio Grande Basin Initiative.

(30% complete)

Task 4: Watershed Protection Plan

Subtask 4.1 – ***Develop Annual Reports and a Final Report Summarizing Basin Assessment, Educational Programming, and Monitoring (Investigator: Texas Cooperative Extension, Texas Water Resources Institute)***

- The annual report summarizing activities for year one has been developed, and will be posted to the project website.

(25% complete)

Subtask 4.2 – ***Produce the Final Watershed Protection Plan for the Pecos River Segments 2312, 2311, and 2310 (Investigator: Texas Cooperative Extension, Texas Water Resources Institute)***

- The first draft will be developed following preparation of the annual report.

(0% complete)

III. Related Issues/Current Problems and Favorable or Unusual Developments

- The delay in the completion of the QAPP has required the project to seek other funds for completion of some of the monitoring activities planned for this project.

IV. Projected Work for Next Quarter

- Continue collection of information on historical water quality, irrigation delivery, rainfall, lake levels, and groundwater.
- Receive approval of QAPP.
- Begin model simulations upon approval of QAPP.
- Finalize the fact sheet that presents information about how water use and water quality in the basin have evolved since the beginning of Anglo-American settlement in the 1800s.
- Continue providing educational meetings for interested parties.
- Update website.
- Finalize annual report.
- Begin drafting Watershed Protection Plan.