The Arizona Riparian Council Newsletter

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Buffelgrass - Sonoran Desert Nightmare

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A plant taxonomist's nightmare is coming true in Sonora. A single, alien plant has taken over the landscape. The same plant is permanently changing the entire Sonoran Desert. Over the next few decades it may destroy untold areas now populated by the cacti, the trees, the shrubs, the herbs, that make our desert so appealing.

The alien is here in Arizona because myopic agronomists and bureaucrats in the U.S. Department of Agriculture (USDA) Soil Conservation Service (SCS) brought it here, using our tax money. In Sonora, Mexico, the plant is steamrolling through the desert, thornscrub and tropical deciduous forest, thanks to subsidies paid by Mexican taxpayers. It is ravaging native plants. Nuisance aliens such as tumbleweeds and saltcedars are benevolent by comparison.

It is a grass from Africa called buffelgrass, *Pennisetum ciliare*. In the 1940s a South African researcher collected the grass near Lake Turkana in Africa's Great Rift Valley to improve forage in his country's drylands. The plants were tested and released in South Africa and shipped to the United States in 1946. These were successfully established in Texas and only three years later, in 1949, SCS released a strain of the grass labeled T-4464. Today it is established in about 10 million acres in Texas, 14 million acres in Mexico and nearly 20 million acres in Australia.

It was imported to foster range improvement. The idea was to produce more beef. Buffelgrass arrived in the United States free of its natural enemies, organisms that keep it in check. It was tested in Texas, then in Monterrey, Mexico.

The results appealed to ranchers. Big increases in beef - they found. It grew into a bully grass - tough, aggressive, mean. Cows ate it and grew fat. It was tried it in Arizona and California, but Mexico, it turns out, has a better climate for the grass. In a humid climate, the grass is subject to devastation by insect and fungal infestations. In harsh desert it does not receive sufficient moisture. In the more moist portions of the Sonoran Desert, however, and in thornscrub and tropical deciduous forest, the rainfall is usually sufficient and long dry seasons kill most disease-bearing organisms.

Mexican agronomists at SARH (Mexico's equivalent of USDA), with help from their counterparts in the USDA, took buffelgrass to Sonora and planted it 30 or so years ago. It produced better weight gain per acre on cows than native grasses did. It has been so successful in Sonora that around

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In This Issue

President's Message

Kris Randall, President

As I assume the responsibilities of President, I remember what the Council was like when I first joined. I was proud to be associated with an organization known for its scientific objectivity and technical expertise. The value of riparian areas was finally being recognized and incorporated into management plans and guidance documents and the state had taken a keen interest.

By 1988, State Parks had prepared the Wetlands Priority Plan, the Commission on the Arizona Environment began compiling information on status, economic value, and public opinion and solutions to issues surrounding the management of riparian areas. State Parks prepared the 1988 Statewide Comprehensive Outdoor Recreation Plans, SCORP, which included a study on Arizona river, streams, and wetlands. Governor Rose Mofford signed two Executive Orders. On June 10, 1989 she signed E.0.89-16 *Streams and Riparian Resources,* which formed the Governor's Riparian Habitat Task Force. The Task Force produced several reports one of which was the adoption of a riparian area policy and another was an inventory of possible site actions to achieve the goals of the riparian protection policy. On February 14, 1991 Gov Mofford signed Executive Order 91-6 *Protection of Riparian Areas,* which established the Riparian Areas Coordinating Council. The E.O. directed an inventory and classification of riparian areas, and legislation was to be developed for instream flow and state riparian area protection.

Legislation was passed in 1992 directing three state agencies to conduct studies on riparian areas. The Arizona Department of Environmental Quality, Arizona Game and Fish Department, and the Department of Water Resources have all provided valuable information to a 34-member committee who will use the findings of those reports along with information on existing state and federal laws and regulations to develop recommendations for riparian area protection. These recommendations will be submitted to the Governor, President of the Senate and Speaker of the House by December 1, 1994 .

Could Arizona be at the crossroads and finally recognize riparian areas as valuable ecosystems worthy of protection? The current political climate makes one wonder. Public opinion surveys show that people vigorously support protection of riparian areas and are willing to pay for protection through taxes, increased regulation, or some other means (Morrison Institute 1991, Arizona Game Fish Department Wildlife 2000 Survey, 1994 - See page 10.). Studies have identified the important functions riparian areas perform for wildlife and for people.

You might ask, what is the next step? Public involvement is needed. The Council has six committees that could always use new people. I urge you to contact me or the chairperson of the committee you would like to serve on. You could write the Legislature and the Governor to express your concern for riparian areas. Before the fall election determine which candidates have an understanding of riparian areas and of the need to preserve wildlife habitat and recreational opportunities. The time to be involved is now.

Congratulations to Duncan Patten!

The Ecological Society of America presented its prestigious annual Distinguished Service Award to Duncan Patten for fifteen years of valuable volunteer service as Business Manager of the Society.

Protecting Riparian Habitat in Pima County

Gayle Hartmann
Co–chair, Riparian Habitat Protection Committee

After three and one–half years of effort, Pima County adopted an ordinance designed to protect washes. On 19 July 1994, the Pima County Board of Supervisors unanimously passed the "Watercourse and Riparian Protection and Mitigation Ordinance."

Natural, tree–lined washes are one of the real amenities of the Sonoran Desert. But, for decades we in Tucson and Pima County have not treated our washes well. They have been scraped, cemented and channelized into concrete–lined ditches. This occurred partly through ignorance. Buildings were allowed to be built close to the banks of our major streams, the Santa Cruz River, for example. Then, when floods undermined foundations and buildings slumped into streambeds, there was really no option but to stabilize the streambanks with soil cement — at enormous taxpayer expense.

Other smaller washes were channelized because such treatment seemed easier and cheaper from the developer's perspective, and frequently from the city and county's perspective as well. It seemed as if no thought was being given to the future.

Finally, in 1990 and 1991 the City of Tucson passed two wash–protection ordinances designed to help save the few relatively natural washes that remained within the city limits. But Pima County, with most of the large, significant washes still in a natural state, seemed unable to do anything.

After numerous stops and starts, and continued pressure from environmental groups, the County Board of Supervisors finally took some action. They appointed a nine–member citizen committee to hammer out the details of the ordinance. The committee included environmental, neighborhood and private property representatives as well as developers and members of the Pima County Planning and Zoning Commission and the Pima County Flood Control Advisory Board. Alan Lurie, Executive Director of the Southern Arizona Home Builders Association, and I were the co–chairs.

So, what does this ordinance do? Its purpose is to keep development away from washes, with the primary goal being to preserve the heavy vegetation along the banks. The ordinance allows modification of certain development standards — "carrots" for the developer if you will — that encourage compliance. Thus, the ordinance is very much incentive–driven.

The development standards that may be modified include (1) setbacks between structures; (2) subdivision lot size; (3) off– street parking requirements; and (4) bufferyard requirements. Minimum size for lots in a CR–1 or GR–1 subdivision may be reduced from 36,000 square feet to 18,000 square feet; minimum size for lots in a CR–2 subdivision may be reduced from 16,000 square feet to 12,000 square feet; and minimum size for lots in a CR–3 or CMH–1 subdivision may be reduced from 8,000 to 7,000 square feet. In bufferyards, the number of trees required may be reduced up to 50 % when riparian habitat is preserved. Other development modifications may be requested; all modifications must be approved by the Pima County Planning Department and, ultimately, by the Board of Supervisors.

The development community in Pima County has complained for years that the county's environmental regulations do not contain incentives that encourage them to comply. This ordinance is designed to counteract that concern. Now we have to see if it will work.

Who does this ordinance affect? The ordinance comes into play whenever a development plan or subdivision plat requires a floodplain–use permit. This permit is required when a total of one acre or 10%, whichever is less, of the riparian area of a subject property is to be altered. The ordinance does not apply to private property owners who are not developing their property. Thus, if a private property owner lives along a wash, he or she is not prohibited from cutting down trees along the wash, **unless the cutting occurs in connection with proposed development activities.** Some environmentalists would have liked the ordinance to affect private property owners, but such an ordinance would have been a nightmare to enforce.

Which washes are included? How to decide which washes to include was one of the big hang–ups in moving the ordinance

toward completion. The county finally hired an environmental consulting firm to help make this decision on some kind of rational basis. The decision was made to classify washes according to the amount and type of vegetation in association with them. To do this the following "techno-jargon" was utilized: hydroriparian, mesoriparian, and xeroriparian. "Hydroriparian" is defined as riparian habitats generally associated with perennial watercourses — cottonwood/willow is a typical plant community; "mesoriparian" is defined as riparian habitats generally associated with intermittent watercourses or shallow groundwater — mesquite bosques and sycamore-ash are typical communities; and "xeroriparian" is defined as riparian habitats generally associated with ephemeral streams — plant communities are similar to upland habitats but the specimens are larger and occur at higher densities.

Pima County has only a few "hydro" and "meso" washes — Sabino Creek and Tanque Verde Creek, for examples. All "hydro" and "meso" washes are covered by the ordinance. The xeroriparian washes were divided into four categories (A, B, C, D) depending on the volume of vegetation in association with them. The A, B, and C categories are covered by the ordinance; D washes are not covered. The decision not to include D washes just about had to be made as we had no way to define a lower limit for D. However, a developer will receive certain incentives if he chooses to avoid or mitigate D washes.

What exactly will happen to washes covered by this ordinance? Avoidance of the riparian area is strongly encouraged, but mitigation will be allowed. Mitigation basically means planting new vegetation to replace vegetation that has been destroyed. Guidelines for this will be quite specific and will be spelled out in a mitigation handbook. Or, in a few cases — such as a gas station on a commercial corner where a wash happens to cut through the middle of the lot — mitigation could mean putting money into a county fund to buy important riparian land in other parts of the county.

What does this ordinance really mean? Had it been passed 15 or 20 years ago, it would have meant a lot. A lot of downstream damage caused by upstream channelization wouldn't have happened. Instead of cement channels, natural, tree-lined, sandy-bottomed washes would flow in their place. However, now in 1994, I consider this ordinance only a modest step in the direction of trying to design our community in harmony with the desert instead of in spite of it. It may serve as a model for other counties where washes remain relatively intact.

Ed note: The Arizona Riparian Council was a member of the coalition which helped to achieve this new ordinance.

Mesquite Workshop

The Redington Natural Resource Conservation District (NRCD) has planned an innovative workshop (October 29-30) to educate the NRCD and others on the role of mesquite in a riparian ecosystem and to examine potential economic benefits as well as negative impacts, of mesquite on private landowners and rural economies.

Some of the most knowledgeable mesquite experts in Arizona will be speaking and leading field trips - Julie Stromberg, Richard Felger, Paul Martin, Gary Nabhan, Ray Turner, Peter Feller, Drum Hadley, Jerry Lawson, Dave Matthews, John Meyer, Ken Milhauser, Carlos Nagel, Phil Ogden, Bob Ohmart, and Dave Perino.

Space is very limited in the Cascabel Community Center, so the NRCD is not encouraging big attendance from outside the NRCD. If you would like to attend, contact Bonnie Thompson at (602) 384-2292. Registration for non-NRCD cooperators is $35.

The winter issue of this newsletter will contain a summary of the workshop presentations.

Ecosystem Profile

Julie Stromberg,
Arizona State University

Hackberry Bosques

Netleaf hackberry (*Celtis reticulata*) is a deciduous tree that has an interesting distribution pattern in Arizona's riparian areas. It often grows intermixed with mesquite (*Prosopis* ssp.), Arizona walnut (*Juglans major*), Mexican elder (*Sambucus mexicana*), and other trees along the edges of intermittent canyon streams or on the upper floodplain terraces of alluvial perennial rivers, over an elevational range from about 700 to 2000 m. Occasionally, however, it forms monotypic (i.e., same–species) stands which can be referred to as hackberry "bosques". Examples of the hackberry bosques, which generally are quite small, can be found along the San Pedro River (at Cook's Lake), the Santa Cruz River (near Rio Rico), Sonoita Creek, Hitt Wash (near Prescott), and many other rivers.

Netleaf hackberry occurs throughout western US and northern Mexico. Although little research has been done on the ecology of netleaf hackberry in Arizona, some has been conducted in other areas. These studies suggest that hackberry has a preference for loam soils, which often develop on stabilized, infrequently flooded terraces. The trees grow slowly and have a long life–span of up to 400 years. Like mesquite, hackberry varies its size and growth rate depending on water availability, with the largest trees occurring on sites underlain by a shallow water table. In parts of the West where there is sufficient rainfall, hack-berry grows as widely scattered, small trees in the uplands.

The small, fleshy fruits (drupes) produced by hackberry serve as a valuable fall and winter food source for many birds and mammals. Many birds also feed on the "nipplegalls" and "blistergalls" found on hackberry leaves. Galls are abnormal growths of plant tissue caused by the stimulus of an animal or other plant. In the case of hackberry, the galls are formed by one or more species of tiny insects called psyllids, also known as "jumping plant–lice." These gall–forming insects, which resemble tiny cicadas, lay their eggs in the hackberry leaves and cause the leaves to develop galls which provide homes for developing psyllid larvae. Late instar nymphs and adults that emerge from the galls provide food for woodpeckers, flickers, warblers, finches and other birds.

Besides the leaf galls, another interesting feature found on hackberrys are the warty protrusions found on the tree trunks. The technical term for these structures are "hypertrophied lenticels," with lenticels being pores in the stems of plants through which gas exchange occurs. The lenticels become distended in *Celtis reticulata* and *C. laevigata*, a closely related species found in midwest and eastern USA. In *Celtis laevigata*, which often grows in seasonally flooded wetlands, they may serve to increase aeration of root tissue.

Many questions remain about the ecology of netleaf

hackberry in Arizona's riparian areas. For example, what conditions allow the trees to establish? Why does hackberry form monotypic bosques in some areas but grow in mixed stands in other places? What role do birds play in dispersing hackberry seeds? Many other riparian trees and shrubs of relatively limited distribution, including soaptree (*Sapindus saponaria var. drummondii*) and buttonbush (*Cephalanthus occidentalis*), also fall into this information "black–hole". We still have much to learn about our diverse riparian ecosystems!

Riparian Fact Sheets Now Available

The Riparian Council's first fact sheets on many aspects of riparian areas will soon be available for public distribution. The first one describes riparian areas generally. Subsequent ones talk about specific habitats, functions, wildlife use, urban washes, restoration, and other topics. The materials will be made available to teachers, nature preserves, and similar places. The project was partially funded by the Forest Service. Call Cindy Zisner at 965-2490 for more information.

Wildlife That Goes "Moo"

Jeff Burgess

A federal Bureau of Reclamation (BOR) wildlife project near Arizona's Roosevelt Lake, which critics say looks more like a subsidy for the local ranchers, is at least half a million dollars over its projected budget.

The project was initiated by the BOR to compensate for the loss of several thousand acres of wildlife habitat which will be flooded when the level of Roosevelt Lake is raised as part of the Central Arizona Project.

The BOR began consulting with the Tonto National Forest, the primary land owner in the area, and other agencies, on the wildlife project in the 1980's when overgrazing was identified as a primary cause of wildlife habitat degradation in the area. But Forest Service officials made it clear they would not participate in a wildlife project that would reduce or eliminate grazing on the reservoir's arid watershed.

The BOR outlined the wildlife mitigation project that was finally agreed upon in their 1990 environmental assessment (EA) of their plan to raise Roosevelt Dam. They proposed to spend $1.6 million of BOR funds to build many miles of fence and construct dozens of livestock watering devices on public lands so cattle could be restricted from Tonto Creek and be more evenly distributed on the 11 Forest Service grazing allotments surrounding the lake. Some of the $1.6 million was earmarked to hire a third party to monitor the results of these livestock management strategies.

The centerpiece of the plan was the creation of the Tonto Creek Riparian Unit (TCRU), which called for erecting fences along both sides of the lower 15 miles of Tonto Creek, a perennial tributary to the lake, in order to create a series of riparian pastures.

Tonto Creek is now a wide, gravelly wash after suffering from more than a century of overgrazing. But according to one of area's first American settlers, "the water seeped rather than flowed down through a series of sloughs," when he first saw it in the 1870's.

However, despite the severely degraded condition of the creek, Forest Service officials were unwilling to suspend grazing within the TCRU. They wanted an opportunity to show the stream's riparian habitat could be rehabilitated with continued, intensively managed, livestock grazing in the TCRU's riparian pastures.

The other agencies on the planning team, including the BOR, U.S. Fish and Wildlife, and Arizona Game and Fish, agreed to let the them try. The problem was they all underestimated the cost of the project, especially monitoring costs.

According to the BOR's Henry Messing, monitoring managed grazing in the TCRU is going to cost at least $700,000. That's in addition to the $700,000 already spent to set up the riparian pastures. Another $650,000 is going toward the new grazing allotment management plans (AMPs) being implemented on 11 allotments adjoining the lake. An additional $50,000 will be spent to monitor the success of these AMPs. Total bill for the BOR's "wildlife" project: $2.1 million. Or about $191,000 per ranch.

"It just kept getting more expensive the further we got into it," Messing explained. He added they would not be receiving any more BOR money for the project. The size of the BOR's investment has some people wondering if the money was well spent.

Professor Robert Ohmart, of Arizona State University's Center for Environmental Studies, was one of bidders for the TCRU monitoring contract, which was recently awarded to BioSystems Analysis of Santa Cruz, California. Ohmart said his bid, like the winning bid, was also in the $700,000 range because BOR wanted a lot of information collected. "The experimental design contained a number of different treatments and each had to be replicated which entailed intensive field measurements annually for a minimum of five years." Ohmart explained.

Ohmart feels that the Forest Service should have totally removed cattle grazing in the TCRU and used it as a learning guide and wildlife area. He observed that too many of our low elevation perennial streams are degraded and the cottonwood-willow gallery forest virtually gone in central Arizona. "It is a well-known fact in the riparian grazing literature that the most effective and cheapest method to restore these habitats is to not graze them." When riparian habitats are grazed the management strategy is to harvest the forage with minimal damage to the stream and its floodplain.

Phoenix grazing activist, Mike Seidman, a follower of the Tonto's livestock management strategies for several years, also thinks it would have made more sense to simply discontinue grazing in the TCRU. "It's hard to criticize them for monitoring, because they almost never do it, but biologists agree total rest from grazing is the best way to improve riparian areas," Seidman said.

So why, people are wondering, was the BOR willing to spend at least $700,000 to study the effectiveness of managed grazing when it would have been cheaper and more effective to simply eliminate grazing in the TCRU?

Arizona BOR officials claim the Tonto National Forest wouldn't agree to end grazing in the TCRU and Tonto officials claim they had little choice but to allow it to continue. "There were some politics involved, unfortunately," said Don Pollock, wildlife biologist for the forest's Tonto Basin Ranger District. "The whole Tonto Basin community has always been a ranching community," he explained.

Pollock said the TCRU monitoring results will be useful because they will either show the compatibility of riparian restoration and continued grazing, or, provide the information the Forest Service needs to prove to the local ranchers that grazing in the TCRU should be suspended.

"If the creek, after six years, isn't found to be making adequate progress towards meeting riparian recovery objectives, grazing will be terminated in the TCRU," the BOR's Messing pointed out. Seidman doubts that the monitoring data, no matter what it shows, will ever be used to end grazing in the TCRU. "The Tonto Basin Ranger District is a stronghold of the Forest Service's tradition of pandering to livestock interests," he explained.

The AMPs being developed on the 11 allotments around the lake with the BOR's $650,000 are good examples of the district's subservience to the local ranchers. "The EAs for these AMPs don't even acknowledge the AMPs are supposed to be wildlife projects but say they're being implemented to compensate the ranchers for the public rangelands that will be flooded be the new dam," he said.

He says the EA's fail to analyze the suitability of the area for grazing, consider reducing cattle numbers, propose ending yearlong grazing and don't prescribe specific grazing strategies for riparian areas other than Tonto Creek. "It's obvious upon reading the EA's the main objective of these new AMP's is to maintain the existing livestock operations, not improve wildlife habitat," Seidman said.

"Welcome to the era of ecosystem management."

Draft Wetlands Priority Plan

Arizona State Parks has just issued a Draft Wetlands Priority Plan for public comment. This important document will help guide wetlands actions for many years. If you did not receive a copy and would like one, contact Matt Chew at State Parks,(602) 542-2148. Comments are due by September 9, 1994.

1994 Election Items

Three propositions on the November ballot will be of direct importance to riparian area protection.

Proposition 300 is the referendum of the ill-advised "Takings Bill" passed in the 1993 Legislature. The language of this measure would require lengthy and expensive reviews of new laws and rules for their impact of private property. It would also require compensation for "taking," far beyond what the U.S. Supreme Court has deemed appropriate, effectively paying polluters not to pollute. A "No" vote overturns the law.

Proposition 101 is a third attempt to amend the Constitution to allow the State Land Department (SLD) to trade land. Law currently requires SLD to manage state land to maximize revenues for education and other purposes. This requirement is too rigid to allow SLD to take measures to preserve riparian areas, where economic values dictate sale. If this measure were in place, valuable riparian areas could be saved through trades for less ecologically valuable lands. This proposition failed in the past through lack of public understanding, when many people voted "no" because they thought a "giveaway" of state lands was involved. A "Yes" vote allows trades within an appraisal system.

Proposition 102 is another constitutional amendment, exempting all livestock from property tax. This is not a real estate tax, but a tax akin to the inventory tax which businesses pay. A "No" vote means this tax continues to be levied.

Buffel - from Page One

Hermisillo and throughout central and southern Sonora--everywhere below 2900 feet in Sonora (its upper limit) it has changed the landscape. The hills formerly dressed with ocotillos, elegant Willard acacias, burseras, and giant cacti, are now covered with a uniform, dense mantle of buffelgrass, except where cows have gnawed it to the ground.

Mexican researchers found that the buffelgrass grows even better if they strip all other vegetation from the land, scoured it clean, and planted just buffelgrass. It worked - for cows, at any rate - worked so well that ranchers have torn up immense amounts of desert, scrub forest, tropical forest, bulldozed every native plant from the earth, and planted buffelgrass. They've rooted out the desert, scraped away the scrub. When they found it won't grow in the forest, they've cut down the forest. A new industry has been spawned by woodcutters who follow the bulldozers: they cut up the downed and uprooted trees and roast them into charcoal -- some of it for export to the United States. The rancher may earn enough by selling firewood rights to *carboneros* to cover the cost of the *desmonte*--clearing.

Now the cows can eat everything that grows. No nonedible plants, far fewer birds and furry mammals. After a rain the pasture looks pretty, a rich green. When it dries out it's stiff, tough and nasty, of little value as forage; it pokes cows in the eyes, some ranchers say.

But the bulldozers are still tearing away. Two million acres in Sonora have been officially cleared, heading for fourteen million, by government estimates. That's every bit of the Sonora below 2900 feet with rainfall in excess of 8 inches. The Sonoran government now offers to pay one-third the cost of stripping away the desert, scrub or forest. The combination of the government subsidy and the firewood concession are too good to resist. Everyone is invited to join the buffelgrass express.

Recently, however, SARH issued a regulation called "directives for the improvement of the range." In this footnote, Mexican government technicians mention the value of winter forage provided by desert trees at a time when buffelgrass is dry stubble with no food value. In other words, they've suggested to ranchers that it would be a good idea to have something for cows to eat in the winter. This directive makes the recommendation of leaving some trees and not bulldozing the arroyos. This futile attempt to stop the wanton destruction of the desert comes too little and too late, after 2 million acres have been ravaged. Once the bulldozer gets rolling, swerving to avoid trees and shrubs is a nuisance. Trees of the thornscrub and the tropical deciduous forest cannot survive in isolation. They suffer sunburn, are buffeted by winds and more prone to disease. Few survive more than a couple of seasons after the desmonte. Once the desert legumes are gone, nothing is left to enrich the soil. Without the trees, cows have no shade and may suffer severely from excessive exposure to the sun.

It gets worse. Sonorans have learned one peculiar and painful fact about buffelgrass: it loves fire and burns like a torch. It even burns when still green and sprouts anew immediately after the flames die down. The burning grass torches fenceposts, so ranchers have to replace wooden posts with concrete. For smalltime ranchers this can be a backbreaking expense. The electric company has had to fit all wooden power poles with a skirt of galvanized steel sheeting to protect them from fire. Buffelgrass roots flourish in the ashes. Wildland fires, almost unheard of a few years ago, are now extremely common during the dry months of the year. From Sonora come reports of a 3000% increase in wildland fires for the City of Caborca. During April to June 1994 a wildfire occurred in the Hermosillo area every three days, invariably fueled by buffelgrass growing in city lots or in nearby fields. In the desert the fires, rarely seen before, burn whatever else is growing.

Most native desert plants do not survive fire. Saguaros, chollas, palo verdes, ironwoods, all of them die when burned, some quickly, others experiencing a slower, creeping death. Buffelgrass, by contrast, needs fire, invites the fires that threaten to kill our Sonoran desert. The dried grass helps fires spread. Then it moves in when the competition has died, choking out all other aspiring plants. It hates company.

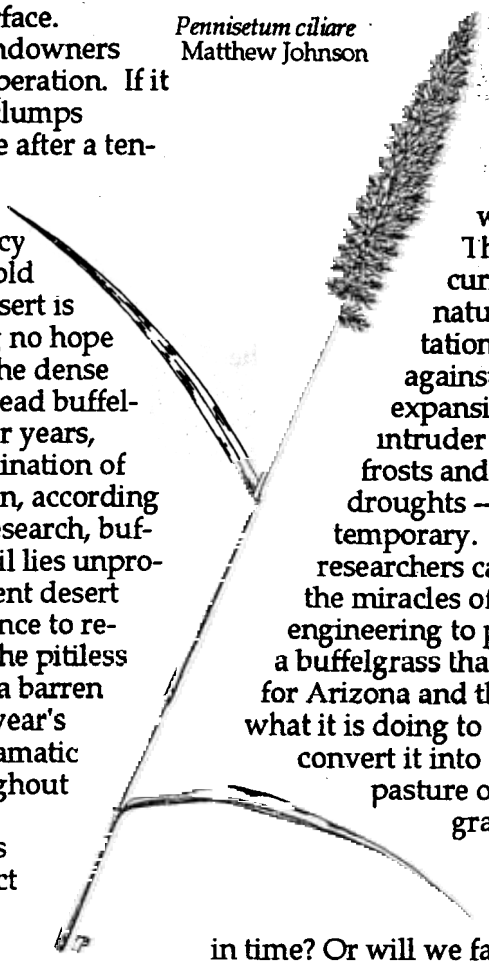
The Sonoran Desert doesn't burn naturally. This spring's fire in Saguaro National Monument killed desert plants where fires were

previously unknown, probably because invading, non-native grasses (in this case an introduced Mediterranean grass called red brome (*Bromus rubens*) provided fuel. Unlike plants that have evolved in different parts of the globe, Sonoran Desert plants have no resistance to fire. Where fires occur, the familiar desert is gone, perhaps forever.

A decade or so ago buffelgrass showed up in some yards in Tucson. It formed dense clumps, a pretty green that turned harsh yellow-brown when it dried. It was hell on a lawn. It couldn't be mowed. People cussed the stuff. Some dug it up. Then it disappeared with hard freezes. Now it has returned following several years without a hard freeze.

Before long it started appearing on Tumamoc Hill, near downtown Tucson. It has grown all over the Hill, sprouting and spreading among the desert plants as it has all over Sonora, providing excellent fuel for wildfires. Then it appeared in the Tucson Mountains, later in Saguaro National Monument, where park officials try to root it out. In the absence of frost, which makes the grass die back, it has flourished in the Tucson Basin. Now it is found throughout the Sonoran Desert except where it is too dry. Buffelgrass is on a roll.

Nothing is free. After a few years of using buffelgrass the grazing has sucked away most of the soil nutrients, so the rancher must resort to prescribed fires, subsoiling, and reseeding. In other words, the entire range must be deep-plowed again to bring nutrients deep in the soil up to the surface. Only wealthy landowners can afford this operation. If it is not done, the clumps deteriorate or die after a ten-year suicidal mission. Behind, they leave a legacy of sterility. The old growth of the desert is removed leaving no hope of return while the dense root mat of the dead buffelgrass survives for years, preventing germination of other plants (even, according to preliminary research, buffelgrass!). The soil lies unprotected. The ancient desert cover has no chance to re-establish itself. The pitiless desert sun sears a barren landscape. This year's drought gave dramatic testimony throughout Sonora as the buffeled pastures took on the aspect of dust bowls.



Pennisetum ciliare
Matthew Johnson

Bigtime ranchers plant the buffelgrass on thousands of acres of their estates, right up to the edge of Sonoran Indians' lands. The original Sonorans report unanimously that it is now hotter and drier and that game and wildlife have dwindled since the advent of the grass. The former cover of forest or scrub absorbed the heat. The yellowed grass reflects it, driving temperatures higher. There is no refuge for animal life in the one-plant sea. Climatic change brought about by buffelgrass planting is an area the cries out for research.

SCS has spent millions of our tax dollars searching for new grasses to import, for strains of buffelgrass that will be frost hardy and drought tolerant. If buffelgrass will yield more beef there, then why not here? Why not everywhere? The current natural limitations against the expansion of the intruder -- hard frosts and long droughts -- are but temporary. SCS researchers can use the miracles of genetic engineering to produce a buffelgrass that will do for Arizona and the West what it is doing to Sonora -- convert it into one vast pasture of one grass. Can we stop them in time? Or will we face a desert of buffelgrass that grades into a grassland of pure Lehmann's lovegrass?

Will SCS continue to bring in more alien plants, willing to sacrifice every other consideration on public and private lands alike to the appetites of cows? Or will they turn their attention to correcting the damage caused by imported grasses? The Mother's Day fire in Saguaro National Monument, for example, destroyed untold saguaros and thousands of acres of desert. A crash program to control the culprit red brome grass would save huge areas of desert from conflagration. It is not unreasonable to steer SCS in the direction of intensive research to heal the harm their programs have wrought. SCS has filed no environmental assessments, held no

RIPARIAN COUNCIL FALL GET-TOGETHER

This year's Arizona Riparian Council Fall Get-Together will be held on the property of Planet Ranch on October 15 and 16. The purpose of our annual get-together is to have a camp-out and meet informally with resource managers and people involved in the area to know more about riparian issues in Arizona There are many interesting issues that are occurring in that watershed which includes the Bill Williams River and the Santa Maria River and we have several speakers lined up to tell us more about them starting At 1:00 Saturday afternoon.

Eric Swanson of the Arizona Game and Fish Department (AGFD) will talk about the work of the Interagency Committee on their studies on the Bill Williams River and Alamo Dam. The Interagency Committee is made up of AGFD, Bureau of Land Management (BLM), U.S. Army Corps of Engineers, and the U.S. Fish and Wildlife Service (USFWS). Two other people involved in those studies, Sara Hooper and Cliff Bobinski will discuss the Ecological Site Inventory that BLM is doing on the Bill Williams and wilderness issues in the area.

An overview will be given on the City of Scottsdale's role on Planet Ranch. Nancy Gilbertson, Preserve Manager of the Bill Williams U.S. Fish and Wildlife Refuge, will present current topics involving the refuge and the USFWS Ecosystem programs. Someone from the National Biological Survey (NBS) will discuss the interests NBS has for this area.

In the evening, Matt Pierce and Jon Kennedy will talk about the Santa Maria, "the forgotten river." They will discuss such topics as grazing issues, burros, and management plans for the watershed. On Sunday morning, Tim Tibbitts of the USFWS will provide an update on the Southwest willow flycatcher inventory and lead a two to three hour hike along the Bill Williams River. Bring binoculars, water and lunch and be prepared to get wet feet.

CH2M Hill and the Design Center are sponsoring dinner on Saturday night. Bring your own camping gear and food for other meals. Restrooms will be provided at the ranchhouse. Dogs are allowed on the Planet Ranch property and you may bring alcohol.

The southwestern part of the state has many issues and activities related to riparian areas. Make plans now to attend and return the enclosed registration form by October 3.

Please see the insert in this newsletter for a map and registration form.

Buffel - from Page Nine

held no public hearings, requested no public comments when introducing a new grass. Their actions can have more devastating environmental consequences than any other program of the U.S. government, but that has not deterred them. Will they turn their efforts to improving our ravaged rangelands by developing better management techniques or will they attempt to squeeze ever more production from the land, thus mortgaging our ecological future? They need pressure from us to change their ways. If you would like to help, contact Matt Johnson at (602) 749-2547. He is forming an action group called "S.O.B., Stamp Out Buffelgrass!" S.O.B. hopes to hold a conference in Fall 1995.

In the Winter Issue of this Newsletter, SCS will be invited to present its viewpoint.

Wildlife 2000 Survey

A new Arizona Game and Fish Department (AGFD) survey reconfirms results of previous surveys by State Parks, AGFD, and the Morrison Institute. People want open space and riparian habitats preserved. For example, 89% of respondents agree that "Arizona's wetlands are important to the survival of wildlife and should be vigorously protected." The results are only slightly less for rural areas (76%) compared to Maricopa County (84%) and Pima County (93%). When asked to prioritize land uses, 71% ranked wildlife protection first, followed by recreation, grazing, mining, logging and urban development. Many other interesting questions were asked in this survey, which was conducted by the Behavior Research Center.

NEWS BRIEFS

Grazing Reform

Marty Jakle

The Arizona Riparian Council submitted comments on the draft environmental impact statement. "Rangeland Reform 94", a joint document for grazing reform on Bureau Land Management and Forest Service lands. Comments on the draft EIS were due on July 28, 1994, however, the comment period has been extended until September 9, 1994.

The major points contained in the ARC's comments are as follows:

- Grazing fees should obtain fair and reasonable compensation for the public. The revenue generated should pay for the administration of grazing on public lands.
- ARC opposed the proposed incentive-based grazing fee reduction plan that would reduce grazing fees up to 30 percent for grazing in an environmentally sound manner. It was opposed because 1) wise land stewardship should be the expected norm and 2) objective standards have not been developed and it will be difficult to do so.
- ARC is skeptical that the Advisory groups recommended in the proposals: Multiple Resource Advisory Councils, Rangeland Resource Teams, and Technical Review Teams, will be effective in implementing sound rangeland management. These different groups will add an extra layer of bureaucracy to the task which would be best accomplished by professional resource managers.
- ARC strongly supports the concept of using standards and guidelines recommended in the draft. Unfortunately, the document did not contain any specific recommendations which the ARC believes are vital for sound rangeland stewardship.
- Rangelands should be defined by ecosystem only; land use (grazing) should not be the basis for defining rangeland.
- ARC supports the Forest Service concept that grazing should occur only where appropriate. Domestic livestock grazing of game ecosystems, such as part of the desert Southwest, may be too detrimental to fragile ecosystems. BLM should incorporate this concept into their guidelines.
- ARC supported Alternative 4, the Environmental Enhancement Alternative as opposed to the preferred alternative, Alternative 2, the BLM-Forest Service Proposed Action.

For a copy of ARC's comment letter contact Cindy Zisner, (602) 965-2490.

Endangered Species Victories

The Southwest Center for Biological Diversity (SCBD) has succeeded (via lawsuits) in persuading the U.S. Fish and Wildlife Service (USFWS) to propose listing the jaguar (*Felis onca*) as an Endangered Species in California, Arizona, New Mexico, Texas, and Louisiana. The jaguar was listed as endangered south of the U.S. border in 1969. 1979, USFWS promised to "take action as quickly as possible" to protect the species. A 1980 listing attempt had to be withdrawn because it was not finalized in time.

SCBD also won a suit requiring USFWS to designate southwestern forests as critical habitat for the Mexican spotted owl (*Strix occidentalis lucida*). Some 3 million acres are to be included in measures to protect the owl from logging activities. The judge asked the environmentalists and the USFWS to agree on a timetable. If agreement is not reached by September, the Court will establish the time table.

Watch for the Winter ARC newsletter which will feature a major article by USFWS about progress on two endangered species matters - the Southwest willow flycatcher (*Empidonax traillii extimus*) and the Arizona willow (*Salix arizonica*).

New Water Center Publications

The Water Resources Research Center of the University of Arizona has three new free publications available:

My Well v. Your Surface Water Rights: How Western States Manage Interconnected Groundwater and Surface Water.

Instream Flow Rights: A Strategy to Protect Arizona's Streams (1994 updated edition);

Where to Get Free (or Almost Free) Information About Water in Arizona (1994 updated edition);

Not free, but definitely worth $8.00 is a poster-sized **Arizona Water Map** showing many important water features.

Contact the Water Center at (602) 792-9591 or FAX (602) 792-8518.

Arizona Land Policy 2000 Forum

Kris Randall

In July, the Riparian Council participated in Governor Symington's Land Policy Forum. The Governor's proposal was presented to state agencies, resource users, and a few environmental organizations. The proposal calls for the federal government to relinquish management of Arizona lands currently administered by the Forest Service, Fish and Wildlife Service and Bureau of Land Management. The goal is to resolve management issues by consolidating those agencies with the State Land Department and the Game and Fish Department. The proposed organization would combine and consolidate missions and programs, forming an umbrella agency, the Resource Management Agency (RMA).

Part of the rationale for this concept was to eliminate overlapping authorities, personnel and administrative costs. Under the current system, however, resolution of management issues such as protection of federally listed species, protection of riparian ecosystems and minimization of nonpoint source pollution is achieved by having each agency be accountable for its respective missions. It is widely recognized that some uses are not appropriate for some lands and need the checks and balances of multiple agency review. Decisions concerning issues would occur "within" the RMA, but agency accountability would be lacking.

In our comment letter, the Arizona Riparian Council commended the Governor for recognizing and attempting to resolve land management problems. However, because this proposal is focused primarily on resource users and not on conserving and preserving Arizona's valuable resources, the Council stated that it could not support this proposal.

This "reinvention of government" has been submitted to Interior Secretary Bruce Babbitt in Washington DC, but there is no word on Babbitt's reaction.

Riparian Vegetation Maps Are Now Available

Ruth Valencia, Arizona Game and Fish Department

The Arizona Game and Fish Department (AGFD) released 26 preliminary maps of riparian vegetation associated with perennial waters in Arizona. These maps are printed at a scale of 1:100,000, and cover all areas of the state except for Navajo, Apache, Greenlee and Coconino Counties. Maps are available for public viewing at each of the six AGFD regional offices. Fees are $20 per map for private, non-commercial use and $120 per map for commercial use (i.e., profit-making applications). To request an order form, call (602) 789-3614.

Digital data are available to government agencies and for private, non-commercial use from the Arizona Land Resources Information System at the Arizona State Land Department; a small media fee may be charged. Digital data is in ArcInfo format. Call (602)542-4061 for digital data requests. For commercial requests, contact Ruth Valencia at (602)789-3510. The riparian classification applied to these maps is preliminary. Conversion to the Brown, Lowe and Pase classification has not yet been completed. Updates to the maps will be released when that conversion is complete.

AGFD would like to receive comments from those of you who have an opportunity to review or use these maps. If you find errors or discrepancies, please be as specific as possible in your comments. This was a massive data collection effort and the method was not 100% accurate, but we would like to make it as accurate as possible. So your input is greatly appreciated. Please call Ruth Valencia at (602)789-3510 or send comments to her attention at: Arizona Game and Fish Department, Nongame Branch, 2221 W. Greenway Road, Phoenix, AZ 85023.

MASTER'S THESIS ABSTRACTS

Population Genetic Structure in Three Southwestern Riparian Tree Species
Harry Spanglet
Arizona State University

The genetic structure of populations of three common riparian tree species was examined to test for differentiation among riparian tree populations inhabiting different drainage basins in the mountains of Arizona. Three levels of potential population subdivision were examined: subdivision by distance within a drainage, subdivision among drainages, and subdivision among mountain ranges. Analysis of patterns of allozyme diversity of three representative mid-elevation riparian tree species using starch-gel electrophoresis revealed distinct patterns of genetic structure in each species.

Acer grandidentatum (bigtooth maple) subpopulations exhibited little differentiation between different sites within a drainage (F_{ST}=0.037) or among drainages on the same mountain range (F_{ST}=0.007), however subpopulations inhabiting different mountain ranges exhibited very high levels of divergence (F_{ST}=0.344). An inferred prehistoric spread out of the riparian zone in previously moister periods, but not into intervening lowland valleys, may explain this pattern.

Alnus oblongifolia (Arizona alder) exhibited low levels of differentiation at all levels of geographic subdivision (F_{ST}≤0.073). This pattern changes with the removal of one atypical population, yielding high levels of differentiation between sites within single drainages (F_{ST}=0.176), and no differentiation among streams (F_{ST}=*-0.79*) and mountain ranges (F_{ST}=-0.005). High values of F_{IS}, indicating high levels of nonrandom mating, may be obscuring the magnitude of subpopulation differentiation.

Fraxinus velutina (velvet ash) subpopulations within the same drainage exhibited low levels of differentiation (F_{ST}=0.069), and was more strongly differentiated among drainages (F_{ST}=0.127). Differentiation among mountain ranges was essentially zero (F_{ST}=-0.079). High F_{IS} values may also be obscuring the importance of subpopulation differentiation in these populations.

The analysis of differentiation was restricted by small numbers of resolvable loci, and was potentially obscured by high levels of F_{IS}, so the hypothesized pattern of genetic structure may exist, but cannot be decisively demonstrated by this study.

Effluent Dependent Ecosystems: Options for Environmental Management
Matthew Conway
Arizona State University

Federal, state, and local water policies were examined to evaluate the potential for stream flow and wildlife habitat protection. A number of communities in arid regions sustain riparian areas through discharges of municipal effluent. These effluent-dependent ecosystems are endangered because of policy incentives that promote the reuse of effluent outside of the main stream channel.

Laws, regulations, and rules concerning water quality and quantity were analyzed to locate policy "gaps" which inhibit the use of effluent for stream flow and riparian area protection. A case study-like approach is taken to illustrate a local community that is evaluating different effluent reuse alternatives. Officials with the City of Phoenix, Arizona, are currently debating future water resource management opportunities. Options and alternatives are presented that could be used to provide some form of protection.

The results of the study are quite remarkable. Escalating costs to meet federal water quality laws are driving many municipalities to cease discharging effluent to rivers and streams. Likewise, state water quantity rules provide a number of incentives for effluent reuse outside-of-the-channel. Stream flow protection is neither a goal nor objective of Arizona water law. Although effluent is considered the water source for the future, current policy reflects primarily human uses.

The Winter Issue of this newsletter will feature a thesis workshop at the University of Arizona where five master's theses focusing on different aspects of Cienega Creek, near Tucson.

NOTEWORTHY PUBLICATIONS

Pat Ellsworth
Section Editor

BOOKS

de Waal, L.C., L.E. Child, P.M. Wade, and J.H. Brock. 1994. *Ecology and Management of Invasive Riverside Plants.* John Wiley & Sons.

This useful book was published for the International Centre of Landscape Ecology, Loughborough University, UK. J.H. Brock is in the School of Agribusiness and Environmental Resources, ASU.

Kentula, M.E., R.P. Brooks, S.E. Gwin, C.C. Holland, A.D. Sherman, and J.C. Sifneos. 1993. *An Approach to Improving Decision Making in Wetland Restoration and Creation.* Lewis Publishers. 192 pp.

The authors compare created wetlands with natural ones. They present strategies for mitigation of wetland losses, site selection for restoration projects, and assessment of the level of function attainable for restored wetlands.

U.S. Environmental Protection Agency. 1993. *Created and Natural Wetlands for Controlling Nonpoint Source Pollution.* Lewis Publishers. 224 pp.

This book is the first to include comprehensive discussion of wetlands and nonpoint source pollution (NPS) in a single work. Additionally, it outlines research needs and approaches for including wetlands into NPS pollution control strategies.

ARTICLES

Angermeier, P.L. 1994. Does biodiversity include artificial diversity? *Conservation Biology* 8: 600-602.

This essay is a strong argument for a clear definition of biodiversity that excludes artificial diversity. Conservation biologists should try to maximize ecological integrity rather than diversity, per se.

Contreras-Balderas, S. and M.L. Lozano-Vilano. 1994. Water, endangered fishes, and development perspectives in arid lands of Mexico. *Conservation Biology* 8: 379-387.

The authors review the discouraging situation in northern Mexico. Problems include: drying of springs and portions of rivers, lowering of the water table, salt water intrusion, reversal of phreatic flow in the Torreon region with concomitant arsenic contamination, municipal and industrial pollutants, loss of native fish and replacement of freshwater species by salt-tolerant species. These problems become more urgent in light of NAFTA and the anticipated development of the border lands.

Leberg, P.L. and R.C. Vrijenhoek. 1994. Variation among desert topminnows in their susceptibility to attack by exotic parasites. *Conservation Biology* 8: 419-424.

A serious consequence of decreased genetic diversity is vulnerability to disease. Of particular concern are parasites from newly introduced exotics. This article describes the susceptibility of several genetic lineages of topminnow to a trematode which naturally parasitizes guppies and mosquitofish. Since both of these exotics have been introduced into Mexico and Arizona, the authors urge wildlife agencies on both sides of the border to monitor streams for the presence of exotics and their parasites.

Metcalf, R.C. and D.V. Peck. 1993. A dilute standard for pH, conductivity, and acid neutralizing capacity measurement. *Journal of Freshwater Ecology* 8: 67-72.

There is a need for a quality control standard when using electrochemical monitoring equipment in aquatic habitats. A phosphate standard has been developed to evaluate measurement errors for pH, conductivity, and acid neutralizing capacity in dilute, neutral waters.

Trombulak, S.C. 1994. Undergraduate education and the next generation of conservation biologists. Conservation Biology 8: 580-591.

This essay should be read by all biologists in an academic setting. It is not enough to push for greater research funding. Recruiting young people to the profession requires that faculty spend time on quality undergraduate education - curriculum revision as well as teaching. Frequently this emphasis carries professional risk. Established faculty can help to minimize the risk for their newer colleagues by communicating the urgent need to recruit a new generation of conservation biologists.

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

The purpose of ARC is to provide for the exchange of information on the status, protection, and management of riparian systems in Arizona. The term "riparian" includes vegetation, habitats or ecosystems that are associated with bodies of water or are dependent on the existence of perennial, intermittent, 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 are $10. Additional contributions are gratefully accepted.

This newsletter is published three times a year to communicate current events, issues, problems, and progress involving Arizona's riparian systems, to inform ARC members about Council business, and to provide a forum for you to express your views or news about riparian topics. The Winter Issue will be mailed in January, with the deadline for submittals Dec. 1. Please call or write with suggestions, publications for review, announcements, articles, and/or illustrations. Articles on computer disk (any type) are preferred.

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To join the Arizona Riparian Council, contact

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Tempe AZ 85287-3211

(602) 965-2490

Annual dues are $10.

Calendar

Sept 17-18. Arizona's Mountain Ecosystems. Show Low. Annual meeting of the Arizona Native Plant Society. Contact Larry Stallcup (602) 378-1169.

Sept. 19-23. Biodiversity and Management of the Madrean Archipelago Tucson. U.S. Forest Service and others. Contact Leonard DeBano (602) 621-2543.

Sept 22-23. Annual Symposium. Scottsdale. Arizona Hydrological Society. Contact Suzanne Kirk at (602) 371-1110.

Sept. 22-23. Water Quality in the Sustainable West. Utah National Park Service Water Quality Task Force. Contact Jack Wilbur (801) 538-7098.

Sept. 30 - Oct. 2. Environmental Literacy: Pathway to Our Future. Heber. Arizona Association for Learning in and about the Environment. Write Lynn Krigbaum 7620 N. 15 Ave. Phoenix AZ 85021.

Sept. 29 - Oct. 1. Friends of Trashed Rivers II. New York City. Coalition to Restore Urban Waters. Contact (201) 525-2594.

Oct. 6. Managing Connected Groundwater and Surface Water: Problems, Choices and Opportunities. Casa Grande. Contact Barbara Tellman (602) 792-9591.

Oct. 14. Ecotourism Workshop. Sierra Vista. Contact SEAGO (602) 432-5301.

Oct. 15-16. Arizona Riparian Council Fall Get-Together. Planet Ranch. See page 10 and insert.

Nov. 13-14. Environmental Ethics and History Conference. Prescott. Arizona Humanities Council. Contact Laura Stone (602) 257-0335.

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Fall Get-Together
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