



Arizona Riparian Council

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BUREAU OF LAND MANAGEMENT: RIPARIAN/WETLAND MANAGEMENT IN ARIZONA

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BACKGROUND

The Bureau of Land Management (BLM) began earnest riparian/wetland management in the early 1980s by changing livestock management practices on Bonita and Burro Creeks. Both creeks were open to year-long livestock use which did not provide for the health and reproduction of riparian plants.

The changes made were simple. Remove livestock from the creeks during parts of the year to allow the plants to reproduce and thrive. The pictures (page 3) of Burro Creek show the dramatic changes that have occurred in the 21-year period from 1981 to 2001. These improvements have been made through rotation of livestock through a series of pastures so they are not in the same location at the same time of year after year.

In 1991 the Bureau, at the national level as well as here in Arizona, issued documents on riparian/wetland management. The Riparian/Wetland Strategy for the 1990s established a definition of riparian in regards to BLM managed lands.

Riparian Area was defined as: "An area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lake shores and streambanks are typical areas. Excluded are such sites as

ephemeral streams or washes that do not exhibit the presence of vegetation dependent on free water in the soil."

It also set a goal for riparian/wetland condition. The goal established was to have these areas in proper functioning condition. A proper functioning condition assessment determines the physical stability of a riparian/wetland area to erosional forces of flowing water or wave actions, in the case of lake shores. With stability comes the positive attributes associated with riparian areas. Quality wildlife and fish habitat, reduced flood damage to the stream course, and improved water quality are just a few of the benefits. The results of the assessment fall into one of the categories of proper functioning condition: function at risk with an upward trend, unknown trend, or downward trend; nonfunctional; or unknown.

The process is outlined in BLM Technical Reference 1737-9, *Process for Assessing Proper Functioning Condition*, and Technical Reference 1737-11, *Process for Assessing Proper Functioning Condition for Lentic Riparian/Wetland Areas*. An interagency cadre has been formed to provide training to anyone interested in using these tools for riparian/wetland management. Dave Smith with

the BLM Kingman Field Office and Tom Subridge with the Apache/Sitgreaves National Forest are the cadre leaders. Dave can be contacted at (928) 692-4400, and Tom can be contacted at (928) 333-6250 for questions regarding the training.

ACTIONS TO DATE

BLM's emphasis has been on implementing management actions to improve conditions. To date, livestock and wild burro use has been the focus of our management efforts. Following are some office by office highlights:

The Arizona Strip has changed livestock management on the Virgin and Paria Rivers and Kanab Creek. Of particular importance is the management of the Paria River riparian area, as this is a world-class hiking trail.

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PRESIDENT'S MESSAGE

In the last newsletter I posed the question "What riparian issues should the Council focus on?" Your response has been overwhelmingly in favor of conducting riparian workshops. We have received several workshop topic recommendations and two of the more popular choices have been riparian restoration and stream assessment/geomorphology. Other ideas included conducting highly technical workshops focused on proper research/assessment techniques for members of the scientific community and introductory workshops geared toward the nonscientific general public. Nearly all of your feedback favored both classroom lecture and field activities.

Although the Council has not yet laid out specific plans for these workshops, we will be reviewing everyone's ideas and suggestions for ways to make the workshops informative and productive for our members. As always, we encourage additional input from the membership throughout the organizational process, so please forward your thoughts to anyone on the Board.


In the coming months we will begin planning for upcoming workshops. Planning and organizing workshops will require additional time and effort and the Board encourages members to become involved in the planning process. I realize additional time commitments can be difficult but your help is needed to implement these events. If you are interested, please contact me at jinwood03@aol.com. Also, more information on workshops will be in future newsletters and email so stay tuned.

On a different note, I recently represented the Arizona Riparian Council at the inaugural Conservation Summit 2002 sponsored by the Arizona League of Conservation Voters. The purpose of this summit was to help establish a conservation policy vision for Arizona to communicate to member organizations, elected officials and the public. Approximately 90 people representing numerous environmental and advocacy groups throughout Arizona attended the summit. Although this was only the first step of many, it appears to me that

an effective coalition could be built to induce changes in conservation policy at many levels.

One of the primary goals of the summit was to identify two or three attainable policy or education priorities that the summit participants could work on over the next year. By the end of the two-day summit we identified three priorities: (1) public education tailored to specific audiences (agencies, communities, legislature, etc.) that has consistent messaging; (2) conservation funding growth; and (3) a clear, measurable and accountable legislative agenda related to air, land and water.

Obviously, these priorities are nothing new to those of you in the habitat/wildlife protection and enhancement world. The key is always in the execution. A number of group leaders were chosen at the summit to spearhead "next steps" in the coalition building process so I am optimistic that good things will happen. I will keep you all posted on future developments as they occur.

Jeff Inwood, President 



Field trip to Canyon Creek at Fall Campout and Get-Together, September 22, 2002.

BLM....Continued from page 1

The Phoenix Office has improved riparian condition through improved livestock management on the Agua Fria and Hassayampa Rivers, Antelope and Bumblebee Creeks, and Badger Springs. There has been great success shown by changing livestock use to winter only. During the winter season the livestock does not stay in the canyon bottoms because of the colder weather and the availability of water on the upland areas. The Phoenix Office has also had to deal with Off-Highway-Vehicle (OHV) use of the riparian areas. They are dealing with this use through education of user groups, designation of the creeks as closed to vehicle use, and physical barriers to control access.

The Kingman Office has improved conditions on Burro Creek and Big Sandy and Santa Maria Rivers. Much of the improvement has been as a result of winter only or intensive rotational livestock grazing systems. Another significant issue has been the protection of the Big Sandy River from the development of a proposed power generation plant near Wikieup. Water withdrawals for use at the plant would likely impact the Big Sandy River flow. Kingman has been working through an Environmental Impact Statement to prevent any potential damage.

The Safford Field Office, as previously discussed, has been actively managing riparian areas since the early 1980's. Aravaipa Creek and Gila River riparian conditions have improved significantly. Conditions within the San Simon channel and watershed have show significant improvement since the major flooding and channel incision in the late 19th century. Riparian areas have developed behind erosion-control structures and the channel is stabilizing. Safford manages the Gila Box Riparian National Conservation Area which was designated in November 1990 by



Picture 1. Burro Creek in 1983 at the time of change in livestock use.



Picture 2. Burro Creek in 1989, showing channel changes after six years.



Picture 3. Burro Creek in 2000 after 17 years of intensive livestock management. Notice the dramatic increase of vegetation, presence of water and the development of an active channel.

Proper Functioning Condition as of October 2001.

flowing water - lotic							
<i>Field Office Name</i>	<i>PFC</i>	<i>FAR</i>	<i>FAR</i>	<i>FAR</i>	<i>Non- Func</i>	<i>Unkwn</i>	<i>Total</i>
		(up)	(?)	(down)			
							miles
Arizona Strip	72	4	10	0	2	0	88
Phoenix	49	31	44	14	2	0	140
Kingman	54	14	32	3	0	102	205
Safford	98	58	10	2	12	0	182
Yuma	0	8	17	0	0	0	25
Tucson	52	31	31	11	5	5	135
Havasu	0	21	0	17	0	0	38
total	325	167	144	68	21	107	813
percent	40	20	17	8	2	13	100

non-flowing water - lentic							
<i>Field Office Name</i>	<i>PFC</i>	<i>FAR</i>	<i>FAR</i>	<i>FAR</i>	<i>Non- Func</i>	<i>Unkwn</i>	<i>Total</i>
		(up)	(?)	(down)			
							acres
Arizona Strip	33	0	5	0	0	0	38
Phoenix	0	0	0	0	0	0	0
Kingman	0	0	0	0	0	0	0
Safford	8	0	0	0	0	0	8
Yuma	0	17830	10	0	0	838	18668
Tucson	0	0	0	0	0	0	0
Havasu	52	0	0	96	3027	0	3175
total	93	17830	15	96	3027	838	21889
percent	0.45	81	0.1	0.45	14	4	100

PFC= Proper Functioning Condition, FAR=Functional at Risk

Congress. Livestock use and OHV use have been prohibited in the riparian corridor.

The Yuma Field Office manages portions of the lower Colorado River riparian/wetland corridor. This is no small challenge because of the changes in the flow regime of the River, complex landownership patterns, the saltcedar-dominated riparian areas and the presence of the aquatic weed giant salvinia. They are actively working with diverse partnerships to remove saltcedar and replace it with native riparian species and control giant salvinia. Yuma also developed a partner-

ship with the Imperial and Cibola National Wildlife Refuges, U.S. Army Yuma Proving Ground and the Arizona Game and Fish Department to develop vegetation monitoring techniques to assure vegetation health within the wild horse and burro Cibola-Trigo Herd Management Area.

The Tucson Office manages the San Pedro Riparian National Conservation Area designated by Congress in November, 1988 as well as Cienega Creek within the Las Cienegas National Conservation Area. Much work has been done to improve conditions along the San Pedro. Agricultural fields

have been planted with native species, erosion control efforts have been implemented and beaver have been reintroduced. The most difficult issue facing the San Pedro is maintaining instream flow. The Tucson Field Office is actively working with the San Pedro Partnership to understand the hydrology and water demand in the basin and to assure water is kept in the River.

The Havasu Office also manages a portion of the lower Colorado River and the Bill Williams River. The Havasu Field Office faces the same challenges along the Colorado River as the

Yuma Field Office. They too have developed partnerships to improve conditions. Along the Bill Williams River, Havasu has been working with an interagency task force to obtain and maintain instream flow below Alamo Reservoir. This required a balancing act between maintaining the valuable resources associated with the reservoir while having low and flood flows to maintain the riparian area.

FUTURE ISSUES

The strain on BLM-managed riparian areas will continue to increase commensurate with Arizona's population growth. More residents means more

demand for water. BLM will continue to actively protect instream flow through obtaining water rights through the state of Arizona. We have currently 30 applications with the State on 20 streams. Six of the applications have permits and four have been certificated.

As stream condition continues to improve, BLM will be looking for opportunities to reintroduce threatened or endangered species such as native fish. In 1995, the Phoenix Office in partnership the Arizona Game and Fish and U.S. Fish and Wildlife Service, introduced Gila chubs into two streams north of Phoenix. Gila topminnows were introduced in 2000, and

desert pupfish in 2001 into these same streams. Preliminary indications are the fish are doing well.

The recent creation of national monuments and national conservation areas along with the existing riparian national conservation areas will bring additional riparian management challenges from recreation use. BLM will be working with partnerships to develop and implement management that assures our riparian areas are healthy and functional while providing for public use and enjoyment.



FALL MEETING, SEPTEMBER 21-22, 2002

To all of you who attended the Fall Campout Get-Together, thank you. We had a great turnout this year, even though not everyone was able to camp overnight. We especially want to thank Valerie Swick and Mario Castaneda, Gateway Community College, and Joe Feller, College of Law at Arizona State University, for bringing their students.

On Saturday afternoon, after arrival and camp setup, Grant Loomis, Hydrologist, Tonto National Forest talked to us about the fire and explained the BAER (Burned Area Emergency Rehabilitation) plan that the U.S. Forest uses immediately after a fire. Jonathan Long, Watershed Program Coordinator, White Mountain Apache Tribe also spoke to us about efforts after the fire.

Sunday morning we drove to near the Canyon Creek Fish Hatchery and hiked downstream. Ty Gray, Arizona Game and Fish Department, spoke to us about the effects of the fire and how the recovery process was occurring.

All in all it was a great trip, good food, good friends and great information presented. Thanks to all of you who participated!



Canyon Creek downstream from hatchery. Before the fire the aquatic vegetation covered the surface of the stream.



Burned stand of ponderosa pine about 100 yards from Canyon Creek.



SPECIES PROFILE



SEEP WILLOW: ARIZONA'S UNDER APPRECIATED RIPARIAN PLANT

by Elizabeth Making, Department of Plant Biology, Arizona State University

Seep willow (*Baccharis salicifolia*) is a common shrub found along Arizona watercourses. Botanical names for plants are two Latinized words that are usually descriptive in nature. The generic name *Baccharis* has two possible origins: after the Roman god of wine Bacchus, or from the Greek word Bakkaris, given to a plant with a fragrant root. *Salicifolia* is the descriptive term that refers to the willow-like leaves of this species. *Baccharis glutinosa* is an older synonym for *B. salicifolia*. It refers to the sticky/glandular leaf texture.

Seep willow (also known as mule fat) is dioecious, which means each plant has either male or female flowers but never both. Seep willow is actually not a willow at all. It is a member of the Asteraceae (sunflower family). In this family, what appears to be a single flower is actually a composite head composed of many individual flowers. Seep willow flower heads are white, from 4-6mm long, and found in flat-topped clusters at the ends of stems. Male flower heads are

rounded while female flower heads are more slender. The differences are noticeable if you have flowering branches from male and female plants to compare. There may be as many as 150 individual flowers in one female flower head. Seep willow normally blooms from March



Top left clockwise: achene with pappus, female flowering head, male. From *An Illustrated Guide to Arizona Weeds* (Parker 1972).



Baccharis salicifolia U.S. distribution map.

through October. The flowers are mainly bee-pollinated but can be seen swarmed with a variety of insects taking advantage of the nectar and pollen rewards. The female flowers mature into fruits consisting of a tiny achene (seed) dispersed with the help of a ring of bristly pappus to help it stay airborne. Seep willow and other *Baccharis* species such as desert broom (*Baccharis sarothroides*) can appear to be exploding with white fuzz in their later stages of flowering.

Seep willow occurs in wet soil habitat throughout Arizona (see distribution map). Its wide spreading root system and tendency to form thickets make it ideal for erosion control. The abundance of this species in Arizona probably makes it highly under appreciated. However, seep willow plays an important role in many riparian vegetation communities. They trap sediment during flooding which provides crucial substrate for recruitment of many types of seedlings. While the cottonwoods (*Populus* spp.), willows (*Salix* spp.), sycamore (*Platanus* spp.), and other riparian trees can inspire with their height and beauty, many would not exist if not for the shrubby seep willow.



Male flower head.





LEGAL ISSUES OF CONCERN

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DELTA BLUES: CURRENT LEGAL AND POLICY DEVELOPMENTS AFFECTING THE COLORADO RIVER DELTA

Recent studies suggest that declining levels of Colorado River water flowing into Mexico have had a direct negative effect on some commercial fisheries in the upper Gulf of California and have significantly altered benthic productivity and species composition in the lower Colorado River Delta (Galindo-Bect et al. 2000, Kowalewski et al. 2000, Rodriguez et al. 2001). In addition, the restoration and ultimate conservation of some federally listed endangered species is partly dependent on assuring that an adequate amount of water from the Colorado River flows through the region (Hinojosa-Huerta 2001). This issue was previously discussed in *Arizona Riparian Council Newsletter* Vol. 14, No. 3 (2001). This article provides an update of environmental, legal, and policy developments affecting the Delta.

STATUS OF CLAMS, FISHERIES, AND ENDANGERED SPECIES

A common problem in the assessment of the effects of human activities on ecosystems is that, often, cause and effect cannot be determined directly, as data on flora and fauna assemblages and abundance are nonexistent prior to human perturbation. Reconstructing the Delta's past and the effects of water diversion in this region is certainly no exception to this problem. However, recent studies have provided some compelling and quantifiable evidence of the negative effects of the lack of Colorado River flow.

Using paleontological, ecological, geochronological, stable isotope, field, and satellite

imagery tools, various researchers have shown that during the time of natural river flow, an average population of 6×10^9 bivalve mollusks thrived in the Delta with a population density of approximately $50/m^2$. In contrast, the present abundance of benthic macroinvertebrates is 94% lower ($3/m^2$). According to Kowalewski et al. (2000), this dramatic decrease in abundance testifies to the severe loss of benthic productivity resulting from diversion of the river's flow. The bivalve mollusk *Mulinia coloradoensis* was once the most abundant species of clam inhabiting the Colorado Delta. Shells of this species make up 84-95% of the shells in the Delta's beaches (Rodriguez et al. 2001). However, the large number of old shells of this species is in stark contrast to the small living population surviving near the mouth of the river (Rodriguez et al. 2001). Stable isotope analyses have proven that *M. coloradoensis* lived in water lower in salinity than is now typical of the Delta (Rodriguez et al. 2001). Hence, the decline in abundance of this species is most likely attributed to decrease in flow of Colorado River water to its estuary (Rodriguez et al. 2001).

In the same vein, Galindo et al. (2000) conducted a correlation analysis relating shrimp landings with discharge of the Colorado River into the northern Gulf of California. Their study shows a clear relationship between total catch and the rate of discharge of Colorado River water into the marine ecosystem. This comes as no surprise to local fishermen, who have consistently argued that years of good flows cause subsequent positive effects on their

fisheries (Cudney-Bueno and Turk-Boyer 1998). Similarly, empirical evidence suggests that the modification of the Delta ecosystem, along with fishing pressure, could have been one of the reasons behind the collapse of the totoaba (*Totoaba macdonaldi*). The totoaba is an endangered fish endemic to the upper Gulf of California that uses, like other fish, the Delta as a spawning and nursing ground.



Totoaba. Photo from Desert Fishes Council (<http://www.desertfishes.org>)

Besides the river's effect on the marine ecosystem, recent studies on bird populations of the Delta address the critical need to maintain adequate riparian habitat, habitat which is directly dependent on the Colorado River. Studies on population and habitat use of the endangered Yuma clapper rail (*Rallus longirostris yumanensis*) have shown that the Cienega de Santa Clara (Santa Clara Slough), an artificial remnant of what the

Delta used to be, represents a critical habitat for the survival of this species (Hinojosa-Huerta et al. 2001). Furthermore, recent field observations suggest that surprising increases in water flow to the Delta during 2001-2002 rapidly increased cattail (*Typha* spp.) habitat and birds nesting in this habitat (Hinojosa-Huerta, pers. comm.). Similarly, the patches of willows (*Salix* spp.) and other riparian habitat provide important habitat for the migratory endangered southwestern willow flycatcher (*Empidonax trailii extimus*) and a nesting site for the yellow-billed cuckoo (*Coccyzus americanus*), a species that may soon enter the endangered species list (66 Fed. Reg. 38611 [July 25, 2001]).

LITIGATION OVER THE SCOPE OF THE LOWER COLORADO MSCP AND RELATED ISSUES

It was initially hoped that the Multi-Species Conservation Plan (MSCP) being developed for the Bureau of Reclamation's lower Colorado River operations would address the environmental challenges facing the Delta and upper Gulf of California. However, the Steering Committee that formed in January 1997 to develop a MSCP for the lower Colorado River continues to maintain that the plan's scope does not extend into Mexico. Accordingly, a draft Conservation Plan was developed on July 10, 2001 that limited the geographic scope of the MSCP to the U.S. side of the Mexico border. See *Administrative Draft Conservation Plan and Preliminary Draft Impact Assessment for the LCR MSCP* (July 11, 2001). A second administrative draft of the Plan developed on January 25, 2002, and currently under review by the Steering Committee, is similar in scope. The latest draft is available at <http://www.lcrmscp.org/files.html>.

In response to the Steering Committee's decision, Defenders of Wildlife, among others, filed suit in U.S. District Court in June, 2000 asserting that the Endangered Species Act required the Bureau to take into consideration the effects of U.S. lower Colorado River operations in Mexico. *Defenders of Wildlife, et. al. v. Babbitt*, D.D.C. Civ. No. 00-1544 (June 28, 2000). The profound effect this decision could have on Colorado River operations prompted many water users to oppose this lawsuit.

In an early procedural victory for the environmentalists, the court, in an October 2000 order, denied motions to intervene in the lawsuit by a number of municipal and private water users, including the state of Arizona, because they lacked judicial "standing," i.e., they had failed to adequately allege an "injury in fact" (Order, *Defenders of Wildlife, et. al. v. Babbitt*, Civil Action No. 00-1544 [JR] [Oct. 13, 2000]). This decision was appealed to the Ninth Circuit Court of Appeals, which is declining to address the issue until the lower district court provides its decision. There is no indication of when the district will make its decision despite oral arguments having been heard in October 2000.

OPERATION OF THE YUMA DESALTER

Currently, the Cienega de Santa Clara survives on highly saline irrigation tail water that flows from the Wellton-Mohawk Irrigation District (WMID). The WMID primarily serves to provide irrigation water to 62,500 acres of agricultural land located approximately 30 miles east of Yuma, Arizona. WMID is a political subdivision of the state of Arizona, although it is part of the Gila Project authorized by Congress in 1947 to be built by the Bureau of Reclamation.

Water from the WMID flows into the Cienega de Santa Clara

via what is referred to as the Wellton-Mohawk Bypass Canal. What the Canal bypasses is the federal Wellton-Mohawk Desalinization Facility (aka "desalter") in Yuma. The desalter was built to reduce the salinity of drain waters from the WMID in response to a 1944 agreement between Mexico and the U.S. regarding delivery of usable Colorado River water to Mexico. However, after 12 years of planning and \$256 million in construction costs, Congress has failed to appropriate money for its annual operating costs (\$23 million) and the desalter has been idle since 1992. As a consequence, the Cienega de Santa Clara has thrived on the tail water the desalter is supposed to treat and has been designated as a United Nations biosphere reserve.

The Bureau of Reclamation, however, recently indicated that it may have to begin operation of the desalter as a result of the Colorado River Surplus Criteria that was implemented January 16, 2001. Under this new Criteria, a limited "surplus" of Colorado River water has been declared until 2016. The surplus was declared so that California could rely on the surplus water while it begins to ratchet down its Colorado River water use by 2016 to what it is entitled pursuant to the Supreme Court's decision in *Arizona v. California*. Before the Criteria's surplus declaration, the Bureau claims that it has utilized the water conserved by the lining of 49 miles of the Coachella Canal in California to offset the need to operate the Yuma desalter. Now that California is using all available surplus (i.e., the water saved by the Coachella Canal lining) the Bureau is faced with finding another source of water to continue to offset the need to start the desalter. If it cannot, then the Bureau may attempt to obtain the funds to begin the desalter. (See *Colorado Water Conservation Board Memorandum* [Sept. 14, 2001]). If so, the Cienega de Santa Clara would be

decimated because it would no longer receive the WMID tail water.

A solution to this issue lies squarely within the jurisdiction of not only the Bureau of Reclamation, but also with the International Boundary and Water Commission (IBWC). Recent activity by the IWBC in regard to the fate of the Colorado River system in Mexico provides hope that a solution may be found.

RECENT IBWC ACTIVITY

On December 11, 2001, the IBWC met in El Paso to consider a conceptual framework for cooperation by the U.S. and Mexico through the development of studies and recommendations concerning the riparian and estuarine ecology of the Colorado River Delta. Minute 306 was adopted, which recognizes that an exchange of information between U.S. and Mexican researchers in regard to the Delta is necessary. Out of this recognition, a symposium intended to be a major information sharing exercise was scheduled in Mexicali. Unfortunately, the Mexicali symposium coincided with the events of September 11, 2001, which reduced its efficacy. Proceedings are still being translated and have yet to be published.

As one commenter has recognized, it is within IBWC's authority to facilitate an agreement with Mexico that would ensure the continued biological relevance of the Delta. (See Robert Glennon, *The Last Green Lagoon: How and Why the Bush Administration Should Save the Colorado River Delta*, 28 Ecology Law Quarterly 903, [2002].) A major hurdle to overcome is the fear that any water voluntarily provided to the Delta by the U.S. would instead end up in the fields of Mexicali's farmers. Also, under the terms of the U.S.-Mexican Water Treaty of 1944, Mexico has no obligation to use any of its water allotment for species preservation. (See Memorandum from Mr. John Leshy, Solicitor, Department of Interior

to Mr. Eluid Martinez, Commissioner, Bureau of Reclamation, dated August 14, 2000.) However, creative solutions may exist that adequately resolve these issues. For instance, a widely circulated May 2001 report by Michael Clinton Engineering, *Immediate Options for Augmenting Water Flows in the Colorado River Delta in Mexico*, suggests securing water for the Delta from alternative sources, most notably, from the purchase of marginal agricultural land with water rights in Mexico and the U.S., and the dedication of those rights to riparian habitat along the river corridor below Moreles Dam. Significantly, the Clinton Report helps to dispel the myth that Mexico's water management regime is inadequate to ensure that water meant for the Delta actually gets there (see Clinton Report at p. 15).

The Clinton Report has been criticized by some environmental groups for not addressing the fate of the Cienega de Santa Clara, and for not including soliciting the input of local groups, such as the Cucupah Nation. Nevertheless, it demonstrates the type of creativity in regard to the Delta that IWBC is in a position to exploit.

Recent events in Texas involving a highly publicized dispute between Mexico and Texas farmers over Rio Grande water has diverted the IWBC's attention from the Colorado. Moreover, both the U.S. and Mexico are accused of tying the fate of the Delta to resolution of the Rio Grande issues. The political fallout of this dispute has delayed diplomatic negotiations regarding the Delta. For example, environmental groups have been cautioned by the U.S. State Department to forgo discussions regarding the Delta with Mexican officials while this dispute is being resolved (pers. comm. by author with environmental organizations). On the other hand, the Rio Grande dispute has resulted in U.S.-Mexico water issues getting the attention they deserve. As a result, if the Bush

Administration were to provide immediate and proper attention to these issues, then a window of opportunity exists for the U.S. State Department and IWBC to ensure the Delta's survival, while at the same time providing certainty with regard to water deliveries to and from Mexico.

ACKNOWLEDGMENTS

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NOTEWORTHY PUBLICATIONS

Jere Boudell, Department of Plant Biology, Arizona State University

Kennedy, L. J., R. L. Tiller, and J. C. Stutz. 2002. Associations between arbuscular mycorrhizal fungi and *Sporobolus wrightii* in riparian habitats in arid southwestern North America. *Journal of Arid Environments* 50: 459-475.

Sporobolus wrightii or big sacaton is a tallgrass species of the Southwest. It can be found in both lower floodplains and upper terraces. Big sacaton once occupied millions of acres; however, disturbances such as groundwater decline and river alteration have reduced sacaton grasslands to an estimated 5% of its former acreage. This species has been slow to reestablish and attempts to restore the species have failed. Research has revealed that it is important to reestablish mycorrhizal species to degraded areas to facilitate revegetation in arid areas. Mycorrhiza is a mutualistic symbiotic relationship between plants and fungi, where the fungus plays a dominant role in phosphorous uptake. However, not all species form symbiotic relationships with mycorrhizal fungi and some species respond negatively to colonization. Kennedy et al. investigated the mycorrhizal communities associated with big sacaton at four riparian sites along the San Pedro River.

The authors selected four sites that were representative of both lower floodplain and upper terraces in perennial and intermittent reaches of the San Pedro. They collected soil and root fragments at 0-15 and 15-30 cm six times during the year of investigation. Mycorrhizal colonization was assessed and AM (arbuscular mycorrhizae) fungi were cultured and species identified.

Results of the Kennedy et al. investigation reveal that big sacaton was colonized by

mycorrhizal fungi throughout the field season. Differences were found in the levels of colonization over a growing season and between different riparian habitats. A relatively species rich community of mycorrhizal fungi was associated with big sacaton. However, of the 15 species that colonized big sacaton, the majority were from one genus – *Glominae*. Seasonal patterns were found to occur in the mycorrhizal communities, which varied with the growth and reproductive cycle of big sacaton. The authors also found that differences exist between upper terraces and lower floodplain sites. Colonization by mycorrhizal fungi was highest in sites with perennial flow.

Kennedy et al. found a close association between big sacaton and mycorrhizal fungi. This information has management implications. Big sacaton may reestablish more quickly if its associated mycorrhizae fungi is present. Efforts to restore big sacaton may be more successful if a healthy community of mycorrhizae are present.

Adair, E. C., and D. Binkley. 2002. Note: Co-limitation of first year Fremont cottonwood seedlings by nitrogen and water. *Wetlands* 22(2):425-429.

Adair and Binkley investigated nutrient availability for riparian systems populated by cottonwood species. Nutrient availability has been found to affect species composition and productivity of most upland systems. However, nutrient availability has received little attention in Southwestern riparian ecosystems where water is thought to be the primary limiting factor for many riparian species. The authors point out that cottonwood seedling survival is dependent on root growth. If cottonwood seedlings cannot

reach the water table, they die. Greater nitrogen availability may affect the growth of cottonwood root systems.

The authors selected two main sites for investigation in the northwest Colorado floodplain of the Yampa River, which is located in Deerlodge Park in Dinosaur National Monument. The sites selected contained cottonwood seedlings that had not surpassed 4 cm in height. Fifteen sites were randomly located within each of the two main sites. Four plots were established in each of the 15 sites. Four experimental treatments of control, water, nitrogen, and water plus nitrogen were randomly assigned to the four plots. Density was measured throughout the investigation. At the end of the study period, the total (shoot plus root), shoot, and root growth of the five largest seedlings from each plot were measured.

Adair and Binkley found the nitrogen or water additions doubled the total growth and shoot length of cottonwood seedlings. The water-only treatment did not increase root growth; however, the nitrogen-only treatment doubled root growth. The water-plus-nitrogen treatment doubled both total growth and root length and tripled shoot length.

The authors' results support the hypothesis that water is not the only limiting factor to cottonwood growth and survival. Nitrogen, as well as water, may indeed make the difference to successful cottonwood establishment and survival.



The Arizona Riparian Council (ARC) was formed in 1986 as a result of the increasing concern over the alarming rate of loss of Arizona’s riparian areas. It is estimated that <10% of Arizona’s original riparian acreage remains in its natural form. These habitats are considered Arizona’s most rare natural communities.

The purpose of the Council is to provide for the exchange of information on the status, protection, and management of riparian systems in Arizona. The term “riparian” is intended to include vegetation, habitats, or ecosystems that are associated with bodies of water (streams or lakes) or are dependent on the existence of perennial or ephemeral surface or subsurface water drainage. Any person or organization interested in the management, protection, or scientific study of riparian systems, or some related phase of riparian conservation is eligible for membership. Annual dues (January-December) are \$20. Additional contributions are gratefully accepted.

This newsletter is published three times a year to communicate current events, issues, problems, and progress involving riparian systems, to inform members about Council business, and to provide a forum for you to express your views or news about riparian topics. The next issue will be mailed in January, the deadline for submittal of articles is December 15, 2002. Please call or write with suggestions, publications for review, announcements, articles, and/or illustrations.

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CALENDAR

Arizona Riparian Council Board of Directors Meeting, October 16, 2002, 4 PM, Maricopa County Flood Control District Offices, Phoenix. Contact Cindy Zisner, Cindy.Zisner@asu.edu or (480) 965-2490.

2002 Watchable Wildlife Conference, October 16-18, 2002, Saint Paul, Minnesota. For detailed information and to register go to <http://www.watchablewildlife.org> or call (651) 433-4100.

Desert Fishes Council 34th Annual Meeting, November 14-17, 2002, in San Luis Potosí, México. Meeting questions may be addressed to Juan Miguel Artigas Azas, email juan@cichlidae.com. For more information, visit <http://www.desertfishes.org/meetings/2002/index.html>.

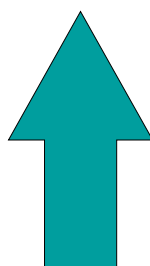
Lessons Learned – Gateway to Flood Mitigation, Association of State Floodplain Managers, May 11-14, 2003, St. Louis, MO. Contact Association of State Floodplain Managers, (608) 274-0123 for more information or <http://www.floods.org/StLouis/>.



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