



Urban Riparian Symposium

February 11 – 13, 2015

Palmer Events Center

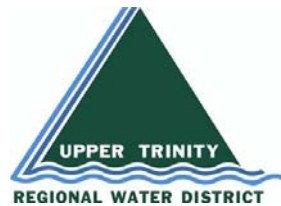
Austin, Texas



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Planning Committee:

Staryn Wagner, City of Austin, Watershed Protection Department

Nikki Dictson, Texas Water Resources Institute/Texas Riparian Assoc.

Melissa Parker, Texas Parks and Wildlife Department/ Texas Riparian Assoc.

Mateo Scoggins, City of Austin, Watershed Protection Department

Lori Hazel, Texas A&M Forest Service/ Texas Riparian Assoc.

Blake Alldredge, Upper Trinity Regional Water District / Texas Riparian Assoc.

Anne Rogers, Texas Parks and Wildlife Department / Texas Riparian Assoc.

Tom Arsuffi, Texas Tech Llano River Field Station/ Texas Riparian Assoc.

Jacquelyn Duke, Baylor University/ Texas Riparian Assoc.

John Clement, City of Austin, Watershed Protection Department

Visit us at our website: <http://texasriparian.org/>

Welcome!

Welcome to the first Urban Riparian Symposium in Austin, Texas coordinated by the Texas Water Resources Institute, City of Austin, and Texas Riparian Association. This conference includes over 55 presentations and 11 posters. The goal of the symposium is to provide an opportunity for natural resource professionals to share ideas, discuss management and policy issues, lessons learned in urban riparian and stream planning, assessment, design, construction, and evaluation. The symposium includes workshops on Wednesday, while Thursday and Friday's events will include plenary speakers, concurrent topical presentations with moderated discussions, and a poster session. Scientists and practitioners are encouraged to share experiences, network with colleagues, and become involved in shaping the future of urban riparian issues in Texas. The Conference Planning Committee and sponsors are happy that you chose to participate in the first Urban Riparian Symposium. Thanks for coming and we hope that you enjoy your time at the Symposium and in Austin!

Wednesday Schedule

Wednesday, February 11 , Barton Creek Room 4	
10:30 am - 12 pm	FREE Workshop: Writing Successful Grant Proposals for Riparian Projects
Lunch	Lunch on your own
1:00 - 3:00 pm	Workshop 1: Managing Riparian Restoration in Urban Areas
3:15 - 5:00 pm	Workshop 2: Contracting and Managing Sustainable Vegetation Practices in Large Stream Restoration Projects
5:15 - 8 pm	Welcome Reception at Threadgills Restaurant and TRA Board Meeting

Thursday Schedule

Thursday, February 12			
9:30 - 9:45 am	Welcome and Introduction		
9:45 AM	Opening Plenary - Kevin M. Anderson Ph.D. , Austin Water Center for Environmental Research and Founder of the Texas Riparian Association has dedicated a considerable amount of time researching and discussing the resilience of Texas' novel riparian ecosystems. He will share his observations and ideas and set the stage for the how and the why of riparian restoration.		
10:30 AM	Break		
10:45 AM	Keynote - Dr. Peter MN. Groffman , Cary Institute of Ecosystem Studies. A microbial ecologist, Dr. Groffman's research focuses on the role of microorganisms in ecosystem function. Much of his work, and there is a lot of it, has looked at riparian areas and what urbanization does to soil and hydrology.		
11:45 AM	Symposium structure		
12:00 PM	Lunch (on your own)		
1:30 - 3:30 PM	Onion Creek: Case Studies	Barton Creek: Restoration / BMPs	Colorado River: Riparian Area Management
1:30 PM	Susan Kenzle - Collaborative Urban Riparian Stream Rehabilitation: The J.J. Seabrook Project	Fouad Jaber - Modeling Low Impact Development Effects on Stream Health	Susan Chadwick - Is the traditional vision of local and urban flood control agencies in conflict with federal and state agencies charged with protection of riparian zones?
1:50 PM	Deborah January-Bevers - The Policy Values of Ten Ecoregions within a Large Urban Core (Incorporating ecosystem services into infrastructure and policy decisions in the Greater Houston Region)	Carolyn White - Corridor Channel Design – Blending Flood Damage Reduction, Stormwater Quality and Recreation	Megan Bean - Riparian Restoration Projects on Public and Private Lands in the Llano River Watershed
2:10 PM	Mike Marshall - Groundwater Conservation in Texas: Public Benefits of Rural Working Lands	Morgan Byars - Sustainable Stream Management in the City of Austin	Stan Wilson - Implementing Adaptive Management and Maintenance Within Restrictive, Commodity-Based Budgets
2:30 PM	Blake Alldredge - Coordinated Watershed Protection Programs to Protect North Texas Water Supplies	Michele Adlong - Enlargement and Instability of Stream Channels in Austin, Texas: When to Restore?	Mark Simmons - Riparian Restoration of the Mission Reach, San Antonio: Challenges of Ecological Design and Installation
2:50 PM	30 min Questions/Discussions		

Thursday Schedule

Thursday, February 12			
3:20 PM	Break		
3:35 - 5:00 PM	Onion Creek: Case Studies	Barton Creek: Restoration / BMPs	Colorado River: Ecology/Biology
3:35 PM	Fred Phillips - The Yuma East Wetlands, Restoring Severely degraded Riparian Habitat on the Lower Colorado River, In downtown Yuma	A.C. Conrad - Urban Stream Riparian Mapping using Small General Purpose Unmanned Aerial Platforms	George Guillen - The Influence of Urban Stream Syndrome on Freshwater Fish Stream Communities: Implications for Restoration
3:55 PM	Justin Stewart - Poquito and Chestnut Creek Restoration and Confluence	Tom Ludwig - Guerilla Green Infrastructure	Kyle Wright – Healthy Landscapes and the Soils They Rest Upon Promote Healthy Stream and Clean Water
4:15 PM	Andrew Clamann - Application of Coir Logs and Emergent Vegetation for Urban Lake Shoreline Stabilization: Results of a Five Year Pilot Study and Discussion of a Large Scale Implementation.	Andreina Alexatos - Integrated Stormwater Management for an Environmentally-Sensitive Area	Casey Williams - A Preliminary Plan for Riparian Restoration to Complement Habitat Improvement for the Endangered Fountain Darter (<i>Etheostoma fonticola</i>)
4:35 PM	25 min Questions/Discussions		
5:30 PM	Poster Session/Happy hour		
8:00 PM	Moonlight Hike		

Friday Schedule

Friday, February 13			
8:30 -10:20 am	Onion Creek: Outreach and Education	Barton Creek: Restoration BMPS	Colorado River: Waller Creek Session
8:30 AM	Nikki Dictson - Texas Riparian and Stream Ecosystem Educational Program: Educationa and adoption of Conservation Practices	Angelita Rodriguez - A Bayesian approach to assessing impacts of invasive plants on native plant species richness in City of Austin parks	Mateo Scoggins Existing conditions: Waller Creek, a very urban stream Kristin Pipkin A new Waller Creek: The tunnel and the formation of the district
8:50 AM	Tina Hendon - Connecting the dots – Increasing knowledge by preserving history, conserving resources, and enhancing recreation.	Stephen Davis - Isolating pathogenic bacteria sources in urban streams: A case study	Melba Whatley The Waller Creek Conservancy and the design competition (Waller Creek Conservancy)
9:10 AM	Tom Arsuffi - Healthy Urban Riparian Ecosystems and the Role of Environmental Education and Literacy	Ana Gonzalez - Assessing Improvement in Riparian Function in Urban Creeks	Gullivar Shepard The Waller Creek Corridor Restoration: process and product (Michael Van Valkenburgh Associates)
9:30 AM	Sarah Woolley - Evolving towards Your Audience: Using Student Test Data and Teacher Feedback to Improve Environmental Education Programming	Aaron Richter - Assessment of Riparian Zones with a NaHegve Bayes Classifier	Tim Dekker The structure and function of the new Waller Creek (MVVA/LimnoTech)
9:50 AM	30 min Questions/Discussions		
10:30 – 12:00 PM	Onion Creek: Outreach/Education	Barton Creek: Restoration BMPS	Colorado River: Ecology
10:30 AM	Mateo Scoggins - The human-ecology interface: delivering restoration ecology to everyone	Fred Phillips - Restoration of the Colorado River Delta in the US and Mexico	Jewel Lipps - Trekking through the Trees: Forest Succession at the Trinity River Audubon Center
10:50 AM	Jessica Wilson - Restoration Communication Tools: Beauty, benefits and threats are in the eye of the beholder	Tom Hegemier - Flood Control Dam Impact on Endangered Species Habitat in the San Marcos River	Shakaikha Abedin - Understanding Nitrogen Dynamics and Organic Matter Sources in the Jordan River

Friday Schedule

Friday, February 13			
10:30 – 12:00 PM	Onion Creek: Outreach/Education	Barton Creek: Restoration BMPS	Colorado River: Ecology
11:10 AM	Judy Walther - Developing Signage as Effective Outreach	Kyle Wright - Agricultural Practices and Procedures that also Apply in Urban Areas	Ananda Bhattacharjee - Ecological Perspective on New Connectivity between Nitrogen and Carbon Cycle
11:30 AM	30 min Questions/Discussions		
12:00 PM	Lunch (on your own)		
1:30 - 3:00 PM	Onion Creek: Outreach/Education	Barton Creek: Riparian Area Management	Colorado River: Ecology/Biology
1:30 PM	Bill Stout -Future Forest Project: Coordinated collaboration of partnerships to restore the urban forest in riparian zones	John Clement - Implementing the City of Austin Invasive Species Management Plan	Heidi Trathnigg - Riparian and Wetland Restoration Effects on Bird and Butterfly Communities on the Lower Colorado River
1:50 PM	Megan Helton - Youth Engagement in Ecological Restoration	David Mahler - Riparian and Wetland Species Selection for Plantings in Central Texas.	Lauren Ross - The Invisible Life of Soil in Urban Stream Restoration
2:10 PM	Adam Comer - More than a conveyance: Altering perceptions of the urban riparian patchwork through service learning	Shane Hrobar - Selective Clearing A Method to Encourage Native Forest Canopies along Flood Control Channels in Harris County	Darcy Nuffer – Urban Riparian Soils: A Case Study of the Shoal Creek Restoration
2:30 PM	30 min Questions/Discussions		
3:00 PM	Break		
3:15 PM	Closing Plenary - Matt Hollon , Environmental & Conservation Program Manager with the City of Austin, was critical in the creation of the City's new Watershed Protection Ordinance. Over 2 years in the making with over 350 private and public stakeholders, the ordinance is now in place to better protect creeks and floodplains, facilitate the integration of public trails and greenways, and save the City 100s of millions of dollars in future erosion, flood, and ecological mitigation.		
4:00 PM	Common Threads and Future Directions		
6:00 PM	Offsite Social Event		

Poster Session

Colorado River Room

Presenter Name	Poster Title
Andreina Alexatos	Integrated Stormwater Management for an Environmentally-Sensitive Area
Megan Brown	Using GIS to Perform DRASTIC Evaluations for Groundwater Vulnerability to Contamination
Stephen Davis	Developing a Stream Stability Index: Evaluation from the ground up
Angela E. England	A Biodiversity Restoration Tool: Girdling to Create Canopy Gaps in Privet-Dominated Riparian Forests
Acayla Haile	Arundo donax Control Program
Kirstin Hein	Analysis of Surface Water Quality for Carters and Burton Creek - Year One
Megan Helton	Youth Engagement in Ecological Restoration
Olive Hershey	The Struggle for Control over the Urban Commons Case Study: Buffalo Bayou and The Memorial Park Demonstration Project
Tom Ludwig	Changing the Channel
Kathryn Nichols	Engaging Diverse Voices in Multiple-objective Stream Projects
Colleen Peters	Occurrence of Microplastic Particles in the Stomach Contents of Sunfish from the Brazos River Basin, Central Texas

COA - Urban Riparian Symposium
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Colorado River Meeting Room 1 - 3

Meeting Rooms 4 & 5
Barton Creek and Onion Creek

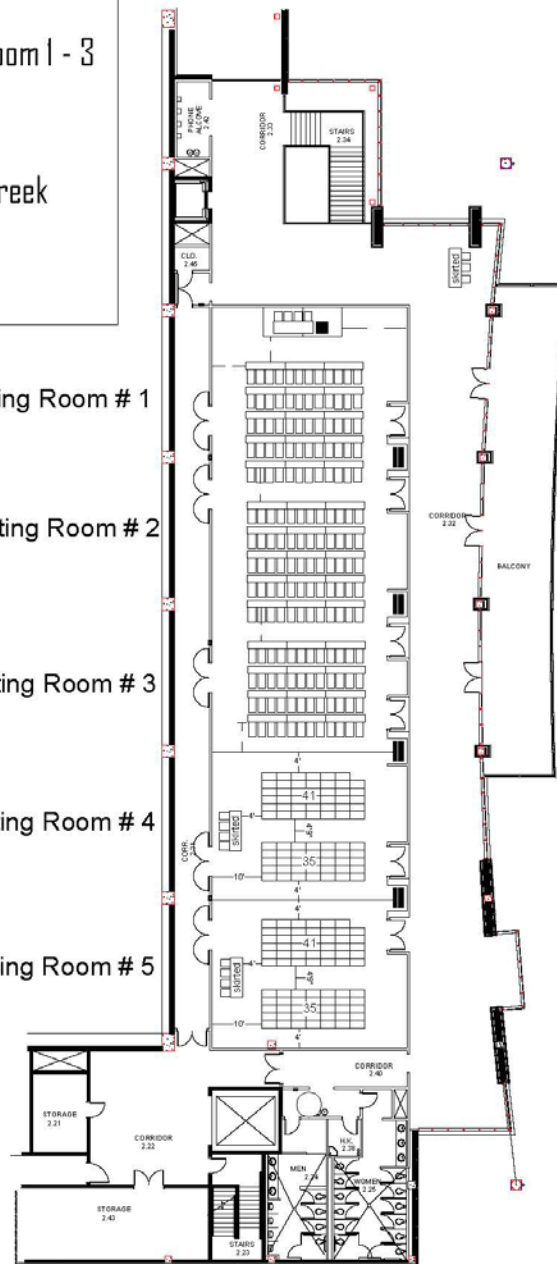
Meeting Room # 1

Meeting Room # 2

Meeting Room # 3

Meeting Room # 4

Meeting Room # 5



Urban Riparian Symposium

February 11 – 13, 2015

List of Presenters in Alphabetical Order

Authors: Shaikha Abedin*, Sachiyo Mukherji, Ramesh Goel, Michael Barber

University of Utah

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Topic: Ecology/Biology – Friday at 10:50 AM

Title: Understanding Nitrogen Dynamics and Organic Matter Sources in the Jordan River

Abstract:

In the growing urbanization era, anthropogenic changes like hydraulic modifications, waste water treatment plant effluent discharge etc. have caused a variety of ailments to the urban rivers that include organic matter and nutrient enrichment, loss of biodiversity, and chronically low dissolved oxygen concentrations. Utah's Jordan River is no exception, where nitrogen contamination and persistently high organic matter are some of the major current issues. The purpose of this research is to look into the sources of organic matter and nitrogen dynamics at selected sites along the Jordan River. During the fall season, leaves from the deciduous trees account for a significant amount of organic content in the river flow. Leaf leachate provides a readily available energy source for the decomposers. Studies on two different species, *Quercus gambel* and *Acer grandidentatum*, illustrate how high amount of dissolved organic carbon can be leached within 24 hours of immersion in water. Serum bottle denitrification experiments using leaf leachate with pure biomass show that this organic carbon is biodegradable with a denitrification rate of 2.21 mg N/g VSS-day. To demonstrate the study of nitrogen dynamics, three sites along the Jordan River were chosen. Results from serum bottle denitrification and nitrification experiments strongly indicate that Jordan River sediment is very active in ammonia oxidation and more importantly, in nitrate reduction. Variation in nitrification and denitrification rates is also supported by the molecular analysis-qPCR. Nitrification rate is proven to be higher for the sediment samples containing higher AmoA gene copy numbers and similar relation is obtained for denitrification rate with nirS gene copy number. Denitrification and nitrification rates at different locations along the Jordan River provide a better understanding of the nutrient dynamics along the river, which will be essential in forming more reasonable TMDL and management practices.

Author: Michelle Adlong*

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Topic: Restoration and Best Management Practices – Thursday at 2:30 PM

Title: Enlargement and Instability of Stream Channels in Austin, Texas: When to Restore?

Abstract:

Watershed development, specifically an increase in impervious cover and alteration of drainage patterns, leads to changes in hydrology and sediment loads that in turn causes years of stream channel instability and adjustment. Consideration of stream stability is important when planning restoration

projects, as understanding the ultimate equilibrium condition can help avoid unanticipated impacts as channel morphology adjusts over time. Specifically, adjustment through enlargement of the bankfull channel occurs in response to hydrologic changes through the process of downcutting and widening. To quantify channel enlargement in local streams, in 1997 the City of Austin Watershed Protection Department (WPD) undertook stream surveys in 17 urban and suburban watersheds. Utilizing historic wastewater profiles, staff compared historic (pre-development) channel dimensions with modern (post-development) surveyed dimensions to calculate the change in channel cross sectional area up to that time. The 1997 surveys resulted in enlargement ratios ranging from one to four with a mean of about two, or an approximate doubling of channel cross sectional area. Locally relevant correlations between enlargement ratio and watershed imperviousness were calculated, with a greater effect observed in alluvial channels compared to rock bed channels. In 2014, WPD staff began to re-survey the same cross sections in order to calculate updated enlargement ratios and evaluate whether channels have stabilized over the years or are continuing to enlarge. Enlargement data can be used to inform Austin's development regulations through Erosion Hazard Zones and also to guide passive and active restoration efforts that depend on stable channel form.

Author: Andreina Alexatos*

Texas State University – San Marcos

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Topic: Restoration and Best Management Practices – Thursday at 4:15 PM and Poster Session at 5:30 pm

Title: Integrated Stormwater Management for an Environmentally-Sensitive Area

Abstract:

Urban landscapes continue to pose threats to the water quality of rivers, streams, lakes, and coastal environments by increasing the amount of impervious surface cover. When rainfall does not absorb into the ground, it becomes stormwater runoff, carrying with it numerous pollutants such as oil/grease, fertilizers/herbicides, trash and other debris straight into nearby water bodies, virtually unfiltered. Previous studies have shown that integrated best management practices such as low-impact development and green infrastructure significantly reduce the negative effects of stormwater pollution by mimicking natural processes. In environmentally-sensitive areas that are located in urbanizing landscapes, the task of mitigating stormwater runoff becomes a particularly challenging task. To protect the ecological integrity of Spring Lake, the headwaters of the San Marcos River, The Meadows Center for Water and the Environment was established in order to facilitate conservation and sustainability efforts. This research project provides an environmental inventory and conceptual design for managing stormwater from the site's parking lot by using integrated features such as raingardens and riparian buffers. If the features are implemented accordingly, most of the runoff that drains off the site will either be diverted and harnessed away from Spring Lake, or be filtered beforehand by the vegetated buffers carefully chosen for the design.

Authors: Blake Alldredge*, Jason Pierce

Upper Trinity Regional Water District

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Topic: Case Studies – Thursday at 2:30 PM

Title: Coordinated Watershed Protection Programs to Protect North Texas Water Supplies

Abstract:

As working agricultural lands transform into urbanized communities, it's important to protect the quality of water in local streams and lakes - - the sources of our drinking water. A coordinated approach to protecting our natural assets (such as riparian areas, wetlands, and other native habitats) is needed to ensure the continued health and sustainability of North Texas waterways for years to come. To date, over eighteen municipalities and utilities have adopted resolutions supporting and promoting Upper Trinity Regional Water District's (UTRWD) coordinated Watershed Protection Program.

UTRWD collaborates with multiple partners (i.e. cities, counties, utilities and other agencies and organizations) on various programs to advance watershed management in North Texas. Programs seek to identify areas for both open space preservation and the implementation of best management practices to reduce nonpoint source pollution in the Lake Lewisville, Ray Roberts and Grapevine watersheds - - key drinking water sources for North Texas. To raise watershed awareness, UTRWD has installed signs along creeks in the local watersheds, provides book covers and tree saplings to school children, and hosts workshops and symposiums regarding watershed protection.

As part of its Watershed Protection Program, UTRWD established the Upper Trinity Conservation Trust in 2011. The Trust protects land and preserves water resources by receiving and overseeing conservation easements. The Trust's mission is to protect water quality and does this by focusing on riparian corridors in rural and urban watersheds.

This presentation will discuss i) an overview of programs conducted by UTRWD with multiple partners, ii) how the Upper Trinity Conservation Trust operates to encourage stewardship of riparian areas, and iii) how a Comprehensive Greenbelt Plan for Denton County will benefit the citizens and watersheds of the county.

Authors: T.L. Arsuffi*, Jenny Strovas, Christine Moseley,

Llano River Field Station

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Topic: Education & Outreach – Friday at 9:10 AM

Title: Healthy Urban Riparian Ecosystems and the Role of Environmental Education and Literacy

Abstract:

Water, the environment, and natural resources are critical issues for present and future generations. An ecologically literate public is needed to make informed decisions as resources become limited. Yet studies consistently reveal that the public suffers from a tremendous environmental literacy gap that is

increasing rather than decreasing. Further, >90% of U.S. will live in urban areas and children will have increasingly little contact with nature. The disconnect between children and nature has important health, policy and career ramifications (Richard Louv, Last Child in the Woods). Most riparian, river and watershed restoration projects have a public component and require stakeholder support for project success and sustainability. Here, we examine environmental education and literacy at various scales in Texas and results are not encouraging. First, we examine the structure and function of environmental education and literacy using a database and survey approach. Databases are used to advance many disciplines and this is the first to develop a comprehensive database of Texas environmental education programs and conduct an empirical analysis of their characteristics (location and major landscape features, instructional characteristics (Texas Essential Knowledge and Skills based, learning style, etc.), staff expertise, park capacity, habitats, ecosystems and biodiversity and curricular units and association with STEM subject areas. Next, the new Natural Resource and Environmental Literacy Plan for Texas provides a framework on getting the next generation informed on land, water, climate and ecosystems. The plan emerged from planning meetings, input from multiple stakeholders/ partnerships and focuses on assessment and implementation approaches at all levels of environmental education, to improve ecological and scientific literacy of a public and generation increasingly removed from the natural resources on which they depend. Riparian and restoration ecologists should consider more direct public engagement in restoration activities and additional education efforts to help the public better understand natural systems and challenges they face.

Authors: Megan Bean*, Timothy Birdsong, Melissa Parker, Matt Shelley, and Arlene Kalmbach

Texas Parks and Wildlife Department

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Topic: Riparian Area Management – Thursday at 1:50 PM

Title: Riparian Restoration Projects on Public and Private Lands in the Llano River Watershed

Abstract:

The Llano River Watershed is a focal area for Texas Parks and Wildlife Department (TPWD), Texas Parks and Wildlife Foundation, Southeast Aquatic Resources Partnership, Texas Tech University, and several other agencies and regional groups. Through the Conserving Texas Rivers Initiative and Guadalupe Bass Restoration Initiative, we have been working with landowners to implement projects that restore and/or protect important riparian and aquatic resources. Projects have impacted ranches representing over 65,700 acres of the watershed with projects on 6,970 of these acres benefiting upland, riparian, and aquatic resources. Projects have been a collaborative effort between the Wildlife, Inland Fisheries, and State Parks Divisions at TPWD. This innovative partnership has been highly effective in providing conservation best management practices for a holistic management approach, identifying and implementing projects, and providing important outreach and educational opportunities. Efforts to protect and restore riparian areas within the watershed have also focused on providing recreational opportunities like the newly developed South Llano River Paddling Trail, supporting scientific research to fill in data gaps, monitoring restoration projects to inform future activities, and providing watershed workshops.

Authors: Ananda Bhattacharjee*, Sachiyo Mukherji, Ramesh Goel

University of Utah

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Topic: Ecology/Biology – Friday at 11:10 AM

Title: Ecological Perspective on New Connectivity between Nitrogen and Carbon Cycle

Abstract:

Recent but very limited research shows that the nitrogen cycle depicted by ecologists and engineers is not complete and some novel nitrogen transformation pathways are missing; of this foremost example is denitrification of nitrate (NO_3^-) and nitrite (NO_2^-) directly using methane (CH_4) as the carbon source in anaerobic environment. Denitrification coupled with CH_4 oxidation has a broader environmental implication, as it provides a novel connectivity between nitrogen and carbon cycles. Denitrification by anaerobic oxidation of CH_4 (DAMO) to CO_2 provides another pathway for depletion of nutrient such as NO_3^- , NO_2^- and CH_4 in the environment, especially in sediments of riverine and wetland ecosystems. In anaerobic environment, DAMO prokaryotes (Methanotrophs) oxidize CH_4 using CH_4 mono-oxygenase enzyme encoded by particulate CH_4 mono-oxygenase (pmoA). Although these methanotrophs are ubiquitous in nature, but little is known about their function and diversity. In the present study, we are focusing on studying the diversity of DAMO methanotrophs correlated with rate of CH_4 oxidation by DAMO prokaryotes and geochemical data from sediments of riverine ecosystem. Results from sediments indicated presence of DAMO prokaryote Candidatus Methyloiridis sp. of NC10 phylum at different depths of sediment cores (0-5, 5-10cm; 10-20cm). Serum bottle tests performed for NO_2^- and NO_3^- dependent CH_4 oxidation rates, were found to be in a range from 0.0123 mg/L/day to 0.0125 mg/L/day, and 0.0021 mg/L/day to 0.006 mg/L/day of CH_4 , respectively. Further, our lab scale enrichment of 3 months DAMO prokaryotic community showed NO_3^- , NO_2^- and CH_4 consumption rates to be 0.525mg/L/day, 0.29mg/L/day and 4.33mg/L/day, respectively. Community profiling based on 16S and pmoA amplicons sequencing is being carried to understand the diversity of these methanotrophs in natural system. This research provides an insight into the interlinking the Nitrogen and Carbon biogeochemical cycles at ecosystem levels.

Authors: Megan Brown*, Samuel Sewell, Dr. Yanli Zhang

Stephen F Austin State University

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Topic: Poster – Thursday at 5:30 PM

Title: Using GIS to Perform DRASTIC Evaluations for Groundwater Vulnerability to Contamination

Abstract:

Vulnerability maps produced using DRASTIC methods in GIS can help in prioritizing and acquiring funding for remediation of riparian areas to help mitigate or prevent contamination of groundwater. Groundwater monitoring is a major player in prioritizing restoration efforts as a means to prevent

contamination. The quality of groundwater is important because it is the primary source of drinking water for over half of the nation. Also, it is an important contributor to irrigation, streams and rivers, and wetland habitats affecting many species of plants and animals. Groundwater may be a reliable resource in many places today, but to keep the groundwater supply sustainable, risk assessments need to be conducted to keep groundwater a renewable resource. Groundwater contamination can be minimized by delineating and monitoring vulnerable areas such as urban riparian zones. Determining how to delineate areas susceptible to contamination is difficult due to the many variables that may or may not affect groundwater contamination in variable or modified areas. Hydrogeologic factors are used to determine groundwater susceptibility. The Environmental Protection Agency (EPA) introduced the widely used DRASTIC model. The DRASTIC model accounts for the most significant hydrogeologic factors that contribute to groundwater contamination and applies a series of ratings and weights based on the overall importance to water infiltration. The D stands for Depth to water, R stands for Net Recharge, A stands for Aquifer media, S stand for Soil media, T stands for topography, I stands for Impact of the Vadose zone, and C stands for Hydraulic Conductivity. The DRASTIC model supplies a standard method to assess the risk of groundwater contamination. The integration of DRASTIC and GIS can visually represent the spatial aspects of groundwater data as well as critical riparian areas to facilitate decision making to protect groundwater.

Author: Morgan Byars*
City of Austin

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Topic: Restoration and Best Management Practices – Thursday at 2:10 PM

Title: Sustainable Stream Management in the City of Austin

Abstract:

The practice of stream restoration requires disciplines of planning, engineering, science, landscape design, real estate, construction and land management. The term restoration implies corrective action to a prior disturbance, but the semantics used to describe stream restoration practices can influence the vision of success. The City of Austin Stream Restoration Program has adopted the term “Sustainable Stream Management” to help guide its actions for the protection and restoration of streams in a municipal context. A clear definition of success can be achieved when core values of community, environmental protection, public safety, cost-effectiveness, economic impact and maintenance are held throughout the development of a stream restoration project.

Sustainable stream management infers value placed on waterway protection to prevent future degradation and equally restoration of previously impacted areas to become higher functioning landscapes. The City of Austin has placed an emphasis on waterway protection since the 1980’s as exemplified through the Comprehensive Watershed Ordinance which includes impervious cover limits, stream buffers and storm water management controls. However prior decades of hydrologic disturbance, stream encroachment, channelization and adverse maintenance practices have resulted in degraded stream systems and damages associated with stream erosion. The City of Austin Stream Restoration Program has been implementing innovative stream stabilization and bioengineering projects since the 1990’s. Over this time there has been an evolution from single objective erosion control projects to multi-mission stream restoration planning that includes goals for water quality protection,

habitat enhancement, flood hazard mitigation, public recreation, mobility, community desires and reduced long-term maintenance. Stream restoration under the auspices of sustainable stream management includes active, passive, direct, indirect and adaptive management strategies weighing the community factors of environment, economy and quality of life. This presentation provides an overview of how these principles are manifested in the city of Austin through its programs and regulations.

Author: Susan Chadwick*

Save Buffalo Bayou

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Topic: Riparian Area Management – Thursday at 1:30 PM

Title: Is the traditional vision of local and urban flood control agencies in conflict with federal and state agencies charged with protection of riparian zones?

Abstract:

Most state and federal resource agencies have focused on protection and restoration of riparian zones in rural areas. But as this workshop recognizes, there are significant issues involving riparian buffer on urban streams. The long-standing mission of urban flood control managers has been to move as much floodwater downstream as fast as possible. For that reason, urban flood control managers prefer the removal of the riparian vegetation from urban riverbanks: plants, trees, roots, habitat, and the things that cleanse our water and protect property from erosion, also slow storm waters. Most urban rivers in Texas have probably already been stripped of their riparian vegetation. But there are a few, such as parts of Buffalo Bayou in Houston and of the Trinity River in Dallas that are still protected by their riparian forest. And there is a growing movement to remove the concrete channels of years past and replant riverbanks with trees and plants. Is removing or restricting riparian vegetation on urban streams a wise policy and is it effective? How do urban flood control managers reconcile their mission with that of other agencies who advocate the protection, preservation, and restoration of riparian buffers? And how much riparian buffer and how close to the water are urban flood control managers willing to tolerate?

Authors: Andrew Clamann*, F.A. Richter

City of Austin

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Topic: Case Studies – Thursday at 4:15 PM

Title: Application of Coir Logs and Emergent Vegetation for Urban Lake Shoreline Stabilization: Results of a Five Year Pilot Study and Discussion of a Large Scale Implementation

Abstract:

Shorelines of urban lakes are increasingly subjected to the erosive pressures of residential development and intense recreation. Methods for the stabilization of lake shorelines traditionally involve hard

armoring (i.e. rip-rap revetments and bulkheads) which is known to degrade the physical and biological integrity of the shoreline. In an effort to address the need for an inexpensive and progressive method for shoreline stabilization that restores both stability and riparian function, in 2009 the City of Austin Watershed Protection Department initiated a pilot study using the installation of coir (coconut husk fiber) logs and native emergent vegetation on 80ft of shoreline. Results of the monitoring period (Sep 2009 – May 2014) indicate that under certain circumstances, the method can successfully stabilize and vegetate eroding sections of the Lake Austin shoreline despite intense wave action. Observations included increased stabilization of the shoreline, slow decomposition of coir material, and proliferation of American water willow (*Justicia americana*). Building on the lessons learned from the pilot study, the City of Austin has implemented a similar approach on an additional 0.4 mile of shoreline. This new and larger endeavor includes applications in different environments, a variety of coir arrangements, increased resolution of monitoring and several new species of emergent plants.

Author: John Clement*

City of Austin Watershed Protection Department

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Topic: Riparian Area Management – Friday at 1:30 PM

Title: Implementing the City of Austin Invasive Species Management Plan

Abstract:

The City of Austin has developed an Invasive Species Management Plan to guide efforts to minimize the harmful environmental and economic impacts of invasive plant species on city-managed properties. The plan presents strategic five-year goals based on a central framework of prevention, early detection-rapid response and long-term control at prioritized sites. The plan also includes recommendations for staffing, funding sources, centralized mapping and monitoring, and education and outreach. The City of Austin Watershed Protection Department has been implementing the plan through 1) sampling to evaluate the distribution and impacts of invasives on City lands, 2) volunteer outreach and training and 3) the development of low-impact restoration methods with minimal inputs. The focus of these efforts is on the restoration and sustainable management of riparian areas, rather than simply removal of invasives. Sampling has identified the most abundant invasives species on City lands and the most impacted parcels. Further analysis of this data will be used to guide future management efforts. Through our volunteer program, staff members provide technical expertise and restoration materials to groups working on invasives management projects in City parks, greenbelts and preserves.

Author: Adam Comer*

Austin Youth River Watch

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Topic: Education & Outreach – Friday at 2:10 PM

Title: More than a conveyance: Altering perceptions of the urban riparian patchwork through service learning

Abstract:

Building on 22 years of teaching Austin-area high school students how to test water quality in urban streams, Austin Youth River Watch has supplemented its water-quality testing program with weeklong, stream-improvement service learning projects. Our program design provides staff and students, the “River Watchers”, with an opportunity to cultivate long-term relationships – most of our students are in the program for multiple years while in high school. The combination of long-term relationship building and engaging the younger generation in protecting riparian areas has led to three conclusions: 1. Urban riparian areas are not usually perceived as places to protect 2. Urban riparian areas are not usually perceived as places for enrichment 3. Urban riparian areas are burgeoning places to engage community. In this session, we’ll discuss the conditions that have led to an indifference of urban riparian areas among urban teens; strategies to engage adolescents and the community; and we’ll share information about Austin Youth River Watch’s Service Learning Program model.

Author: C.J. Conrad, **A.C. Conrad***, J.R. Conrad

Save Buffalo Bayou

Contact Email: acconrad@comcast.net

Topic: Restoration and Best Management Practices – Thursday at 3:35 PM

Title: Urban Stream Riparian Mapping using Small General Purpose Unmanned Aerial Platforms

Abstract:

We describe urban riparian stream photo mapping using small general purpose, off-the-shelf unmanned aerial vehicles. Our approach combines: (a) low altitude drone photo mapping, (b) cloud based photo mapping stitching services³, (c) conventional historical mapping, and (d) GIS (Geographic Information Systems) techniques⁴. We will present results of photo campaigns carried out on the urban river Buffalo Bayou Memorial Park reach (1.25 mile) in Houston, Texas and on a trout stream near Mt. Horeb, Wisconsin. We will also address the future feasibility of flying lightweight light detection and ranging (LiDAR) scanners on UAVs. The impact and prospects of current and evolving FAA regulations relating to UAV technology will be discussed.

Author: Stephen Davis*

City of Austin Watershed Protection Department

Contact Email: Stephen.davis@austintexas.gov

Topic: Restoration and Best Management Practices – Friday at 8:50 AM

Title: Isolating pathogenic bacteria sources in urban streams: A case study

Abstract:

Urban riparian areas pose an interesting challenge regarding maintaining water quality for contact recreation. Particularly in controlling inputs of pathogenic bacteria. During summer 2014, The City of Austin Watershed Protection Department initiated a multi-phase bacteria source study in seven watersheds (i.e. Little Walnut, Fort Branch, Buttermilk, Waller, Boggy, East Bouldin, and Blunn). Stream reaches that historically exhibited chronic and acute elevated bacteria concentrations were sampled for E. coli at multiple locations in an attempt to geographically isolate bacteria hotspots. Study observations and sample data revealed a variety of different E. coli hotspot scenarios among the seven creeks. The most prevalent contamination scenarios were observed in riparian areas adjacent to creeks: leaking wastewater infrastructure, direct human defecation from transient populations, and unpredictable inputs from stormwater drainage networks. Healthy riparian zones are excellent tools for improving stream water quality, but traditional restoration methods would not necessarily benefit the sources identified in this study. Approaches to address some of these bacteria source issues are still in development and include education and outreach campaigns to homeless populations, installation of public restrooms in hotspot areas, and outreach campaigns to incentivize private wastewater audits for streamside homeowners. As ecology and sociology continue to intertwine, creative and communal methods should be considered in riparian restoration efforts.

Author: Stephen Davis*

City of Austin Watershed Protection Department

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Topic: Poster – Thursday at 5:30 PM

Title: Developing a Stream Stability Index: Evaluation from the ground up

Abstract:

Stream morphology responds to watershed stressors of varying types, duration, and magnitude, which may result in degraded surface water quality, damaged structures, loss of amenity values, and diminished habitat. Both short term and long term monitoring of stream channel characteristics are necessary for proper management and can be achieved through the development and implementation of a Stream Stability Index. The City of Austin Watershed Protection Department has launched a project to assess which geomorphic, hydrologic and riparian parameters are effective indicators of stream stability for the Austin area, and are using the results to develop an index for comprehensively evaluating the structural integrity of stream channels. A total of fifteen parameters were collected for both stable and unstable reference sites in the Edwards Plateau and Blackland Prairie regions. A Bayesian statistical approach will be used to select a suite of the most effective metrics that will be

compiled into the Stream Stability Index, which will be used to identify and prioritize watershed-scale restoration efforts as well as help contextualize the results of our biological monitoring program.

Authors: Nikki Dictson* (Texas Water Resources Institute), K. Wagner, S. Nelle, H. Simpson, M. Parker, R. McGillicuddy, C. Entwistle, T.A. Berthold

Contact Email: n-dictson@tamu.edu

Topic: Education & Outreach – Friday at 8:30 AM

Title: Texas Riparian and Stream Ecosystem Educational Program: Education and adoption of Conservation Practices

Abstract:

The Texas Riparian and Stream Ecosystem Program is conducting riparian trainings in priority watersheds throughout the state. This new program is also utilizing evaluations at trainings to measure knowledge gained, program satisfaction, and intentions to adopt management practices through a pre and post-course evaluation. Riparian trainings in impaired watersheds focus on the nature and function of riparian zones (fluvial geomorphology, hydrology, vegetation), the benefits and ecological services provided of healthy riparian zones, best management practices (BMPs) for enhancing and protecting riparian zones, and technical and financial resources available for implementing riparian BMPs and protection measures. These one-day watershed trainings include indoor classroom style presentations, outdoor field sites and a creek walk. The goal is for participants to better understand and relate to riparian and watershed processes, the benefits that healthy riparian areas provide, and the tools that can be employed to prevent and/or resolve degradation and improve water quality. A major goal of the program is to foster implementation of riparian BMPs and protection activities. A summary of the program, techniques, and training course evaluations conducted to date will be discussed.

Authors: Angela E. England*, Ana Gonzalez

City of Austin – Watershed Protection Department

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Topic: Poster – Thursday at 5:30 PM

Title: A Biodiversity Restoration Tool: Girdling to Create Canopy Gaps in Privet-Dominated Riparian Forests

Abstract:

Biologists at the City of Austin's Watershed Protection Department are attempting to enhance native biodiversity of riparian areas by developing techniques to manage exotic species with minimal negative impacts. Exotic tree species such as glossy privet (*Ligustrum lucidum*) are widespread in Austin's urban riparian areas, often inhibiting or excluding native vegetation. Traditional eradication methods have

focused on herbicides or mechanical removal, but these are less than ideal in riparian areas because of the risk of surface water and groundwater contamination, degradation of stream bank stability, and soil compaction. We are testing the hypothesis that gap creation via girdling privets and clearing nearby young non-native woody species is a method that benefits young native trees and shrubs.

Author: Ana Gonzalez*

Contact Email: ana.gonzalez@austintexas.gov

Topic: Restoration and Best Management Practices – Friday at 9:10 AM

Title: Assessing Improvement in Riparian Function in Urban Creeks

Abstract:

To address the deleterious consequences of urbanization on creeks in the City of Austin, one of the efforts implemented is the reestablishment of riparian forests along urban creeks. The main goal is to restore the ecological function and services that riparian forests provide to streams, including, among others, enhanced water quality and reduced erosion. In an effort to assess the functional recovery of degraded creek edges undergoing riparian restoration, we established a Riparian Functional Assessment that measures eleven functional parameters and how each of these parameters compare against riparian areas with a longer history of relatively undisturbed vegetation but still influenced by urbanization. In addition, a single value incorporating several of these eleven parameters was developed to score the overall functional improvement of these sites. Our results suggest that six of the eleven proposed parameters: soil compaction, vegetation structure, woody demographic diversity, woody species richness, number of tree snags, and number of large woody debris pieces, are strong indicators separating degraded and reference sites. These functional parameters can be used to monitor the trajectory of degraded sites undergoing restoration towards a condition comparable to relatively undisturbed riparian buffers as well as adjust management practices to address specific functional components of the riparian forest.

Authors: Peter M. Groffman*

Cary Institute of Ecosystem Studies

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Topic: Keynote Speaker – Friday at 10:45 AM

Title: The bio-geo-socio-chemistry of urban riparian zones

Abstract:

Riparian areas are “hotspots” of plant-soil-water-microbial-human interactions in watersheds. Urban land use change has been shown to have dramatic effects on these interactions altering “connections” between streams, riparian zones, upland ecosystems and people. Efforts to restore urban riparian zone need to focus on reestablishing these connections. Geomorphic stream restoration designed to reverse structural degradation can restore biogeochemical functions but also considering the “human element” create positive feedbacks between ecological restoration and human preferences that can be key for

achieving specific biological, chemical and social goals in urban and suburban watersheds. In this talk I will highlight results from research on the bio-geo-socio chemistry of urban riparian zones in the National Science Foundation funded Baltimore urban Long Term Ecological Research Project and discuss relevance and applications of this work in more arid regions.

Authors: George Guillen*, Jenny Oakley, and Stephen Curtis

Environmental Institute of Houston

Contact Email: Guillen@uhcl.edu

Topic: Ecology/Biology – Thursday at 3:35 PM

Title: The Influence of Urban Stream Syndrome on Freshwater Fish Stream Communities: Implications for Restoration

Abstract:

The term “Urban Stream Syndrome” has been used to characterize streams exhibiting the symptoms of urbanization. Within Texas streams in urban areas have been subjected to various stressors including altered hydrology, channel modification, reduction in instream habitat, loss of riparian cover, and impaired water quality. Many of these alterations have resulted in creating conditions that facilitate the invasion of exotic species. Data from various stream surveys conducted over the last 30 years within the Harris and surrounding counties in southeast Texas are used to describe temporal and spatial trends in stream fish communities associated with increasing urbanization and associated factors. We have observed an overall increase in the number and density of exotic fish species in streams experiencing urbanization. Sources of exotic fish include aquarium releases, intentional stocking, and escapes from aquaculture facilities. During this period of time the concurrent conversion of normal varying seasonal stream flows into constant elevated effluent dominated base flows, elevated storm flows, and reduced instream habitat have favored the establishment and of exotic species including tilapia and suckermouth catfish. These species share many life history attributes including high fecundity, omnivorous food habits, and tolerance of impaired water quality. These life history traits allow these introduced species to more efficiently exploit these altered stressed environments and out-compete more sensitive native fish species. Attempts to restore fish communities in these urban streams will require a comprehensive watershed approach that includes reestablishment of traits associated with natural stream morphology and instream habitat, reduction in pollutant loads, and reestablishment of riparian vegetation. These actions will require both watershed and site specific actions to be successful. Currently comprehensive integrated policies, tools and institutions are lacking that integrate the various scales of activities necessary to accomplish stream restoration that includes reestablishment of native fish communities as a goal.

Authors: John Clement, **Acayla Haile***, Chris Meyer

City of Austin Watershed Protection Department

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Topic: Poster – Thursday at 5:30 PM

Title: *Arundo donax* Control Program

Abstract:

The City of Austin Watershed Protection Department is developing an *Arundo donax* control program for City waterways. There are a number of infestation sites spreading along local streams that pose a problem by hindering stormwater conveyance, blocking inlets and pipe entrances, crowding out native species and blocking access to waterways. These populations can spread into disturbed areas very quickly, especially following flood events. We will be partnering with City of Austin Public Works and Parks and Recreation Departments to make a concerted, long term effort to manage these populations. Sites of *Arundo* infestation are currently being mapped using observations from the Texas Invasives database, staff field reports, 311 complaint data and orthophoto inspection. We are prioritizing our efforts by identifying the most significant infestations and simultaneously treating these areas and all upstream patches to prevent re-colonization. We intend to treat larger infestations at full height with an imazamox foliar spray mixture in September for maximum effectiveness while minimizing impacts to woody vegetation. When possible, an imazamox/glyphosate mixture will be used. We plan on two years of foliar spray treatment, followed by spot treatments in following years with reseeding for soil stabilization as needed. A variety of different control methods will be evaluated for smaller patches. Property owners with *Arundo* patches adjacent to City easements will be encouraged to use small-scale methods that have been identified as useful. We will also be evaluating the use of rhizome barriers to prevent re-colonization across easement boundaries. A program of periodic inspection and spot treatment will be developed to prevent re-infestation.

Author: Tom Hegemier*

RPS Consulting

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Topic: Restoration and Best Management Practices – Friday at 10:50 AM

Title: Flood Control Dam Impact on Endangered Species Habitat in the San Marcos River

Abstract:

San Marcos, Texas, located between San Antonio and Austin, is identified as one of the fastest growing cities in the U.S. The San Marcos River, supplied by springs discharging from the Edwards Aquifer, flows through the city center and is home to endangered species, critical habitat, and a thriving recreation industry. In 2013, the USFWS issued an incidental take permit to the City and Texas State University based on the Habitat Conservation Plan (HCP) that will guide restoration and protection measures to protect the urban river species. The HCP noted that sediment deposition within the river and Spring

Lake causes direct species mortality by smothering habitat and vegetation. The HCP found that accelerated sedimentation affecting endangered species is due to a combination of upstream flood control dams built in the 1980s and sediment discharged from construction activities. As a result, the City and Texas State University spend about \$500,000 per year to remove sediment through a hydro-suction process to minimize loss/harm to biota. A study conducted by Texas State in 2002 noted that runoff from the nearly 50 square mile drainage area to the San Marcos River is now greatly limited by the NRCS dams that contain about 11,000 acre-feet of storage. It was reported that the dams reduced the mean annual flood from 18,000 cubic feet per second to 1,500 cubic feet per second, which is less than the threshold value to scour accumulated sediment from the river channel. This presentation will summarize current activities and evaluate potential NCRS dam modifications to achieve natural condition river scouring flows while maintaining existing flood protection. Potential solutions will be evaluated with the NCRS, the City, and Hays County to consider inclusion into a 20-year capital improvement program, with immediate benefits being the reduction in annual river maintenance costs and habitat enhancement.

Authors: Kirstin Hein* (*Texas A&M/ Texas Water Resources Institute*), Lucas Gregory, Jacqueline Aitkenhead-Peterson, Kevin Wagner, Matthew Brown, Cara Harclerode

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Topic: Poster- Thursday at 5:30 PM

Title: Analysis of Surface Water Quality for Carters and Burton Creek – Year One

Abstract:

Carters and Burton Creeks are small streams in the Brazos River watershed located in southeastern Texas that are currently considered impaired due to elevated levels of *Escherichia coli* (*E.coli*). The watershed encompasses portions of Bryan and College Station which are experiencing a continued increase of urban land use within the watershed. This research aims to characterize the fate and transport of several pollutants within the watershed through a two year water quality monitoring program. Data presented represent the first year of monitoring and initial analysis and focus on *E.coli*. Water samples and field parameters were collected from 14 sampling locations using volunteers and trained professionals. A time series of rain events and concentrations of rainfall within three days before sampling was considered to determine if *E. coli* originated from overland runoff or originated in the stream. Rainfall was shown to have a significant impact on the amount of nutrients and *E.coli* present for three out of the four routine sites. A nested watershed approach was used to determine the effects different land-use percentages had on nutrient loading and transport within the watershed in comparison to a similar study conducted in 2007 for the same area (Harclerode 2013). This information will be used to help the municipalities improve water quality within the watershed and remove Carters and Burton from impaired status.

Authors: Megan Helton*, Erick Hetzel

Texas Conservation Corps at American YouthWorks

Contact Email: mhelton@americanyouthworks.org

Topic: Education & Outreach – Friday at 1:50 PM

Title: Youth Engagement in Ecological Restoration

Abstract:

Texas Conservation Corps (TxCC) is an award winning AmeriCorps program that annually engages over 100 members in critical, hands-on conservation projects. Participants include both local Austin youth as well as high school and college graduates selected from around the country. Projects take place locally and regionally, utilizing partnerships with public land managers such as the National Parks Service, Texas Parks and Wildlife, and the City of Austin. Through this presentation, we will examine best management practices that use experiential learning as a tool to not only impact individuals, but ecological systems too. Through 18 years of experience, TxCC excels at results driven project management while simultaneously providing a ‘pre-professional’ program that provides a pipeline for youth and young adults looking for a meaningful career path and a way to better their world. We will discuss 3 implemented riparian restoration projects and their impact on communities, individuals, and as environmental education tools.

Authors: Megan Helton*, Erick Hetzel

Texas Conservation Corps at American YouthWorks

Contact Email: mhelton@americanyouthworks.org

Topic: Poster – Thursday at 5:30 PM

Title: Youth Engagement in Ecological Restoration

Abstract:

The Texas Conservation Corps (TxCC) empowers the lives of youth and young adults through conservation education, service, and jobs training. Hands – on, skills based projects put program participants in front of the regional environmental problems and ask them to be the solution. While successfully educating, training and producing the next generation of leaders in the conservation world, TxCC is known as a powerful resource in the conservation of the natural landscape of Texas, Oklahoma, New Mexico, Arkansas and Louisiana. Throughout their terms of service, TxCC members will build trails, fell hazard trees, tackle exotic plant management, restore habitat for wildlife, and be exposed to heavy equipment operation and minor construction.

Authors: Tina Hendon*, Dean Minchillo

Tarrant Regional Water District

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Topic: Education & Outreach – Friday at 8:50 AM

Title: Connecting the dots- Increasing knowledge by preserving history, conserving resources, and enhancing recreation

Abstract:

The Airfield Falls Conservation Park is a joint project of the Tarrant Regional Water District and the city of Westworth Village, and is one of the newest additions to the 40-mile Trinity Trail System in Fort Worth, Texas. The Airfield Falls trailhead was originally conceived to provide safe access for the public to a unique natural system and easy connection to the Trinity Trail. The concept of an educational park for demonstrating water conservation, native landscaping, conservation irrigation, low impact design, and preservation of local history soon followed. The park is situated in the riparian zone of the 10 square mile watershed of Farmers Branch. Urbanization and previous government-sponsored flood-control projects have left little riparian or natural areas intact. Conservation of this important ecological area capitalizes on the attraction of visitors to a recognized recreational destination to provide a unique educational experience.

Author: Olive Hershey*

Save Buffalo Bayou

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Topic: Poster – Thursday at 5:30 PM

Title: The Struggle for Control over the Urban Commons Case Study: Buffalo Bayou and The Memorial Park Demonstration Project

Abstract:

I will describe the intense ongoing contest for control of a rare riparian forest taking place in Houston, as governmental entities, private "environmental" groups, and private developers fight over this uniquely valuable forest in the nation's fourth largest city. My approach will define the contested commons as open space belonging to all local citizens and describe how conservationist groups formed with the goal of preserving natural areas and open spaces have been subverted by commercial interests whose principal aim is profit, rather than conservation. This conflict is occurring along Buffalo Bayou, a riparian stream in a public park, Memorial Park, which proponents seek to channelize and re-engineer, calling this Memorial Park Demonstration Project a "restoration" of the natural shape of the stream. Inherent in the proponents' argument is the subversion of the meaning of words like "restore" and "natural" which suggest that they are true conservationists. However, the drawings submitted with the actual

plan show a stream which would be denuded of 80 percent of its riparian forest and whose shape is anything but natural.

Author: Shane Hrobar*

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Topic: Riparian Area Management – Friday at 2:10 PM

Title: Selective Clearing a Method to Encourage Native Forest Canopies along Flood Control Channels in Harris County

Abstract:

This presentation focuses on the methods employed by Harris County Flood Control District (District) to develop and enhance riparian forest canopies with the added benefit of reducing overall maintenance along flood control channels.

Selective clearing focuses on channels that are either heavily forested or overgrown and have not been under consistent, cyclical maintenance for some time. Selective clearing operations address the entire channel and operations take into account habitat sensitivity, species diversity and spatial relationships within the stream flow area. Selective clearing requires a very subjective approach using a variety of criteria such as those listed below:

- Promoting or establishing a closed canopy to reduce maintenance,
- Slope stability to encourage proper development of successional stages of the forest,
- Removal of large woody debris to ensure proper channel drainage,
- Removal of invasive vegetation to promote native vegetation,
- Creating permanent access for inspection and future maintenance.

A balance has to be struck between man and nature. The goal of selective clearing is to ensure peak conveyance of the natural channel while trying to preserve as much of the native vegetation as possible. Managing these complex criteria often requires the judgment of the District's Forester. A prime example of this is distinguishing the difference between a good tree in a bad location and a bad tree in a good location.

This presentation intends to impart the District's experiences over the course of several years and open discussion to future maintenance possibilities and protocols. It is our hope that our future contracts and other agencies might benefit from this discussion.

Authors: Dr. Fouad Jaber*, Sa'd Shannak

Texas A&M AgriLife Extension

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Topic: Restoration and Best Management Practices – Thursday at 1:30 PM

Title: Modeling Low Impact Development Effects on Stream Health

Abstract:

Urban growth contributes to increased stormwater runoff due to the increased impervious surfaces. The increased stormwater runoff has negative hydrological impacts on streams. Stormwater runoff contributes to impairment of stream water quality and results in problems such as loss of habitat, sedimentation, increased temperature, and loss of fish population. Traditionally stormwater control measures such as detention pond were designed and constructed to reduce and control peak flows. Controlling nonpoint source pollutants was not addressed by these measures. Therefore, Low Impact Development (LID) practices were developed to negate the negative impacts of urbanization on water resources by reducing the runoff volume and peak flows as well as improving outflow water quality. This study evaluates the effectiveness of LID practices in reducing stream bank erosion, flooding, and enhancing aquatic life environment. A sub-hourly time step of the Soil and Water Assessment Tool (SWAT) model was calibrated and validated to predict stream flows for the Blunn Creek Watershed (Austin, TX) for the time period 1987-2012. Low Impact Development (LID) practices were incorporated in the SWAT model as an alternative stormwater control measures. The practices evaluated include: bioretention area or rain garden, permeable pavement, detention pond, and a combination of permeable pavement and bioretention area. Results showed that the greatest reduction in runoff volumes, peak flows, and excess shear stress under both real and design storms was when combining both bioretention and permeable pavement. In addition, a combination of permeable pavement and rain garden resulted with the highest percentage of increase in AQP values and baseflows and greatest reduction in peak flows.

Authors: Deborah January-Bevers*, Courtney Hale, Taylor Clark

Houston Wilderness

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Topic: Case Studies – Thursday at 1:50 PM

Title: The Policy Values of Ten Ecoregions within a Large Urban Core (Incorporating ecosystem services into infrastructure and policy decisions in the Greater Houston Region)

Abstract:

Natural landscapes and organisms serve our wellbeing in a great variety of ways: water purification, flood protection, recreation, recharging of aquifers, protection from damage by hurricanes and tropical storms, pollution reduction, carbon sequestration, and more. The Greater Houston region, which

encompasses a huge and diverse assemblage of forests, prairies, bottomlands, wetlands and bays, receives a tremendous amount of benefits from the natural world in the form of ecosystem services. This policy paper explores the ways in which various entities in the Greater Houston Region are working to identify and better understand the services provided by urban riparian ecosystems that traverse the urban cores of this region. In the paper, we discuss the recent urban riparian and other ecosystem successes in enhancing and/or restoring ecosystem services to solve infrastructural issues, often at a lower cost than traditional solutions. With examples provided, we find that the outcome is often even better than the initial cost saving assessments reflect: solving a problem using ecosystem services by preserving or restoring an entire, or even partial, ecosystem can produce a whole host of ecosystem services in addition to the single service needed to accomplish the function of the infrastructure. We look closely at the defining aspect of the City of Houston and the extended Houston Region – its bayou systems. Creeks and bayous play an integral role in flood protection, water quality and wildlife habitat for the region and are prime examples of ways that ecosystem services can effectively benefit everyone and provide more aesthetic and environmental benefits than structural alterations. We then assess the importance of integrating the value and benefits of ecosystem services into mainstream policy decision-making, providing policy makers with more tools to make mutually beneficial decisions regarding the region's most pressing economic and environmental issues, and recommend ways to accomplish these goals.

Authors: Susan Kenzle*, Kirstin Pipkin, Mateo Scoggins

City of Austin Watershed Protection Department

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Topic: Case Studies – Thursday at 1:30 PM

Title: Collaborative Urban Riparian Stream Rehabilitation: The J.J. Seabrook Project

Abstract:

The use of a systems approach to address resource concerns will be discussed. The complexity of the various ecosystems working together will be reviewed and how problems and poor health in only one or two of these ecosystems can throw the whole watershed out of balance. Emphasis will be placed on working to address all resource concerns and why this is critical to the success of a project. Some examples of how USDA-NRCS works with landowners to develop Resource Management System (RMS) conservation plans that address all resources will be given, as well as, lessons our agency has learned working through the process.

Authors: Jewel Lipps*, B.F. Jacobs, S.M. Hart

Southern Methodist University

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Topic: Ecology/Biology – Friday at 10:30 AM

Title: Trekking through the Trees: forest Succession at the Trinity River Audubon Center

Abstract:

The Trinity River Audubon Center in Dallas, TX (TRAC) was established in an effort to restore land that had a long history of intense human disturbance. From the 1960s to 1990s, the site was a large-scale illegal landfill operation in an old gravel mine. More than 15 hectares of urban bottomland hardwood forest along the Trinity River are now protected and publicly accessible since the Center's opening on the remediated land in 2008. This study assessed forest composition, species abundance and importance values, and successional stages to inform conservation strategies and educational goals at TRAC. Six forest stands were delineated based upon existing fragmentation using aerial photography, and were surveyed in spring 2014 by the random plot method. Richness ranged from 5--12 species, but evenness was low and nearly uniform through the six stands. Published bottomland forest succession models were consulted as standards in comparison with species importance values in the study area. Stands exhibit mid--successional, transitioning to late successional, and late successional stages. None of the study areas are yet in transition to old growth bottomland hardwood forest. For all stand data combined, sugarberry (*Celtis laevigata*), ash (*Fraxinus pennsylvanica*), pecan (*Carya illinoensis*), and cedar elm (*Ulmus crassifolia*) had the highest importance values of 54, 48, 41, and 38 respectively. Overall, the urban riparian forest area accessible through TRAC can be characterized as mid--succession transitioning to the subclimax sugarberry-- American elm--green ash association. The Center's conservation strategy should account for expected changes in forest composition and species dominance, particularly along established trails. Results will be developed into a tree ID guide for Center visitors to learn about riparian forest communities.

Author: Tom Ludwig*

City of Austin Watershed Protection Department

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Topic: Restoration and Best Management Practices – Thursday at 3:55 PM

Title: Guerilla Green Infrastructure

Abstract:

Green Storm Water Infrastructure (GSI) occurring within the riparian zone of urban streams traditionally consists of large, highly engineered bioinfiltration systems and sand filters which can require a great deal of construction, space and maintenance in order to remain functional. The riparian zone is typically limited in urban watersheds, and the plans for traditional green storm water infrastructure systems are usually abandoned in favor of space saving, but more expensive and less sustainable grey storm water

infrastructure. The Austin Watershed Protection Department has begun experimenting with cost effective small scale green storm water infrastructure in riparian areas to disconnect urban impervious surfaces from sensitive waterways. Due to their size and simplicity, these functional infrastructures are easy and cheap to install while also providing drainage improvements and landscape enhancements to underutilized areas in city parks and public open space. Though the drainage areas to the controls may be small, the low cost, smaller scale and ease of construction allows for these infrastructures to fit into the complex fabric of urban conditions. This Urban Riparian Symposium presentation will focus on the specific steps taken to initiate the installation of these projects and the process of managing their growth into functional riparian ecosystems, including:

1. Tools for finding and recognizing potential GSI locations
2. Completing a preliminary design based on the hydrography of the site and the different strategies available
3. Conducting percolation tests and modelling GSI efficiency
4. Gauging stakeholder interest and interdepartmental coordination
5. Installation, construction, monitoring and maintenance

The presentation will focus on how these steps played out over the course of several real world projects currently being undertaken by the City of Austin Watershed Protection Department in the anticipation that local governments, commercial enterprises and private citizens will recognize the potential for small scale GSI projects in their own localities and start installing Green Guerilla infrastructure on underutilized landscapes around their communities. Though the individual projects may be small, their combined effect could make a tremendous difference.

Author: Tom Ludwig*

City of Austin Watershed Protection Department

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Topic: Poster Session – Thursday at 5:30 PM

Title: Changing the Channel

Abstract:

Traditionally, stream restoration has occurred only where space, infrastructure and resources allow. Typical restoration techniques cater toward a more naturalized condition with a densely vegetated riparian zone and gentle meanders. These projects are usually high in cost with varying degrees of success. The headwaters of urban streams are usually neglected for restoration, as they are a complex system of storm water conveyance systems designed to move large volumes of water quickly over a limited distance. In Austin, TX urban storm water engineering has typically dealt with excess volume by channelizing, straightening and hardening existing streams, as well as creating concrete or stone sluices as a means of transporting water. These measures are very effective at moving large volumes during rain events, but lack the habitat value and the ecological functions of natural hydrological systems. Due to flooding and structural concerns, many of these conveyance waterways cannot be removed and replaced with restored stream systems. This Urban Riparian Symposium

presentation will explore and catalogue the different types of concretized channels used in Austin, and propose different strategies of augmenting these channels into critical infrastructures that not only accommodate flood and erosion concerns, but also ecological, social, and cultural concerns. By allowing the growth of urban adapted plants in these channels, a new form of novel ecosystem could transform these eyesores into functional riparian habitat and water quality infrastructures. A case study of a particular concretized channel in Austin, TX will highlight the implementation process of the various techniques developed and how post construction retrofits can positively change the public perception of urban storm water conveyance systems.

Author: David Mahler*

Environmental Survey Consulting

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Topic: Riparian Area Management – Friday at 1:50 PM

Title: Riparian and Wetland Species Selection for Plantings in Central Texas

Abstract:

Define the characteristics of the site and the specific goals of the project that might influence plant selection. For example, some plantings might be unsuccessful because of the presence of deer or other herbivores. Also, there might be a prohibition of woody species in certain areas because of engineering criteria. Or there might be an aesthetic desire to encourage woody species in some areas. The strategy for managing existing or potential future invasive species must be part of this characterization. 2 2- Identify the edaphic characteristics of the detailed niches to be planted. This is most accurately done after construction is completed and water has reentered the system. Predictions of the moisture levels in the various niches during the extremes of wet or dry weather will need to be made, since these less frequent intervals will have the most influence on the long term success of the plantings. Plantings designed based on engineering drawings rather than actual post-construction field conditions are typically inadequate. 3- Select appropriate plants from an existing list of native species which meet the above guidelines. We will present a species list of Texas native species which ESC has developed over the past 25 years to guide our plant selection process.

Author: Mike Marshall*

Texas A&M Institute of Renewable Natural Resources

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Topic: Case Studies – Thursday at 2:10 PM

Title: Groundwater Conservation in Texas: Public Benefits of Rural Working Lands

Abstract:

Satisfying the demand for water in Texas is the predominant natural resource issue of the state, and increasingly scarce groundwater resources are often used to help solve water allocation problems. Working lands are privately owned farms, ranches, and forests that produce food and fiber, support rural economies, and provide wildlife habitat, clean air and water, and recreational opportunities. Because 83% of the land in Texas is privately owned working lands, we should consider the public benefit these lands provide. However, Texas working lands are undergoing a fundamental

change that has implications for conservation of water and other natural resources. Although Texas leads the nation in land area devoted to privately owned working lands, it also continues to lead the nation in the loss of those working lands (i.e. loss of 1.1 million acres from 1997-2012) mainly driven by drastically increasing market values of these lands (i.e. 214% increase in per acre market value in Texas). Further exacerbating this situation is the growing urban-rural disconnect where 95% of all land is privately owned but 90% of Texans live in cities, resulting in policies that come from an almost singular urban perspective. We need to explore a public-private framework for education and outreach on groundwater sustainability to apply in Texas, the focus of which should be to address the urban-rural disconnect by highlighting the public benefit (e.g. recharge capacity) that working lands provide. Potential audiences to target include policy makers, teachers, youth, and urban communities. Such a campaign not only promotes urban water conservation, but also has the potential to open up funding streams to support land conservation as seen in parts of the Edward's Aquifer near San Antonio.

Authors: Kathryn Nichols*, Justin Bates, Marta Newkirk
National Park Service

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Topic: Poster – Thursday at 5:30 PM

Title: Engaging Diverse Voices in Multiple-objective Stream Projects

Abstract:

The Rivers, Trails, and Conservation Assistance (RTCA) Program is the community assistance arm of the National Park Service. RTCA staff provides technical assistance to community groups and local, state, and federal government agencies working to protect natural areas and water resources and enhance close-to-home outdoor recreation opportunities. RTCA helps communities plan, organize partnerships, and achieve on-the-ground success on projects they initiate. When a community asks for assistance with a project, RTCA staff provides free, on-location facilitation and technical expertise to help guide the project from conception to completion.

RTCA's strength is its community-based planning approach – community engagement strategies, partnership building, and participatory project implementation. Urban projects tend to have a large number of diverse opinions, some of which may be in conflict. In urban areas, it is especially difficult to manage river and stream corridors without accommodating public access. RTCA does find that projects that combine conservation and outdoor recreation goals and provide appropriate outdoor experiences can create appreciation for the resource and foster stewardship activities. By providing broad opportunities for public involvement, projects are more likely to have community support and result in on-the-ground implementation success.

When RTCA assists a project, a typical role is structuring the community involvement process. Stakeholder analyses help identify the folks with diverse interests and the parties that might be affected by a project. Stakeholder steering committees are often set up for both decision-making and creating action agendas. Community opinion surveys are a frequently used tool to gauge support and opposition for projects and to determine priorities for improvements.

Lessons learned on sample projects with riparian components will discuss stakeholder strategies, issues, what worked, and what didn't work. Sample projects include:

- San Marcos River Corridor Plan

- Austin Water Quality Protection Lands
- Bryan's Turkey Creek Recreation and Conservation Corridor
- Llano River Biodiversity Trails.

Authors: Darcy Nuffer*, Mateo Scoggins, Ana Gonzalez

City of Austin Watershed Protection Department

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Topic: Ecology/Biology – Friday at 2:10 PM

Title: Urban Riparian Soils: A Case Study of the Shoal Creek Restoration

Abstract:

Large erosion control projects within Austin's urban creeks typically include a landscape restoration component. However, compaction created by heavy machinery and lack of contractor knowledge about soil structure, chemistry and biology often hinder true restoration efforts. The reach of Shoal Creek in Pease Park from 15th Street to 28th Street runs through a heavily-used urban park that has suffered soil compaction from years of recreational activities within the riparian zone. The restoration project currently under construction includes bank armoring, slope and riparian zone planting, seeding and soil restoration. Several innovative techniques have been introduced to insure proper soil conditioning during construction. Chemical, biological and structural soil testing undertaken throughout the project will gauge the level of soil health from the design phase through the three year landscape maintenance term. In addition, the City of Austin riparian monitoring tool (the Riparian Functional Assessment) provides soil chemistry and physical properties at reference and degraded locations throughout Austin that will facilitate comparison to functional goals and rates of recovery/trajectories. This combination of locally relevant soil metrics with pre- and post-construction data provides an excellent measure of restoration success and the skeleton of a truly adaptive management approach for ensuing reach-scale projects.

Authors: Colleen Peters*, S.P. Bratton

Baylor University

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Topic: Poster Session – Thursday at 5:30 PM

Title: Occurrence of Microplastic Particles in the Stomach Contents of Sunfish from the Brazos River Basin, Central Texas

Abstract:

Plastic micro-particles, from 50 mm to 5 mm, can be found in marine, freshwater, and deep ocean environments. While substantial marine literature has quantified the ingestion of macroplastics by marine vertebrates, relatively few studies have focused on freshwater organisms or microplastics and artificial polymers, such as polyester and nylon threads. We collected 436 sunfish (*Centrarchidae*) – 318 bluegill (*Lepomis macrochirus*) and 118 longear (*Lepomis megalotis*) – from the Brazos River Basin, between Lake Whitney and Marlin, Texas. Of the 196 fish (45%) that had ingested plastic, the average

number of items per fish was 1.80 (1.81 L. *macrochirus*, 1.75 L. *megalotis*). The majority of artificial items (96%) were threads rather than spheres or blocks. The mean number of particles per fish differed significantly by sample location: urban (1.03), upstream (.35), and downstream (.70) based on their geographic position relative to the city of Waco (Kruskal-Wallis, $p=.00$). The location with the lowest rate of contamination was Koehne Park (19%), located on Lake Waco, and the areas with the highest rates of contamination were Pecan Bottoms (75%) and a gravel pit (67%), both of which are located on Lake Brazos. As the sites with the greatest levels of ingestion are located upstream of the Waco sewage effluent, the results suggest that illegal trash disposal, urban run-off, or aerial transport are contributing to the total availability of microplastics within aquatic environments. The levels of ingestion do not unilaterally increase with stream order, implying sedimentation or other forms of removal are influencing the distribution of microplastics in riparian systems. Easily available for collection, sunfish, as suction feeders, serve as effective indicator species for microplastic contamination.

Author: Fred Phillips*

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Topic: Case Studies – Thursday at 3:35 PM

Title: The Yuma East Wetlands, Restoring Severely degraded Riparian Habitat on the Lower Colorado River, in downtown Yuma

Abstract:

The Yuma East Wetlands is adjacent downtown Yuma Arizona within the Yuma Crossing National Heritage Area. This project partnership which includes the Quechan Indian Nation, City of Yuma, multiple federal agencies and local farmers is restoring critical wildlife habitat on the Colorado River. Before the vision was born the land was comprised of a wasteland of illegal activities, widespread dumping and exotic plants species including Tamarisk spp. (Salt Cedar) which has infested more than 90% of the Colorado River Watershed. During the initial two years of the project the project stakeholders reached consensus on the overall restoration plan, required all necessary permits and amassed considerable start up funds for implementation. Currently over 400 acres of restoration is completed including restoring historic river channels and wetland, riparian and upland revegetation. The project is restoring habitat for over 330 species of wildlife including the endangered Yuma Clapper Rail and Southwestern Willow Flycatcher. Various methods of restoration are being used including a variety of exotic plant removal, irrigation, seeding, planting and maintenance techniques. Through intensive restoration site monitoring we have optimized existing techniques and provided new methods for restoration on the Lower Colorado River.

Author: Fred Phillips*

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Topic: Restoration and Best Management Practices – Friday at 10:30 AM

Title: Restoration of the Colorado River Delta in the US and Mexico

Abstract:

The Colorado River Delta in the Southwestern US and Mexico once supported over 2 million acres of riparian, wetland and aquatic habitats. It was one of the most productive habitats in North America and hosted an abundance of wildlife, provided a major transport route for the southwest and supported diverse wildlife communities along its banks. Over the last 100 years the damming, channelization and development of the Colorado River has destroyed 90% of the Delta's original habitat. Challenges in restoring this watershed include the 25 million people that depend on the Colorado River and an ongoing 20-year drought. Over the last 10 years the United States, Mexico and numerous agencies have worked together in unprecedented fashion to secure water, land and treaties to restore a portion of this once cherished Delta. In 2013 the first ever Bi-national water treaty for restoring habitat across borders (Minute 319) was reached and in the spring of 2014 a "pulse flow" was released to restore habitat in the Colorado Delta. The lessons learned from the pulse flow are now guiding large scale restoration in the Delta and how future environmental flows will be managed to optimize restoration in the region.

Authors: Frederick Aaron Richter*, Ana Gonzalez

City of Austin Watershed Protection Department

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Topic: Restoration and Best Management Practices – Friday at 9:30 PM

Title: Assessment of Riparian Zones with a Naïve Bayes Classifier

Abstract:

Recently the City of Austin has initiated a process to reestablish riparian forests along urban creeks with the goal of restoring ecological function. It is often helpful to assess or track the success of such riparian restoration projects. Monitoring appropriate environmental parameters throughout the restoration process is a way to ensure that the assessment of success is accurate. An assortment of environmental parameters was collected at sites which have previously been mowed and sites which have been undisturbed for many years but have still been influenced urbanization. This presentation puts emphasis on the methods used to make assessments on these sites. Random Forest analysis was used to distinguish important environmental variables for site classification between the two site types. Naïve Bayes is a fast, easy to implement, and effective classification procedure which was used to assess each site based on the important environmental variables. Future work includes bi-annual assessments of these sites to track the progress of previously mowed sites towards a best-achievable condition in an urban environment.

Authors: Angelita Rodriguez*, Abel Porras

City of Austin Watershed Protection Department

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Topic: Restoration and Best Management Practices – Friday at 8:30 AM

Title: A Bayesian approach to assessing impacts of invasive plants on native plant species richness in City of Austin parks

Abstract:

The Austin Invasive Management program conducted a data collection effort at various City of Austin parks during the summer of 2013 to evaluate the distribution and impacts of invasive plant species across the city. A Bayesian approach was used to estimate from this data the expected number of native species per plot in wooded habitats by park and by stratum (i.e., understory and groundcover) using two generalized linear models from the Poisson family of distributions. The first model determined the expected number of native species independent of any covariate. The second model calculated the numbers of natives dependent on percent cover of an invasive species per plot. The results from this analysis were then input into a Bayesian Modeling Selection routine to establish the most appropriate model for each park. The analysis has identified several parks where invasive plants have had a significant impact on native plant species richness. This analysis can be expanded to include additional models of plant invasion and may assist with land management decisions regarding invasive species on public lands throughout the city.

Authors: D. Lauren Ross*

Glenrose Engineering, Inc.

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Topic: Ecology/Biology – Friday at 1:50 PM

Title: A Bayesian approach to assessing impacts of invasive plants on native plant species richness in City of Austin parks

Abstract:

All of terrestrial life depends upon microscopic organisms, busy deconstructing waste and making nutrients available for larger life forms. Nevertheless, we larger life forms are mostly ignorant of this dependency. While our choices significantly impact micro-life, we fail to understand their consequences. This presentation will explore relationships between soil microbiology and riparian vegetation along an urban Texas Hill Country stream. We will examine the implications of a small soil microbiology dataset obtained for the Shoal Creek Riparian Restoration project through Pease Park. We will discuss riparian restoration construction specifications designed to enhance soil biology, and construction-phase difficulties associated with meeting those specifications.

Authors: Mateo Scoggins*, A. Gonzalez, J. Clement, S. Wagner, A. Clamann, T. Jackson

City of Austin, Watershed Protection Department

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Topic: Education & Outreach – Friday at 10:30 AM

Title: The Human-Ecology Interface: Delivering Restoration Ecology to Everyone

Abstract:

The City of Austin has been implementing a variety of riparian restoration techniques and programs over the last 5 years that all challenge traditional views, visions and expectations of what streams are supposed to look and act like. Although Austin is a progressive city in many ways, our history, geology and climate have left us with a challenging stream restoration environment. Some are distinctive to Austin, flash flood alley, but many we imagine are pretty consistent with other cities around the country. As has been noted by many in the restoration literature, if you don't include people in urban restoration projects, you won't get many opportunities and those that you do get, won't work. The primary urban barriers to restoration that will be reviewed include safety, aesthetics, resistance to change, regulations (flood), invasive species, and fear. Through a series of targeted education and outreach campaigns, cooperation and collaboration with a variety of stakeholders, and sheer tenacity, progress has slowly been made in changing many of these deeply engrained paradigms. The subjective concepts of nature, beauty and value will be examined in the context of basic ecological function, in an effort to present sound, reasonable and reproducible restoration solutions for the urban environment.

Author: Mark Simmons*

Lady Bird Johnson Wildflower Center

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Topic: Restoration and Best Management Practices – Thursday at 2:30 PM

Title: Riparian Restoration of the Mission Reach, San Antonio: Challenges of Ecological Design and Installation

Abstract:

Working to restore ecosystem function in riparian systems in highly urbanized environments is always difficult and often impossible due to economics, flood control needs, and other social/political issues. The novel approach of multiple agencies along an 8-mile stretch of the San Antonio River has succeeded in producing a balanced plan to meet all the needs. This project did not seek to restore the river to its historic condition, but instead sought to use the principles of ecology, fluvial geomorphology and water resource engineering to create a functioning river system with restored sinuosity, native plant communities, flood control benefits and public access. Here we describe the process for designing native

plant assemblages to fit within the hydraulic model and describe the challenges of installation of a completely new native ecosystem in a highly invaded, flood-prone, channel of a section the San Antonio River. With 15 miles of trails, 20,000 trees and shrubs, and over 100 species of native tree shrubs, grasses and wildflowers, the result is one of the largest restored urban riparian parks in North America.

Author: Justin Stewart*

Creek People

Contact Email: JustinStewart744@gmail.com

Topic: Case Studies – Thursday at 3:55 PM

Title: Poquito and Chestnut Creek Restoration and Confluence

Abstract:

Creek People, a non-profit motivated to improve urban creek corridors, is in the midst of implementing their second grant from Austin Parks Foundation (APF) at the confluence of two central east Austin creeks for restoration and pedestrian connection. These two tributaries of Boggy Creek are disconnected from the larger Boggy Creek Greenbelt by the MetroRail Red Line. The immediate subject areas of both creeks are from the confluence at the MetroRail bridge and upstream till they each go under an arterial street. For Chestnut (intermittent stream), this short distance of 500 ft marks the creeks only semi-natural existence with bed and bank, most of it is channelized through 1,200 ft of adjacent parkland. The restoration portion of Poquito Creek (perennial stream) is from Northwestern Street to the rail bridge (185 ft). Upstream from Northwestern Street, Poquito Creek retains a semi-natural state through four private properties, yet mostly through a City owned parcel before it is channelized in a culvert, this is where the year round flow comes out from under the 9 acre distressed Rosewood Courts public housing complex. Currently there is no access from Rosewood Courts to the creek/greenway, and consequently, no access to the larger Boggy Creek Greenbelt. Mr. Stewart will highlight the last 4 years of this unfolding story through lessons learned, the value of “time” in planning for landscape design/green infrastructure, and touch on collaborations that include: Art in Public Places, City of Austin, Channel Austin, National Park Service, American Youthworks, Austin Youth River Watch, and Blackshear, Rosewood and Cherrywood Neighborhood Associations.

Author: Bill Stout*

Austin Parks Foundation

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Topic: Education & Outreach – Friday at 1:30 PM

Title: Future Forest Project: Coordinated collaboration of partnerships to restore the urban forest in riparian zones

Abstract:

The Austin Parks Foundation is a non-profit organization devoted to building public and private partnerships to develop and maintain parks, trails, and open space in Austin and Travis County. Since 1992, Austin Parks Foundation (APF) has initiated, promoted, and facilitated physical improvements,

new programming, and greater community involvement for Austin's parks. Our mission is to connect people to resources and partnerships to develop and improve parks in and around Austin. APF serves as the principal partner for community groups and other organizations wishing to join the City of Austin's Adopt-a-Park Program. APF guides potential park adopters through the application process, providing technical expertise, training, and project management services for more complex projects. Currently over 90 citizen and neighborhood groups have agreed to contribute funds and/or volunteer time towards park improvement projects as part of the Adopt-a-Park Program. In 2011, APF introduced the Future Forest Project (FFP), an intensive five-year program designed to significantly increase the number of trees planted on public land by developing more efficient strategies and collaboration, versus an ad hoc approach, to coordinate volunteer projects with City Departments and complimentary-missioned non-profits. As a result, the FFP has resulted in steady requests from volunteers who want to help the City of Austin parks and watersheds by planting and caring for trees in Austin's parks and riparian "grow zones." The presentation and discussion will focus on the FFP program goals and successes, integration with Adopt-a-Park groups, and the potential for coordinated volunteer park project collaborations with additional City Departments and non-profit partners. The discussion can include the creation and long-term maintenance of administrative processes and communication as outlined in the FFP to maximize effectiveness between departments and organizations to best utilize Adopt-a-Park volunteer resources for the benefit of the urban riparian forest.

Authors: Heidi Trathnigg*, Fred Phillips
Fred Phillips Consulting, LLC

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Topic: Ecology/Biology – Friday at 1:30 PM

Title: Riparian and Wetland Restoration Effects on Bird and Butterfly Communities on the Lower Colorado River

Abstract:

The riparian and wetland habitats of the lower Colorado River through Yuma, Arizona have been degraded by flow regulation, water development projects, agricultural development, timber harvesting, and non-native species invasion. This degradation has caused a decline in wildlife communities, including birds and butterflies. To improve habitat, restoration efforts including removal of non-native species, re-contouring habitat, creation of wetlands and a mile-long backwater channel, and planting native riparian and wetland plants have occurred at the Yuma East Wetlands (YEW), Yuma County, Arizona. The 350 acre YEW is located within the City of Yuma and is a part of the Yuma Crossing National Heritage Area. In this study, we evaluated the effect of on-going riparian and wetland restoration on the richness and density of breeding birds, richness and abundance of butterflies, vegetation cover, nectar resources, and host plant abundance in restored and control riparian and wetland sites at the YEW. Results indicated that breeding bird richness and density were greater in restored wetland and riparian sites as compared to the control sites. Butterfly species richness and abundance were higher in restored riparian sites and butterfly richness correlated with flowering plant richness and abundance, plant species diversity, and percent herbaceous plant cover. Restored riparian sites had higher percent herbaceous plant diversity, overall plant species diversity, and higher flowering plant species richness than control sites. Restored wetlands had higher percent herbaceous plant cover and lower percent

open water than control sites. This study indicates the importance of planting diverse native grasses and herbaceous plants and shrubs in restoration projects to benefit wildlife species. Also, this study shows that sensitive wildlife species can be recovered when habitat is restored in an urban environment.

Author: Judy Walther*

Environmental Survey Consulting

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Topic: Education & Outreach – Friday at 11:10 AM

Title: Developing Signage as Effective Outreach

Abstract:

Urban riparian projects, by definition, are surrounded by people. To make sure public projects are understood and supported by its citizens, it is important to provide information on each project's principles and practices. Outreach can most easily be done through well-designed signage placed prominently at each project's location. Signs are of high value because they are an opportunity to educate the public about the importance of protecting the environment, understanding habitat restoration principles, and practicing good stewardship. Signs can help increase people's environmental literacy. People might not be familiar with the problems that led to the need for each project, with the thinking behind the various solutions and the reasoning for the remedies. Developing citizen support for projects creates community involvement. This can result in neighborhood watchdogs, which can hopefully reduce or eliminate vandalism. Management of urban riparian projects will be more successful if the community has a positive relationship with the project. With understanding, people will have pride in their neighborhood and can talk about the project with others. Having detailed information will make people feel included in the process and send them the message they are important enough to have signs created just for them. It's best if signs are site and project specific. Generic signs about general riparian topics are not as effective. Language should be easily understood by non-scientists, with clear graphics and layout. Materials that are as vandal proof as possible should be used. In addition to the main sign text, include contact information to report problems, web sites for more information, and ways citizens can participate in activities such as clean-ups. This presentation will include examples of interpretive signage developed by Environmental Survey Consulting for a few of our projects at wetponds, creek and lake trails, and other parklands.

Authors: Carolyn White*, W. Harman, S. Kaiser, S. Benigno

Harris County Flood Control District

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Topic: Restoration and Best Management Practices – Thursday at 1:50 PM

Title: Corridor Channel Design – Blending Flood Damage Reduction, Stormwater Quality and Recreation

Abstract:

The northwestern portion of Harris County is rapidly developing, placing increasing demands on area waterways to store and convey stormwater runoff. The Harris County Flood Control District (District) has been working with developers to design and create corridor channels that provide in-line detention, a stable bankfull channel connected to the geomorphic floodplain; best management practices (BMPs) for stormwater runoff treatment; and areas for recreation. The District prepared its “Natural Stable Channel and Best Management Practices Guidance Manual for Corridor Channels” to provide practitioners, including civil engineers, fluvial geomorphologists, and District staff, with guidance and tools to assist in the design of natural stable channels and wetland complexes within corridor channels and plunge pools at stormwater outfalls. Specific objectives for incorporating natural stable channel design into HCFCF’s corridor channels include: creating geomorphically stable conditions; providing conveyance for the 1% exceedance probability, 24-hour rainfall event within the HCFCF right-of-way and without increasing flood levels downstream; improving water quality by establishing riparian and wetland buffers that remove bacteria, nutrients, and sediments from runoff; stabilizing streambanks to reduce bank erosion and sediment loading to the stream; creating aquatic and terrestrial riparian habitat along the corridor channels and within each project area; creating bed form diversity by creating deep pools and shallow riffles, and providing woody debris for in-stream habitat. This guidance manual also includes a case study for a portion of Langham Creek, in northwest Harris County. Design parameters for this area will be presented.

Author: Casey Williams*, Kelly Ebby

Bio-West

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Topic: Ecology/Biology – Thursday at 4:15 PM

Title: A Preliminary Plan for Riparian Restoration to Complement Habitat Improvement for the Endangered Fountain Darter (*Etheostoma fonticola*)

Abstract:

In 2013 aquatic vegetation restoration was initiated by the city of New Braunfels and BIO-WEST as part of the Edwards Aquifer Habitat Conservation Plan to help improve habitat for several endangered species, including the fountain darter (*Etheostoma fonticola*), in the Comal River, New Braunfels, Texas.

Through 2013 and 2014 work was carried out to remove non-native submersed aquatic vegetation, primarily *Hygrophila polysperma*, and propagate and plant native submersed aquatic plant species such as *Ludwigia repens* and *Cabomba caroliniana*. While this unique restoration plan was successful it was quickly determined that dense canopy shading from non-native riparian species, most notably *Ligustrum lucidum*, limited success of the aquatic re-vegetation effort in several locations. In order to improve success for aquatic habitat improvement and meet goals set forth by the HCP we propose additional efforts be focused on the riparian community to complement aquatic restoration efforts.

Author: Jessica Wilson*

City of Austin Watershed Protection Department

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Topic: Education & Outreach – Friday at 10:50 AM

Title: Restoration Communication Tools: Beauty, benefits and threats are in the eye of the beholder

Abstract:

Lush riparian zones are a thing of beauty to environmental scientists but many citizens who have grown accustomed to seeing turf to the edge of creek banks view new vegetation as unmanaged. Citizens may perceive highly vegetated areas to be full of dangers like snakes, transients, and an increased risk of flooding. Learn how careful word selection and a large portfolio of communication tools including: signage, webpages, blog posts, email forums, videos, social media, newsletters, interpretive hikes, volunteer days, and youth education programs can shift community members' perspectives to see these spaces as beautiful future forests. This presentation will include lessons learned, details about identifying stakeholders, and how to select the right communication tools to reach your audience with your available budget and staff time.

Author: Stan Wilson*

Environmental Survey Consulting

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Topic: Riparian Area Management – Thursday at 2:10

Title: "Implementing Adaptive Management and Maintenance Within Restrictive, Commodity-Based Budgets."

Abstract:

Most municipalities procure products and services through standard bid items in order to allow for the highest number of bidders and help control costs in a predictable manner. Municipal riparian restoration and management is no exception, and yet for a riparian project to be successful, it should be adaptive to changing site conditions. This incongruity has, in the past, created scenarios where riparian restoration management was compromised in the interest of "following the recipe" of the original contract despite

shifting needs and unpredictable environmental factors. New arrangements by some municipalities in the budgeting and procurement of riparian restoration management and maintenance are increasingly being utilized to deal with the realities of these projects. This talk, from the contractor's perspective, will discuss project examples where flexibility was needed and how varying levels of contractual flexibility affected outcomes.

Author: Sarah Woolley*

Colorado River Alliance

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Topic: Education and Outreach – Friday at 9:30 AM

Title: Evolving towards Your Audience: Using Student Test Data and Teacher Feedback to Improve Environmental Education Programming

Abstract:

Urban citizens are rarely conscious of their impact on urban waterways and riparian areas. The Colorado River Alliance (the Alliance) works to protect and conserve the Texas Colorado River and its watershed by engaging young urban citizens to develop personal connections with their water resources. We structured an outdoor field experience, the Youth Experience Stewardship (YES) program, for grades 3 through 5 schoolchildren which seamlessly plugs into teachers' curriculum. Since 2009, the program has delivered TEKS-aligned curriculum and conveyed water quality and conservation messages to over 14,000 urban students. Our program features a watershed station that highlights how point and non-point source pollution are introduced within various parts of our watershed, including riparian habitats. In order evaluate program performance and improve our curriculum delivery to schoolchildren, water science and conservation knowledge tests were administered to students, and field trip evaluation surveys were given to teachers. In this presentation, we will describe how we analyzed student test and teacher survey data to identify important patterns in student performance and areas to improve curriculum delivery. We will also outline practices that led to successful program improvements, as well as challenges that are still being overcome. We will relate our operating experience from the perspective of educators, scientists, and activists who are seeking to maximize their role in watershed stewardship.

Author: Kyle Wright*

USDA-NRCS

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Topic: Restoration and Best Management Practices – Friday at 11:10 AM

Title: Agricultural Practices and Procedures that also Apply in Urban Areas

Abstract:

Common agricultural best management practices will be discussed and compared to similar scenarios that occur in an urban setting. Agricultural practices discussed will include Nutrient Management, Integrated Pest Management, Conservation Cover, Grassed Waterways, Filter Strips, Riparian Buffers

and others. These practices will be presented first as they are utilized in rural agricultural setting and then in similar situations that occur in urban and home settings. Conclusions will be drawn suggesting the similarity in function of these practices which can be applied in both of these very different settings on the landscape.

Author: Kyle Wright*

USDA-NRCS

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Topic: Ecology/Biology – Friday at 3:55 PM

Title: Healthy Landscapes and the Soils They Rest Upon Promote Healthy Streams and Clean Water

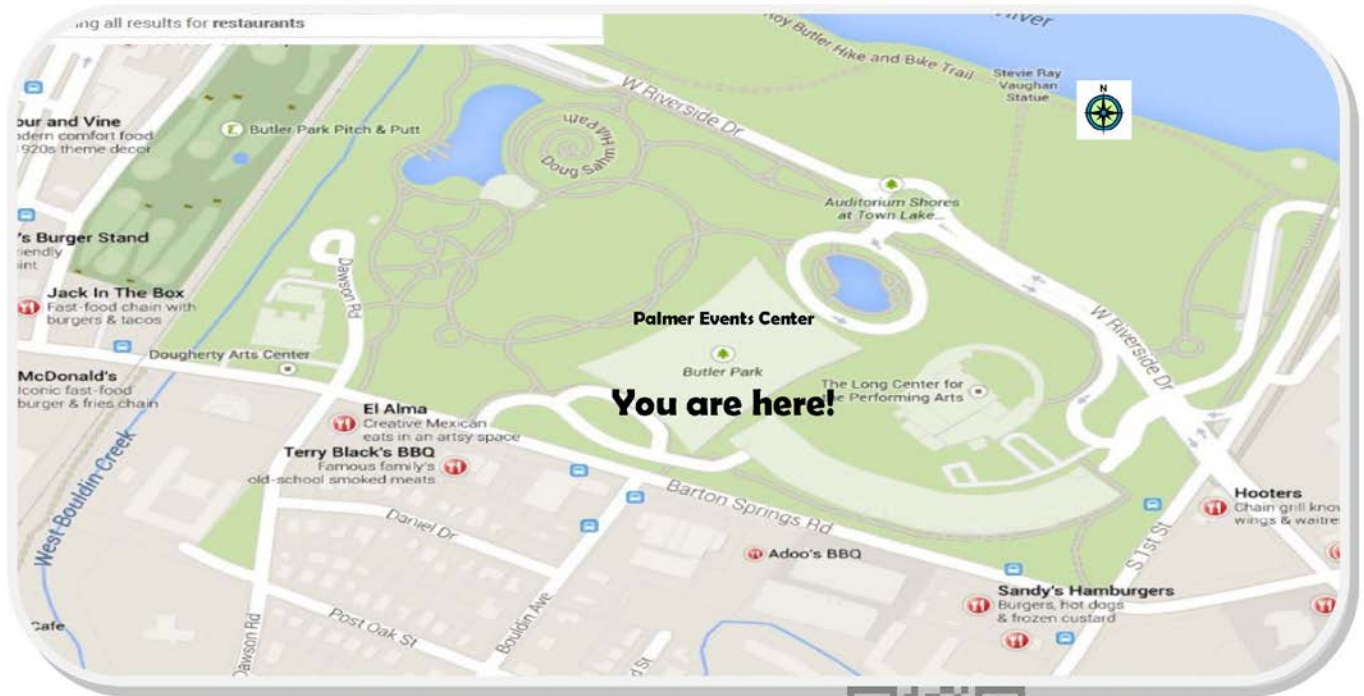
Abstract:

The cause and effect relationship that frequently occurs in watersheds as well as the connectivity between urban, rural and riparian areas on the landscape will be discussed. How many of the problems we face in stream and riparian areas are actually being caused by issues occurring further up the slope in upland area. Additionally we will discuss the possibility that a fix applied in one segment of a watershed may actually cause other problems to surface in other areas. Some of our fixes may be simply treating a symptom rather than looking for the cure. Special emphasis will be placed on the connectivity and complexity of these issues. The importance of healthy soils will be discussed. The health of these soils and their microorganisms should be an integral part of every restoration project, whether it be urban or rural, cropland, rangeland or riparian. As we work to improve the health of the ecosystems around us we need to be mindful of the health of the soils below our feet as these are the very foundation our restoration work stands upon. Healthy soils can improve infiltration and water holding capacity, which reduces the potential for excessive runoff, and in turn reduces erosion. Additionally these waters move slowly through the soil profile and seep into our creeks and streams as return flow or move further through the profile into aquifers. As an added bonus, water that is filtered through soil is much cleaner than water that runs off the surface. Additionally, healthy soils are integral to a properly functioning nutrient cycle. Active diverse populations of soil microorganisms work to cycle nutrients from organic matter into a form that is readily available for plants at the time that they need them.

*Authors names that are **bolded** and starred* indicate that they will be the presenter for the session.*

Lunch Options

Nearby Austin Restaurants



Pick a restaurant for lunch by any of the following:

1. Join or ask a local.
2. Use this map.
3. Go to <http://tiny.cc/atxcreeks> for the Google map.

