FIFTEENTH MEETING OF THE ARIZONA RIPARIAN COUNCIL

Four Points Sheraton
Tucson, Arizona
May 11-12, 2001

Urban Riparian Areas in Arizona

PROGRAM AND ABSTRACTS
2001

Fifteenth Annual Meeting
Arizona Riparian Council
Four Points Sheraton
Tucson, Arizona
May 11-12, 2001

URBAN RIPARIAN AREAS IN ARIZONA

FRIDAY, May 11

7:30-10:00 Registration

8:30-9:00 **Welcome** – Kris Randall, President

9:00-9:30 **Sonoran Desert Conservation Plan** - Julia Fonseca, Pima County Flood Control District

9:30-9:50 **Phoenix Rio Salado -** Walt Kinsler, City of Phoenix

9:50-10:10 **Lessons of Trés Rio and Their Application to Phoenix Rio Salado** - Roland Wass, PBS&J

10:10-10:40 **BREAK – View Posters**

10:40-11:00 **Gilbert Riparian Institute** - Scott Anderson, Director

11:00-11:20 **Agua Fria Project** - Doug Williams, Flood Control District of Maricopa County

11:20-11:50 **Panel Discussion of Invited Speakers**

11:50-12:00 **Logistics**

12:00-1:15 **Lunch**

1:15-1:30 **Business Meeting**

1:30-1:45 **Determining Performance Standards for Effluent-Dependent Riparian Ecosystems – An Update From the Arid West Water Quality Research Report** – Edward Curley[1], Karen Sierra[1], Richard Hawkins[2], Richard Meyerhoff[3], Susan Morea[4], Mark Murphy[5], Waite Osterkamp[6], Nicole Rowan[4], and E. Linwood Smith[7] ([1]Pima County Wastewater Management Department, Tucson; [2]School of Renewable Natural Resources, University of Arizona, Tucson; [3]Camp Dresser & McKee, Phoenix; [4]Camp Dresser & McKee, Denver; [5]URS

Corporation, Phoenix; [6]Tucson Desert Laboratory, U.S. Geological Survey; and [7]Environmental Planning Group, Tucson)

1:45-2:00 **Biogeochemistry in an Extensively Modified Urban Desert Stream: Preliminary Results from Indian Bend Wash** – W. John Roach and Nancy B. Grimm (Department of Biology, Arizona State University, Tempe)

2:00-2:15 **Urban Riparian Systems and the Potential for Bird Hazards at Airports** – Joseph B. Platt (URS Corporation, Tucson)

2:15-2:30 **Evaluation of the Interaction of Ground Water and Surface Water Using Heat as a Tracer** – Matthew A. Bailey (U.S. Geological Survey, Tucson)

2:30-2:45 **Using Satellite Imagery to Establish a Historic Environmental Baseline –** Michael J. Rosko and Errol L. Montgomery (Errol L. Montgomery & Associates, Inc., Tucson)

2:45-3:15 **BREAK – View Posters**

3:15-3:30 **From a Fishes View: Native and Nonnative Fish Associations in Fossil Creek, Arizona** – Pamela J. Sponholtz (Arizona Game and Fish Department, Phoenix)

3:30-3:45 **Riparian Vegetation Mapping and Classification Project of the Sonoran Desert Conservation Plan** – Lisa Harris[1], Russell B. Duncan[2], D. Colby Henley[1], and Jennifer A. Wennerlund[3] ([1]Harris Environmental Group, Tucson; [2]R.B. Duncan and Associates, Tucson; and [3]Dames & Moore, Phoenix)

3:45-4:00 **The Santa Cruz River Conference: Community Involvement in River Restoration** – Rachel Yaseen[1] and Jeanmarie Haney[2,3] ([1]Rillito Consulting Group, Tucson; [2]Tucson Regional Water Council; [3]currently, The Nature Conservancy of Arizona, Tucson)

4:00-4:15 **Avian Inventory of the Effluent-Dominated Santa Cruz River** – Kenneth J. Kingsley and Thomas E. Furgason (SWCA, Inc. Environmental Consultants, Tucson)

4:15-4:30 **Conservation Planning for Birds in Arizona: How Can Open Space in the Phoenix Metropolitan Area Contribute to the Sonoran Desert Ecoplan? –** Laura L. Musacchio (School of Planning and Landscape Architecture, Arizona State University, Tempe)

6:00-6:30 Happy hour at La Parador
6:30-9:00 Dinner at La Parador

POSTERS (View during breaks)

Controls of Plant Species Diversity in a Desert Riparian System – Kenneth J. Bagstad and Juliet C. Stromberg (Department of Plant Biology, Arizona State University, Tempe)

Assessment of Hydrologic Alteration of the Lower Verde River and Possible Ecological Consequences – Vanessa Beauchamp and Juliet Stromberg (Department of Plant Biology, Arizona State University, Tempe)

Historic Channel Changes in the Salt River, Arizona 1890-1931 – Wendy Bigler (Department of Geography, Arizona State University, Tempe)

Groudwater Level Changes in the Tanque Verde Valley (1988-1999) – Elizabeth Hill[1], Julia Fonseca[1], and Staffan Schorr[2] ([1]Pima County Department of Transportation and Flood Control, Tucson, and [2]Pima Association of Governments, Tucson)

Perennial and Intermittent Streams, Springs, and Shallow Groundwater in Eastern Pima County – David Scalero and Julia Fonseca (Pima County Department of Transportation and Flood Control, Tucson)

Mapping the Floristics and Structure of San Pedro River Vegetation Alliances – Joseph M. Watts[1], Mark Burnell[1], Loan Phan[1], John Wilder[1], Sheridan Stone[2], and James Hessil[2] ([1]U.S. Army Engineer Research and Development Center, Alexandria, VA and [2]U.S. Army Garrsion at Fort Huachuca)

SATURDAY, May 12

FIELD TRIPS

Field Trip to the Pantano Jungle Revegetation Project, Cienega Creek Natural Preserve

This field trip will feature a tour of a revegetation project established within the Cienega Creek Natural Preserve by Pima County, with cooperation and support from the U. S. Fish and Wildlife Service's Partners for Wildlife (PFW), and the Arizona Game and Fish Department. The project was created with two specific objectives in mind: (1) promoting the propagation and long-term establishment of mesquite bosque habitat in an area that is currently dominated by nonnative species; and (2) increasing the structure and species diversity of native vegetation for the benefit of neotropical migratory birds. The field trip will include a walking tour of the revegetation site, with descriptions provided on prior landscape and land use, feasibility studies and archeological clearance, plant propagation, site maintenance, supplemental irrigation and monitoring. In addition, the tour will include on site descriptions of two other revegetation projects in the immediate area, a sacaton establishment (monitored by Ron Tiller, ASU) and the Section 404 mitigation project (Pima County Flood Control District).

Birds, Plants and Water: Riparian Issues in Northwest Tucson

Ken Kingsley, SWCA, will share results of his avian surveys, as we visit an effluent-dominated stream. Scott Richardson, Arizona Game and Fish Department, will show us habitat features of the endangered pygmy-owl along small urban streams. Julia Fonseca, Pima County Flood Control District, will talk about the Sonoran Desert Conservation Plan and riparian mapping done in the Tortolita area. Carla Danforth, Pima County Flood Control District, will tell us about the Cortaro Mesquite Bosque Project as we view a large,successful dryland seeding at Continental Ranch. Scott Wilbor, biologist for Audubon Society, will give us a tour around an ongoing mitigation project they have started on City of Tucson's abandoned farmland.

ABSTRACTS

Anderson, S., Executive Director, The Riparian Institute, 1025 South Gilbert Road, Gilbert AZ 85296. ***The Riparian Institute, Gilbert, Arizona***.

The Town of Gilbert has created riparian preserves with the purpose to protect resources such as water and habitat. In addition, the Town created the Riparian Institute to "promote the development of strategies and actions to reserve and protect unique water environments and their ecological value, while meeting the education and recreation aspirations of visitors to these areas."

While the Town recharges groundwater in the preserves, interpretive experiences are being created for all who seek education and/or recreation leisure time. Some of the programs include wildlife tours, astronomy, paleontology, environmental education, and ethnobotanical studies. Also, the preserves serve as an ideal environment for research and development of unique projects. The Institute is now actively involved with local schools, learning centers, universities, and civic organizations to promote a diversity of learning opportunities in riparian areas.

Bagstad, K. J., and J. C. Stromberg, Department of Plant Biology, Arizona State University, PO Box 871601, Tempe AZ 85287-1601 ***Controls of Plant Species Diversity in a Desert Riparian Ecosystem***. (Poster)

Riparian ecosystems in the southwestern United States face increasing threats of dewatering for urban and agricultural use. Depletion of surface and groundwater can alter the riparian plant community, leading to a loss of biodiversity and ecological function. In this study, we examined the plant community of 18 sites along the San Pedro River in southeastern Arizona, to determine whether species diversity measures change across gradients of groundwater depth and surface flow frequency. Herbaceous species richness (species/m^2) in the May/June dry season increased significantly with a qualitative ranking of site wetness for floodplain and streamside zones. After the late summer rainy season, richness was more dependent on site elevation than local hydrology. Multiple regression analysis showed that floodplain width, site relative wetness, and winter rainfall were most important in predicting species richness for the dry season, while only floodplain width and elevation predicted richness for the rainy season. Beta diversity (Whittaker's B_w), representing species turnover across a lateral gradient extending from the channel to the edge of the floodplain, increased in response to floodplain width and site relative wetness after the rainy season; no predictors were statistically significant for the dry season. Overall, local hydrologic and geomorphologic characteristics and site elevation all influenced species diversity patterns. Understanding patterns of spatial and temporal variability of plant diversity will aid in the development of vegetation monitoring techniques, including indices of ecosystem integrity, for use in management, conservation, and restoration activities.

Bailey, M. A. U.S. Geological Survey, 520 N. Park Ave Ste. 221, Tucson AZ 85719. ***Evaluation of the Interaction of Ground Water and Surface Water Using Heat as a Tracer.***

Infiltration from streamflow and discharge of shallow ground water to streams are important water-budget components, especially in riparian environments. Quantification of infiltration and ground-water discharge using conventional methods has a high degree of uncertainty. The use of heat as a tracer, however, has been demonstrated as a cost-effective and robust method for estimating infiltration and ground-water discharge. Heat transport methods were used to estimate these components as part of several hydrologic investigations in the Southwest.

Streamflow and streambed temperatures were measured in vertical profiles and the data used as input to computer models that couple heat transport and fluid flow to simulate water movement along the Rio Grande in New Mexico and Rillito Creek in Tucson, Arizona. This method was used to estimate infiltration and ground-water discharge along the Rio Grande to better characterize the interaction of ground water and surface water along the Middle Rio Grande Basin. Along Rillito Creek in Tucson, Arizona, where ground water does not discharge to the stream channel, the method was used to estimate infiltration. Infiltration estimates from Rillito Creek will be used to help quantify recharge for a regional ground-water flow model of the Tucson Basin.

Quantifying infiltration from streamflow and ground-water discharge to the stream channel can provide information on the availability of water for processes such as ground-water recharge, uptake by riparian vegetation, and in-stream uses by aquatic communities. This information can be used to develop effective management strategies for riparian resources.

Beauchamp, V., and J. C. Stromberg, Department of Plant Biology, Arizona State University, PO Box 871601, Tempe AZ 85287-1601. ***Assessment of Hydrologic Alteration of the Lower Verde River and Possible Ecological Consequences.*** (Poster)

The hydrologic regime is important in determining the structure and function of riparian ecosystems; thus, anthropomorphic alteration of flow regimes often adversely impacts the ecology of these areas. Quantitative evaluation of hydrologic perturbations can help predict and explain ecological responses to flow alteration, and can enhance restoration efforts. Average daily flow values (USGS Gauge 09510000) were used to assess differences in pre- and post-dam hydrologic regimes immediately downstream of Bartlett Dam on the Verde River. This gage has been in operation since 1913, allowing for quantification of pre- (1913-1938) and post-dam (1949-1999) hydrologic conditions. Major changes since dam construction include decrease in winter flow volume and an increase in summer flow volume, along with a shift of the timing of the average annual low flow event from July to March. Annual minimum and maximum flow volumes have decreased since the start of dam operation. The number and duration of high flow events have also decreased. There have been 296 days with zero flow since dam completion, but there are no zero flow days in the pre-dam record. Possible ecological consequences of these changes in hydrologic regime include a decrease in recruitment of early successional riparian tree species, which are sensitive to flood timing and magnitude. The decrease in high-flow events and the resulting decrease in floodplain disturbance could also allow for the expansion of later successional species in the floodplain, causing a decrease in habitat diversity in riparian areas.

Bigler, W. Department of Geography, Arizona State University, PO Box 870104, Tempe AZ 85287-0104. ***Historic Channel Changes in the Salt River, Arizona, 1890-1931.*** (Poster)

The Salt River in the Phoenix metropolitan area has witnessed substantial changes in the past century. Where and how has the channel changed through the Tempe reach of the Salt River? Through the use of historical photographs and maps, I show how the river's character has changed over time. With the closure of Roosevelt Dam and construction of related diversion projects in the early part of the century, the Salt River through Tempe has been virtually dry since 1938. Infrequent discharge events, sand and gravel mining, channelization, and development have changed the channel's morphology. The most recent change has come in the form of Tempe Town Lake, an impoundment formed by the riverbanks and inflated rubber dams, and filled with water from the Central Arizona Project. The city of Tempe hopes to spark economic growth through the private development of condominiums and shops along the riverbanks. Examining the patterns and interpreting mechanisms of channel change are important, especially in light of the possibility of increased development on the riverbanks.

Curley, E.[1], K. Sierra[1], R.Hawkins[2], R.Meyerhoff[3], S.Morea[4], M.Murphy[5], W. Osterkamp[6], N. Rowan[4], and E. L. Smith[7]. [1]Pima County Wastewater Management Department, 201 N. Stone Ave, Tucson AZ 85701-1207; [2]School of Renewable Natural Resources, University of Arizona, Tucson AZ 85721; [3]Camp Dresser & McKee, 4201 24th St, Phoenix AZ 85016; [4]Camp Dresser & McKee, 1331 17th St, Denver CO 80202; [5]URS Corporation, 7720 N 16th St, Phoenix AZ 85020; [6]Tucson Desert Laboratory, U.S. Geological Survey, 1675 W Anklam Rd, Tucson AZ 85745; and [7]Environmental Planning Group, 1430 E Ft. Lowell Blvd, Tucson AZ 85719. ***Determining Performance Standards for Effluent-Dependent Riparian Ecosystems – An Update from the Arid West Water Quality Research Project***.

When storm or reclaimed water is introduced into ephemeral or flow-controlled channels, the ecological consequences can be complex. Currently, much effort is under way across the western US to re-establish urban streams within unvegetated or newly constructed storm water conveyance structures. The results have been mixed. Many urban streams bear little ecological similarity to their predevelopment state; some are no more that grassy swales, landscaped with exotic vegetation. Similar difficulties have beset treated effluent dischargers attempting to return treated effluent to otherwise dry washes. Because effluent-dependent streams are not clearly defined in Clean Water Act regulations and guidances, there has been insufficient science to quantify the ecological success of these systems.

In recognition of this problem, EPA Region IX has funded Pima County Wastewater Management Department to conduct the Arid West Water Quality Research Project (WQRP), a multi-year investigation of the ecological function of effluent-supported waters through out the West. Currently underway, the Habitat Characterization Study of WQRP is looking at the biology, hydrology, hydrochemistry, geomorphology, and ecology of 10 effluent-dependent streams in states from California to Texas. Three study areas are in southern Arizona. Many of the questions the WQRP is addressing are also applicable to the restoration of urban riparian communities in the Southwest.

Two important questions involve the introduction of storm water or treated effluent into ephemeral washes. In the West, undisturbed riparian plant communities are adapted to periodic inundation by flood waters. Further, the spatial distribution of channels and interfluves has a

very important impact on the plant community structure. The WQRP is attempting to quantify the relationship between overall ecosystem health and geomorphic/hydrologic data among our 10 study sites. Hydrochemical data are also being collected from each of the sites. These data will be used to establish the range of compositional extremes of Western treated effluent compared to background water quality. Another important goal of this research is a better description of the relationship between hardness, metal concentrations, and ecosystem health in established effluent-dependent riparian systems.

We feel that the systems ecology approach of the WQRP will extend the usefulness of our results to other urban stream restoration programs. We are also attempting to develop performance metrics for restored or designed riverine systems that reflect interactions between the terrestrial, hyporheic, and aquatic environments. The Arid West Water Quality Research Project and Pima County Wastewater Management Department looks forward to input from other members of the urban riparian restoration community and will continue to share our data and conclusions.

Fonseca, J. Pima County Department of Transportation and Flood Control District, 201 N Stone Ave 4th Floor, Tucson AZ 85701. ***The Sonoran Desert Conservation Plan.***

The Sonoran Desert Conservation Plan (SDCP) is, among other things, a plan preserving habitat of the native plants and animals of Pima County. We are revising our Comprehensive Land Use Plan around the biological resource needs defined in the SDCP. The SDCP involves a multitude of aspects, including:

- Preservation of sensitive species of plants and animals and their habitat;
- Reintroduction of extirpated native species and species that have become rare in Pima County;
- Reduction of invasive nonnative species of plants and animals;
- Designation of certain areas as appropriate for human use and others as appropriate for biological reserves;
- Establishment of new parks and reserves;
- Preservation of ranchlands where sensitive species currently thrive;
- Preservation of historic and archeaological sites.

Already completed are several actions benefitting riparian areas, include support for the designation of the Ironwood Forest National Monument and Las Cienega National Conservation Areas. Pima County has also negotiated an allocation of effluent for riparian projects and completed detailed mapping of riparian vegetation and aquatic resources.

To implement the SDCP, Pima County will sign an agreement with U. S. Fish and Wildlife Service that commits to funding and implementing land acquisitiond, habitat improvements, inventory, research, monitoring, education and ordinances.

Hill, E.[1], J. Fonseca[1], and S. Schorr[2]. [1]Pima County Department of Transportation and Flood Control, Floodplain Management Division, 201 N Stone, Tucson AZ 85701-1207 and [2]Pima Association of Governments, 177 N Church Ave, #405, Tucson AZ 85701. ***Groundwater Level Changes in the Tanque Verde Valley (1988-1999).*** (Poster)

Mesquite bosques are groundwater-dependent riparian woodlands that were once widespread in the American Southwest. Their decline and continued degradation are due to factors such as groundwater pumping for urban or agricultural use, damming and diversion of rivers, cattle grazing, wood cutting, and land clearing. In the early 1980s, a study of the Tanque Verde Creek by Dr. Julie Stromberg and others described the relationship between the depth to groundwater and the health of the mesquite habitat in the area. They found that along a 6-mile stretch of the Tanque Verde, mesquite trees became stressed when groundwater levels depths fell from 16 to 59 feet. When the depth to water exceeded 59 feet, trees began to show signs of near-lethal stress. The current study revisits the Stromberg study to describe variations in groundwater levels since their report was completed. Seventeen wells were inventories, the same as used in the Stromberg study, with variations in depth-to-water discussed with respect to natural and human influences. Groundwater levels generally rose in response to CAP introduction (with the associated shut-down of some domestic pumping wells), high rainfall/runoff events (with associated recharge effects), and declined in response to low rainfall years, and increasing groundwater pumping. Groundwater levels in some areas of the Creek have declined below levels associated with mesquite stress in the Stromberg study.

Yaseen, R., Rillito Consulting Group, 316 S. Convent, Tucson, AZ 85701 and HANEY, J.A.1, Tucson Regional Water Council, 48 N. Tucson Blvd, Suite 106, Tucson, AZ 85716

The Santa Cruz River Conference: Community Involvement in River Restoration

From perennial headwaters in the lush grasslands of the San Rafael Valley, to a cemented flood channel through Tucson, to its demise in the desert near Casa Grande, the Santa Cruz River exhibits much variation of form and habitat. Shared by Mexico, rich in history, loved by many and abused for decades, it is difficult to describe this river in just a few words. One cannot take any single reach and separate it from the rest of the watershed. Yet, what will become of the soil cemented, channelized, mined and landfilled urban reach of the Santa Cruz River?

In the spring of 2001, the Santa Cruz River Alliance and sponsoring groups organized a conference in Tucson, Arizona, to explore the future of the Santa Cruz River in the Tucson urban corridor. Community education and informed community input was the chief objective of the conference. This was achieved through a variety of opportunities for the community to engage with one another and provide their input for how they would like to see the river rehabilitated. Their comments considered processes for change, natural habitat restoration, restoration of the river channel, river flow and water options, and Rio Nuevo and redevelopment.

Several different sessions were designed to enable the participants to express themselves including a working lunch discussion, a form asking, "If I were in charge of the Santa Cruz River, I would….", a final evaluation, and speakers to inspire feedback. The responses were extensive and extremely thoughtful. Responses advocated the continuation of a community

dialogue with government officials. Others commented on restoration of the river channel to a more natural pattern. This included creative alternatives to cement bank protection. Respondents expressed a desire to see a restoration of the natural habitats along the river. Several comments addressed the use and presence of water in the river and where that water might come from. Finally, several suggestions explored redevelopment projects including gardens, trails, museums, and wildlife corridors.

Public participation and community involvement is important to river restoration project success and is often required by law. However, obtaining meaningful input and engaging the community in the design and implantation of river restoration projects often presents numerous challenges to a project team. This presentation will further address the design of the public input process and the results of that process as applied during the Santa Cruz River conference.

1Currently employed by The Nature Conservancy of Arizona, Tucson Conservation Center, 1510 E. Fort Lowell Road, Tucson, AZ 85719