

TEXAS WATER RESOURCES INSTITUTE
AND
TEXAS TECH UNIVERSITY

Development of the Upper Llano River Watershed Protection Plan
FY 2011 Work Plan 11-04

Quarter no. 19 from 4/1/16 through 6/30/16

I. Abstract

This quarter's activities focused on addressing TSSWCB and Coordination Committee comments on the WPP and finalizing it for posting for public comment. Additionally, weekly newsletters continued to be published, a stream restoration training was held, data continued to be uploaded to SWQMIS, and work continued on conducting outreach on the WPP. Next quarter, the final invoice will be submitted along with remaining data, the WPP, and the executive summary of the WPP.

II. Overall Progress and Results by Task

Task 1 Project Administration

Subtask 1.1 TWRI will prepare electronic quarterly progress reports (QPRs) for submission to the TSSWCB. QPRs shall document all activities performed within a quarter and shall be submitted by the 15th of January, April, July and October. QPRs shall be distributed to all project partners and posted on the project website.

The following actions have been completed during this reporting period:

- a. The 19th quarterly report was prepared and submitted on July 15, 2016.

100% Complete

Subtask 1.2 TWRI will perform accounting functions for project funds and will submit appropriate Reimbursement Forms to TSSWCB at least quarterly.

The following actions have been completed during this reporting period:

- a. \$613,841.82 (92%) of federal project funds had been expended as follows:
 - TWRI has expended 90% of their funds.
 - ESSM has expended 100% of their funds
 - SSL has expended 100% of their funds.
 - TTU has expended 92% of their funds.
- b. The final invoice will be submitted next quarter expending remaining funds.

92% Complete

Subtask 1.3 TWRI will host coordination meetings or conference calls, at least quarterly, with project partners to discuss project activities, project schedule, communication needs, deliverables, and other requirements. TWRI will develop lists of action items needed following each project coordination meeting and distribute to project personnel.

The following actions have been completed during this reporting period:

- a. TWRI and TTU-LRFS have communicated frequently throughout the project. This quarter, TWRI, TTU-LRFS, and TSSWCB met on April 13, 2016 to discuss the coordination committee meeting.

100% Complete

Subtask 1.4 TWRI will work with project personnel from ESSM, TTU-WRC, TTU-LRFS, and SLWA to prepare the WPP incorporating input from stakeholders and findings of monitoring, modeling, and data analysis tasks.

The following actions have been completed during this reporting period:

- a. A revised draft of the WPP addressing TSSWCB comments received on March 2, 2016 was submitted to the TSSWCB on April 5, 2016 for review.
- b. All TSSWCB comments were addressed and the WPP was provided to the Coordination Committee for comment.
- c. All Coordination Committee comments were addressed and approval was given by the Coordination Committee to post the WPP for public comment.
- d. On June 8, the WPP was posted for public comment for a 30-day comment period which ended July 8.
- e. Only minor comments were received from the public. These are being addressed and the WPP is being finalized for submission to TSSWCB and EPA.

99% Complete

Subtask 1.5 SLWA will continue to host and maintain a website (<http://southllano.org/>) to serve as a public clearinghouse for all project- and watershed-related information. All presentations, documents and results will be posted to this website. The website will serve as a means to disseminate information to stakeholders and the general public. TWRI and TTU-LRFS shall contribute content matter for the website as appropriate.

The following actions have been completed during this reporting period:

- a. The SLWA website, listserv, and Facebook page continue to be a resource for stakeholders in the watershed on land and water stewardship, hydrologic and weather conditions, latest news, upcoming events, community participation, and the Watershed Protection Plan.
- b. The SLWA/LRWA website was redesigned and went live in June.
- c. For the quarter April through June of 2016, there were 1,241 sessions and 793 users of the website, with daily visits at 13/day. A weekly newsletter, "Watershed Week in Review" is prepared by SLWA/LRFS and distributed to listserve subscribers and Facebook friends and via the website. Note: There was a 4-day period of use-tracking inactivity while the new website was coming online.

- d. The Facebook page for the Alliance currently has 396 "Likes" and reached a total of 4,295 Facebook users during the second quarter of 2016.

100% Complete

Subtask 1.6 The Director of TTU-LRFS will serve as the Upper Llano River Watershed Coordinator and be responsible for the general oversight and coordination of all project activities, reporting requirements, and educational activities, and serve as the primary conduit for interaction with landowners, citizens, and entities to facilitate the development of the WPP. The Watershed Coordinator shall successfully complete (or have already completed) the Texas Watershed Planning Short Course and participate in Texas Watershed Coordinator Roundtables.

The following actions have been completed during this reporting period:

- a. Dr. Tom Arsuffi, Director of the TTU-LRFS, completed the Texas Watershed Planning Short Course on November 14-18, 2011.
- b. Tyson Broad, Upper Llano River Watershed Coordinator and web manager for the South Llano Watershed Alliance completed the Texas Watershed Planning Short Course on September 24-28, 2012.

100% Complete

Task 2 Quality Assurance

Subtask 2.1 TWRI will develop a QAPP for water quality monitoring activities in Tasks 4 and 5 and a QAPP for watershed modeling activities in Task 6 consistent with the most recent versions of EPA Requirements for Quality Assurance project Plans (QA/R-5) and the TSSWCB Environmental Data Quality Management Plan.

The following actions have been completed during this reporting period:

- a. QAPP for Tasks 4 and 6 – GIS & Modeling
 - Revision 0 (covering only GIS inventory & LULC) approved on July 27, 2012
 - Revision 1 (adding modeling) was approved on August 1, 2013.
- b. QAPP for Task 5, Water Quality Monitoring, was approved on September 6, 2012.

100% Complete

Subtask 2.2 TWRI will implement the approved QAPPs. TWRI will submit revisions and necessary amendments to the QAPPs as needed.

The following actions have been completed during this reporting period:

- a. Revision 1 of QAPP for Task 5 - Water Quality Monitoring was approved on March 5, 2013.
- b. Revision 2 of QAPP for Tasks 4 and 6 – GIS & Modeling was approved on October 28, 2014.
- c. Revision 2 of QAPP for Task 5 - Water Quality Monitoring was approved on April 29, 2014.

100% Complete

Task 3 Public Participation and Stakeholder Coordination

Subtask 3.1 TTU-LRFS, with input from TWRI, SWLA, and Texas AgriLife Extension Service, will compile (Months 1-3) and maintain (Months 4-36) a database of watershed stakeholders and affected parties for use in engaging the public in the watershed planning process. The stakeholder group will be added to base upon previous efforts of SLWA. The database and stakeholder group will represent a diverse cross section of Upper Llano River landowners, citizens, local businesses, local and regional governmental entities and elected officials, state and federal agencies, and environmental and special interest groups.

The following actions have been completed during this reporting period:

- a. The Upper Llano Watershed Protection Plan stakeholder database is now at 462 landowners, citizens, local businesses, local and regional governmental entities and elected officials, state and federal agencies, and environmental and special interest groups.

100% Complete

Subtask 3.2 TTU-LRFS will facilitate public participation and stakeholder involvement in the watershed planning process, specifically project meetings and activities. TTU-LRFS will coordinate meetings, secure meeting locations, prepare and disseminate meeting notices and agendas. Meeting summaries will be prepared and posted to the project website. It is anticipated that at a minimum, quarterly public meetings will be sufficient; however, if more meetings are deemed necessary, they will be scheduled accordingly. Meeting frequency may be adjusted throughout the course of the project to accomplish project goals. TSSWCB will review and approve all meeting notices, agendas, and meeting summaries prior to public dissemination.

The following actions have been completed during this reporting period:

- a. On May 12th, a Coordination Committee Meetings was held to discuss the WPP and receive comments from the Committee and make final preparations to post the WPP for public comment.

100% Complete

Subtask 3.3 TTU-LRFS will attend and participate in other public meetings as appropriate in order to communicate project goals, activities and accomplishments to affected parties. Such meetings may include, but are not limited to, city councils, county commissioners' courts, Clean Rivers Program Basin Steering Committee and Coordinated Monitoring, local soil and water conservation districts (SWCDs), groundwater conservation districts and other appropriate meetings of critical watershed stakeholder groups.

The following actions have been completed during this reporting period:

- a. This quarter, TTU-LRFS met with/participated in the following meetings/activities:
 - Participated in monthly meetings of Llano River Watershed Alliance: April 5, May 5 and June 9, 2016; presented information about the WPP at Alliance's April 30th Spring Outing, "From our Uplands to our Rivers" land stewardship workshop at Kerr Wildlife Management Area.
 - Tyson Broad presented information about WPP to Region J (Plateau) Water Planning Group in Bracketville, April 14th

- Tyson Broad attended Groundwater Management Area 7 Planning meeting in Fredericksburg on April 21st.
- Tom Arsuffi was invited to meet with various Federal Agency agencies (USDA National Institute of Food and Agriculture (NIFA, AFRI), Division of Community and Education, USDA, NIFA, National Fish and Wildlife Foundation and Division of Research on Learning in Formal and Informal Settings - National Science Foundation in Washington, DC to discuss the Upper Llano Watershed Protection Plan, environmental education and minority recruitment in STEM natural resource fields, April 21-22, 2016
- TTU-LRFS participated in 100th anniversary celebration of Sonora Experiment Station on April 23rd.
- Tom Arsuffi attended the TSSWCB Water Supply Enhancement Program Science Advisory Committee meeting in Austin, April 27
- TTU-LRFS assisted TPWD and Llano River Watershed Alliance with elephant ear eradication efforts on May 3rd.
- Tyson Broad made presentation to Kimble County Predator Control Board re feral hog trapping program in WPP, May 11th in Junction.
- TTU-LRFS presented and facilitated meeting of WPP Coordination Committee meeting in Junction on May 12th.
- TTU-LRFS presented WPP information and guided members of the Texas Parks and Wildlife Commission on the Llano River, May 16 & 17th at Mason Mountain WMA.
- TTU-LRFS hosted Texas Water Symposium on Endangered Species in Junction on May 18th.
- Tom presented paper, *Do we have the \$\$\$ and sense, environmental literacy and ethics to protect our natural resource capital???* Probably not! at annual meeting of Society for Freshwater Science, Sacramento, Ca, May 22nd
- Tyson discussed the WPP and upcoming Stream Bank Restoration Workshop as a morning guest on KHLB radio in Mason, May 25th
- Tom Arsuffi, *\$\$\$s and Sense of Guadalupe Bass angling and paddling : Bridging environmental literacy, watershed protection, restoration and flows of Texas Hill Country streams*, Southwest Stream Restoration Conference, June 2nd, San Antonio.
- Tyson Broad, *Invasive Species as Hazards on Water Resources and Ecosystems in Texas: Restoration Considerations*, Southwest Stream Restoration Conference, June 2nd, San Antonio.
- TTU-LRFS planned and hosted Streambank Restoration Workshop for 50 attendees as part of WPP implementation, June 3rd.
- Tom Arsuffi, Committee Member, Texas Tech University Thesis Defense. Baseflow Recession and its Relationship to Meteorological Drought in the Llano River Watershed by Ifeanyichukwu K. Nwankpa, June 6th
- Tyson attended South Central Texas Research Interest Group meeting in Uvalde, June 9th.
- Arsuffi, Committee Member. Texas Tech University Thesis Defense. Evaluating effects of drought and anthropogenic influences on the growth of stream fishes on the Edwards Plateau, central Texas by Wade A. Massure, June 10th
- Tyson attended Texas AgriLife Outreach Training in Dallas, June 13th.
- T.L. Arsuffi and K. Wagner organized a special symposium on, Transdisciplinary Bridges to Watershed Science and Human Systems in Texas at the annual meeting of the

Universities Council on Water Resources/ The National Institutes for Water Resources. Pensacola, Fl., June 23rd consisting of the following presentations:

1. Transdisciplinary approaches to bridging lateral and vertical dimensions in the structure and function of watershed science and human systems: Overview - Tom Arsuffi, Texas Tech University Llano River Field Station (co-authors: T. Broad, K. Wagner)
2. Healthy watershed approach to managing streams : Role of science, stakeholders, education and partnerships, Tyson Broad, Texas Tech University Llano River Field Station (co-authors: T. Arsuffi, K. Wagner)
3. Bringing stakeholders together - Examples of bridging the gaps in knowledge, participation, and coordination with partner organizations and landowners - Rachael Ranft, The Nature Conservancy
4. Synergistic approach to water quality protection and restoration in Texas – Kevin Wagner, Texas Water Resources Institute, Texas A&M AgriLife Research (co-authors: N. Dictson, L. Gregory, A. Berthold)
5. T.L. Arsuffi presented a paper, Collaborations for the Future of Texas Water, Watersheds and Environmental Literacy: Community Partnerships with Texas Tech University's Llano River Field Station, at the Twenty-second International Interdisciplinary Conference on the Environment. Austin, TX., June 28th

100% Complete

Subtask 3.4 TTU-LRFS will facilitate communication with stakeholders in order to engage the public and affected entities in the watershed planning process. TTU-LRFS will utilize all appropriate communication mechanisms including direct mail, e-mail, the project website, and mass media (print, radio, television). TTU-LRFS will utilize the existing SLWA Google Group to facilitate direct discussion between stakeholders. TTU-LRFS will develop, publish, and distribute 5 semi-annual newsletters (1 in year 1 and 2 in years 2 and 3) that highlight Upper Llano River watershed activities; the newsletter shall be distributed as most appropriate to individual landowners and entities in the watershed. TSSWCB must approve all project-related content in any educational materials and publications prior to distribution.

The following actions have been completed during this reporting period:

- a. On January 10, 2015, the SLWA initiated dissemination of a weekly newsletter. This has proven to be an excellent source of information for SLWA members and area stakeholders on major topics of interest, including those regarding aquatic species, in the watershed and to Best Management Practices.
- b. The SLWA Google Groups "South Llano River Project" group continues to be an effective tool for communicating with stakeholders. Those interested can sign-up for the group at the SLWA website (<http://southllano.org/>). There are 295 members in the group.

100% Complete

Subtask 3.5 TTU-LRFS will coordinate with SCSC to host a Texas Watershed Steward Program workshop focused on the Upper Llano River through TSSWCB project 11-05, Continued Statewide Delivery of the Texas Watershed Steward Program.

The following actions have been completed during this reporting period:

- a. A Texas Watershed Steward Program was held on August 30, 2012. Thirty-five local stakeholders participated in this exceptional training program.

100% Complete

Task 4 GIS Inventory and Land Use/Land Cover Analysis

Subtask 4.1 TAMU-SSL will collaborate with project partners, local agencies and stakeholders to develop a comprehensive GIS inventory of the Upper Llano River watershed. This GIS inventory will include the most recent information available on land use, elevation, soils, stream networks, reservoirs, roads, public park lands, municipalities and satellite imagery or aerial photography. Locations of SWQM stations, USGS gages, public access points to the waterbodies, floodwater-retarding structures, wetlands, known OSSFs, TPDES permittees (including WWTFs, CAFOs and MS4s), and subdivisions will also be included. Sites permitted for land application of sewage sludge and septage should be included. Information from subtasks 5.4 and 5.5 should be included. The cumulative impact of TSSWCB-certified WQMPs on the management of agricultural and silvicultural lands should be documented. TAMU-SSL will provide watershed maps for stakeholder meetings as needed.

The following actions have been completed during this reporting period:

- a. The compilation of GIS data for the watershed is complete.

100% Complete

Subtask 4.2 TAMU-SSL will perform a combination of satellite based image (2006-2010) classification schemes and where needed "heads-up digitizing" of the 2006-2010 NAIP aerial photos of the watershed using ESRI's ArcGIS 9.x software. TAMU-SSL will identify individual LULC classes and delineate them in shapefile or ArcGIS grid format with a minimum mapping unit of 2 ac on screen. LULC classes will be comparable to NLCD. TAMU-SSL will verify LULC classification through field sampling and ground truthing information to an accuracy of 80% or greater. Ground control points used in the field sampling will be collected for at least ten locations per land use type using GPS units with an accuracy of 1-10 m.

The following actions have been completed during this reporting period:

- a. TAMU-SSL has classified the LULC in the watershed, ground truthed the data using ground control points, and provided it to the project team.

100% Complete

Subtask 4.3 TAMU-SSL will provide the GIS inventory and LULC update to the TTU-WRC for utilization in the watershed model. TAMU-SSL will also provide TTU-LRFS needed maps for the WPP.

The following actions have been completed during this reporting period:

- a. On October 10, SSL provided the GIS inventory and LULC update to the project team.

100% Complete

Task 5 Water Quality Monitoring

Subtask 5.1 TTU-LRFS will conduct routine ambient monitoring at 14 mainstem sites and tributaries quarterly, collecting field parameters, conventional parameters, and flow. The QAPP, as detailed in Task 2, will precisely identify sites. The sampling period extends over 30 months. The number of samples planned for collection through this subtask is 140. Currently, routine ambient monitoring is conducted quarterly at 2 stations by LCRA and TCEQ (16701 and 17425) through the Clean Rivers Program. Sampling will be coordinated with these entities to prevent duplication of efforts and ensure comparability. Flow data will be collected by gage, electric, mechanical or Doppler, and flow severity will be noted. Field parameters measured will include pH, temperature, conductivity, and dissolved oxygen. Conventional parameters measured will include total suspended solids, turbidity, sulfate, chloride, nitrate nitrogen, ammonia nitrogen, total kjeldahl nitrogen, chlorophyll a, pheophytin, total hardness, total phosphorus and E. coli (enumerated using USEPA Method 1603). The Edwards Aquifer Research & Data Center at Texas State University, a NELAC accredited laboratory, will conduct sample analysis, provide all containers and chain of custody.

The following actions have been completed during this reporting period:

- a. The 10th and final quarterly stream sampling was conducted on February 5-6, 2015.

100% Complete

Subtask 5.2 TTU-LRFS will conduct biological monitoring (fish, macroinvertebrate, and habitat assessment) at 14 locations twice a year for 2 years to assess the cumulative impact of pollutant loading on stream health and biological communities of stream health. Biotic conditions and assessments for main stem and lower portions of the watersheds are just beginning as part of the Guadalupe Bass Restoration Project for the South Llano River with TPWD in conjunction with TTU-LRFS and Texas State University.

The following actions have been completed during this reporting period:

- a. The first semi-annual biological sampling was conducted in September 2012.
- b. The second semi-annual biological sampling was conducted February 18-28, 2013
- c. The third semi-annual biological sampling was conducted September 16-26, 2013.
- d. The fourth and final semi-annual biological sampling was conducted on March 3-14, 2014.

100% Complete

Subtask 5.3 TTU-LRFS will conduct spring sampling at 6 sites including 700 Springs, Big Paint and Tanner Springs. TTU-LRFS will work with Kimble County Groundwater Conservation District to identify other priority springs. Quarterly field, conventional, and flow parameters will be collected. Water quality parameters to be measured are defined in Subtask 5.1. The QAPP, as detailed in Task 2, will precisely identify sites. The sampling period extends over 30 months. The number of samples planned for collection through this subtask is 60. The Edwards Aquifer Research & Data Center, a NELAC Accredited Laboratory, will conduct sample analysis and provide all containers and chain of custody.

The following actions have been completed during this reporting period:

- a. The 10th and final quarterly spring sampling was conducted on February 5, 6 2015.

100% Complete

Subtask 5.4 TTU-LRFS will conduct surveys and map distribution and abundance of invasive emergent and aquatic plants from the headwaters (Llano Springs, 700 Springs, South Llano River and North Llano River) to Junction. TTU-LRFS and ESSM will work with the TPWD Aquatic Habitat Enhancement Program Director to determine BMPs for controlling or eradicating invasive species and develop an invasive species management plan for incorporation into the WPP.

The following actions have been completed during this reporting period:

- a. Evaluation of BMPs for invasive emergent and aquatic plant species were completed in consultation with Earl Chilton - Aquatic Habitat Enhancement Program Director at Texas Parks and Wildlife Department.

100% Complete

Subtask 5.5 TTU-LRFS will conduct surveys and map the distribution, abundance, and severity of cut and eroding banks on the South and North Llano Rivers.

The following actions have been completed during this reporting period:

- a. Surveys of the distribution, abundance, and severity of cut and eroding banks on the North and South Llano rivers were completed in June 2013.

100% Complete

Subtask 5.6 TTU-LRFS will conduct a historical data review for the waterbody, to be included in the WPP, in order to assess and characterize trends and variability in water quality. Historical data collection activities will concentrate on 1) ambient water quality data (including groundwater); 2) stream flow and water level data; 3) precipitation records; and 4) biological data. U.S. Geological Survey, National Weather Service, TPWD, Texas Water Development Board, GCDs, LCRA, TCEQ, EPA and others will be queried for data related to the study area.

The following actions have been completed during this reporting period:

- a. TTU-LRFS presented the draft historical data review for the upper Llano River to TSSWCB in May 2013. A final draft of the report was approved by TSSWCB in July 2013. The final report was presented to the Coordination Committee at the August 1, 2013 meeting and posted on the SLWA website.

100% Complete

Subtask 5.7 Through TSSWCB project 05-02 FY05 Statewide NPS Pollution Management Project, USGS will install and operate one new real-time streamflow gage at an appropriate location on the South Llano River as near the outlet of the assessment unit as is practical. Through this project, and contingent upon TSSWCB project 05-02, TTU-LRFS will work with USGS to provide operation and maintenance for this new real-time streamflow gage. Continuous sampling extends over 36 months. This gaging station will complement the existing gages maintained by the USGS. The USGS maintains real-time gages at 08150000 Llano River near Junction and 08148500 North Llano River near Junction and collects periodic data at gages 08149500 Seven Hundred Springs near Telegraph and 08149400 South Llano River near Telegraph. TTU-LRFS will work with USGS to ensure continued operation of these other USGS gages throughout the duration of the project.

The following actions have been completed during this reporting period:

- a. The USGS stream gage was activated on May 16, 2012 on the South Llano River at Flatrock Crossing near the Texas Tech Campus. The SLWA website includes a link to this gage: http://waterdata.usgs.gov/tx/nwis/uv/?site_no=08149900&PARAMeter_cd=00065,00060. Increase flows during May provided the opportunity to further develop a rating curve for the gage.

100% Complete

Subtask 5.8 TTU-LRFS will transfer monitoring data from activities in Subtask 5.1-5.3, and 5.7 to TSSWCB for inclusion in SWQMIS at least quarterly. Data will be transferred in the correct format using the TCEQ file structure, along with a completed Data Summary, as described in the most recent version of TCEQ Surface Water Quality Monitoring Data Management Reference Guide. TWRI will submit Station Location Requests to TCEQ, as needed, to obtain TCEQ station numbers for new monitoring sites. TWRI will input monitoring regime, as detailed in the QAPP, into the TCEQ CMS. Data Correction Request Forms will be submitted to TSSWCB whenever errors are discovered in data already reported. All monitoring data files, Data Summary, and Data Correction Request Forms will also be provided to LCRA. TTU-LRFS will post monitoring data from activities in Task 5 to the project website in a timely manner.

The following actions have been completed during this reporting period:

- a. All but two of the remaining datasets have been uploaded to TCEQ SWQMIS. These will be uploaded next quarter.

90% Complete

Subtask 5.9 TTU-LRFS, with assistance by TWRI, will incorporate the watershed assessment findings in the WPP developed through Task 8.

The following actions have been completed during this reporting period:

- a. A revised draft of the WPP addressing TSSWCB comments received on March 2, 2016 was submitted to the TSSWCB on April 5, 2016 for review.
- b. All TSSWCB comments were addressed and the WPP was provided to the Coordination Committee for comment.
- c. All Coordination Committee comments were addressed and approval was given by the Coordination Committee to post the WPP for public comment.
- d. On June 8, the WPP was posted for public comment for a 30-day comment period which ended July 8.
- e. Only minor comments were received from the public. These are being addressed and the WPP is being finalized for submission to TSSWCB and EPA.

99% Complete

Task 6 Modeling and Data Analysis

Subtask 6.1 TTU-WRC, with cooperation from project partners, will evaluate models, such as SWAT and EDYS, to simulate flow and water quality at appropriate subwatershed scales and identify BMPs and targeted locations to enhance the quality of runoff and recharge. TTU-WRC will recommend the use of a suitable candidate model. Once the most suitable model is selected by TTU-WRC, TWRI, and TSSWCB, TTU-WRC will assist TWRI in developing a modeling QAPP (Task 2). TTU-WRC will collect and evaluate relevant hydrologic data for the Upper Llano River watershed, including rainfall, stream flow, and groundwater conditions, and recent land use and vegetation distributions generated through Tasks 4-5.

The following actions have been completed during this reporting period:

- a. No action occurred this quarter.

100% Complete

Subtask 6.2 TTU-LRFS will employ EPA's Causal Analysis/Diagnosis Decision Information System (CADDIS) to conduct a causal evaluation of the benthic macroinvertebrate data. CADDIS, an online application, provides a pragmatic guide for determining the causes of detrimental changes and undesirable biological conditions observed in aquatic systems. CADDIS supports defensible causal analyses of the mechanisms, symptoms, and stressor-response relationships for various stressors in order to draw appropriate conclusions.

The following actions have been completed during this reporting period:

- a. Macroinvertebrate identification, metrics, and ALUs have been completed. The CADDIS model was unable to identify stressors to the invertebrate community due to the watershed being a relatively unperturbed system.

100% Complete

Subtask 6.3 TTU-WRC, with cooperation from project partners, will summarize modeling findings to inform the stakeholders about the physical behavior of their watershed resulting from various implementation scenarios and work with project partners to incorporate this into the WPP.

The following actions have been completed during this reporting period:

- a. Model output has been summarized for stakeholders and incorporated into the WPP.

100% Complete

Task 7 Public Outreach and Education

Subtask 7.1 ESSM, in conjunction with the TTU-LRFS, TTU-WRC, and SLWA will provide watershed training workshops for landowners on riparian protection, land stewardship, grazing management, invasive species, brush control, conservation, wildlife and habitat plans and water resource issues. Two workshops per year are planned to provide adequate coverage of the broad range of elements associated with water and watersheds and to allow a broad coverage of stakeholder groups. Pre- and post-participant surveys will be administered at selected events to evaluate (1) changes in producer knowledge and awareness and (2) expected adoption of BMPs.

The following actions have been completed during this reporting period:

- a. The LRFS held both core and advanced Texas Stream Team Trainings for 27 volunteer water quality monitors. These volunteers will monitor selected sites in the Upper Llano Watershed on a monthly basis and submit data for entry into the Texas Stream Team database.

100% Complete

Subtask 7.2 TTU-LRFS will develop and offer a K-12 TEKS based water and watershed curriculum unit.

The following actions have been completed during this reporting period:

- a. TTU-LRFS rewrote the established curriculums: Aquatic Biology Units, The Understanding Watersheds, and the Soils/Pedology.
- b. The updated curriculum was unveiled summer 2013 and received positive feedback from a group of teachers attending a Professional Development event at TTU-LRFS.

100% Complete

Subtask 7.3 TTU-LRFS will organize a Texas Water Symposium in partnership with Texas Public Radio, Schreiner University, Hill Country Alliance, SLWA, and TWRI on EPA's Healthy Watersheds Initiative with this project as a case study for Texas.

The following actions have been completed during this reporting period:

- a. TTU-LRFS hosted a Texas Water Symposium on Healthy Watersheds and Upper Llano WPP efforts on March 22, 2011. The Symposium was held at TTU-LRFS in front of a live audience and taped for broadcast during Texas Public Radio's Newsmaker Hour. The TWS included panelists from TPWD, TSSWCB, Hill Country Alliance, TTU-LRFS, and TWRI.
- b. A second Texas Water Symposium on Texas Springs: Making Connections between Groundwater, Surface Water, Science, and Stewardship was held on March 8, 2013. The TWS discussed the connection between groundwater and surface water and included a panel of local ranchers, TTU-LRFS, and Texas Water Development Board.
- c. A third Texas Water Symposium on Private Property Rights was held on October 24, 2013 in Kerrville, TX. The TWS included panelists from the San Antonio Area Foundation, Texas Parks and Wildlife Commission, a national non-profit Sustainable Water Infrastructure Program, and the Real County Judge.

100% Complete

Task 8 Watershed Protection Plan Development

Subtask 8.1 TTU-LRFS, in collaboration with project partners, will develop a WPP for the Upper Llano River watershed that is consistent with and satisfies the expectations of the nine elements fundamental to watershed-based plans as described in EPA's 2004 Nonpoint Source Program and Grants Guidelines for States and Territories [68 Fed. Reg. 60653-60674 (October 23, 2003)] and incorporates the elements of EPA's Healthy Watersheds Framework as described in the technical guidance document Identifying and Protecting Healthy Watersheds (EPA 2011). The WPP shall be founded on decisions made by stakeholders through the watershed planning process (Task 3) and incorporate findings from project Tasks 4-7. TTU-LRFS will facilitate public review and stakeholder approval of the WPP.

The following actions have been completed during this reporting period:

- a. A draft WPP was submitted to TSSWCB on August 30th for review. Comments were received on the draft on September 30. TTU-LRFS and TWRI addressed the comments and submitted a revised draft to TSSWCB on December 18, 2015. Initial comments were received from TSSWCB on March 2nd. All TSSWCB comments were addressed and the WPP was provided to the Coordination Committee for comment and approval for posting for public comment.
- b. On June 8, following response to Coordination Committee comments, the WPP was posted for public comment for a 30-day comment period which ended July 8.
- c. Only minor comments were received from the public. These are being addressed and the WPP is being finalized for submission to TSSWCB and EPA

99% Complete

Subtask 8.2 TTU-LRFS will develop an "executive summary" style document, based on the WPP, which will serve as a public outreach tool to garner support for the implementation of the WPP and achieve long term sustainability.

The following actions have been completed during this reporting period:

- a. The executive summary style document will be completed next quarter.

60% Complete

Subtask 8.3 After EPA has completed a satisfactory nine element consistency review of the WPP, TWRI will publish, print, and distribute the WPP and "executive summary" document to stakeholders.

The following actions have been completed during this reporting period:

- a. The WPP and all supporting documents will be distributed to stakeholders via posting on website, distribution of hard copies, and use of press and social media once the WPP is accepted by EPA.

0% Complete

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

- N/A

IV. Projected Work for Next Quarter

- All Sampling data will be uploaded into TCEQ SWQMIS database.
- TTU-LRFS will participate in SLWA Board Meetings.
- Complete Executive Summary Document
- A 5th newsletter covering the EDYS model will be disseminated
- A Coordination Committee Meeting will be scheduled once the WPP is accepted by EPA.