The Arizona Riparian Council Newsletter

Volume 8, Number 2 *Spring 1995*

Cactus Ferruginous Pygmy-Owl

Marie Sullivan, U.S. Fish and Wildlife Service

On December 12, 1994, the Fish and Wildlife Service (Service) turned on another warning light concerning the health of our riparian areas under the Endangered Species Act. This time it was for the cactus ferruginous pygmy-owl (*Glaucidium brasilianum cactorum*). You may recall in the last issue of the ARC newsletter, Tom Gatz, Endangered Species Coordinator for the Service, indicated proposing to list a species as endangered or threatened is analogous to making a 911 call. Another alarm has been given that our natural ecosystems, in this case riparian woodlands and Sonoran desertscrub communities, are not retaining their biological integrity.

The small, diurnal owl is one of three subspecies of the ferruginous pygmy-owl. This species is distinguished from other small owls by its small size, a rufous crown that is distinctly streaked with white, a generally rufous brown color over the upper parts and as breast streaking, and a tail with 7-8 light brown bars. Its range extends from lowland central Arizona south through western Mexico, to the states of Colima and Michoacan, and from southern Texas south through the Mexican states of Tamaulipas and Neuvo Leon.

The pygmy-owl occurs in a variety of subtropical scrub and woodland communities. In central and southern Arizona, the pygmy-owl's primary habitats are riparian cottonwood forests and mesquite bosques. It is also associated with Sonoran desert-scrub communities. The pygmy-owl nests in cavities in trees or large columnar cactus.

In addition to riparian habitat and the adjacent scrub providing suitable nesting and roosting habitat for the pygmy-owl, the high biodiversity of wildlife species associated with riparian areas also provides an important prey base for this species.

The dependency of the pygmy-owl on Sonoran desertscrub is not as clear from historical records as it is for riparian habitat. It has been suggested that the pygmy-owl adapted to upland cactus associations and xeroriparian habitats in response to the demise of Arizona's riparian woodlands. However, this hypothesis has not been substantiated.

In Arizona, the pygmy-owl was historically abundant in lowland central and southern Arizona in association with cottonwood forest and mesquite bosques along the Gila, Salt, Verde, San Pedro, and Santa Cruz Rivers and various tributaries. The most northern record for the pygmy-owl in Arizona is from New River.

As with so many other species which are on the endangered species list, the cactus ferruginous pygmy-owl is threatened by modification of its habitat, primarily destruction and modification of riparian and thornscrub habitats, throughout a significant portion of its range. In Arizona, the species has been virtually extirpated, in an area which once constituted its major U.S. range. Loss of

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Inside This Issue

PRESIDENT'S MESSAGE

Kris Randall

Our Spring meeting in Payson was a success. I'm sorry I could not attend. A flu bug came to visit and just wouldn't leave. At the meeting it as mentioned that next year's meeting will be our 10th Annual Meeting. As in traditional, anniversaries should be celebrated. We want to commemorate the efforts of the Council and its members over the past ten years and make next year;'s meeting something special. However, planning for the Annual Meeting is not easy. Many things need to occur to make it successful. Your help is needed. Please call me if you would like to be a part of the planning team at (602) 207-4510. Together we can make this meeting really special. Remember, this is YOUR Council. YOU make it happen!

EDITOR'S MESSAGE

Barbara Tellman

As I finish my three-year stint as editor of this newsletter, I want to extend thanks to numerous people who have helped to make this publication an interesting one.

Pat Ellsworth has reviewed dozens of publications to keep us aware of some of the latest work being done on all aspects of riparian research - from highly technical scientific articles to environmental education and government policy. Pat will be devoting more time to her consulting business so we are looking for a replacement publications editor.

Julie Stromberg has regularly contributed articles of many kinds - especially her popular Ecosystem Profiles. This is the first issue she has missed, but she plans to continue her informative articles.

Several other people have frequently contributed articles - Jeff Burgess (on grazing issues), Matt Chew (State Parks issues), Marie Sullivan (Endangered Species matters), Kris Randall (RAAC and other matters).

Finally, I want to thank Cindy Zisner who not only saved me from embarrassing typos, but also was responsible for getting the newsletter printed and in the mail to you.

Jeff Inwood and Cindy Zisner will be taking over as editors so articles should be sent to Jeff c/o ASL Hydrologic and Environmental Sciences, 1130 E. Missouri, Suite 110, Phoenix AZ 85014, or call(602) 263-9522. Jeff and Cindy are open to suggestions for any desired changes in the newsletter - What regular features don't you like? What new ones would you like? Let them know if there are any you'd like to see. Any member of the Council may contribute to this newsletter.

GOODBYE AND THANKS

Duncan and Eva Patten will be leaving soon for their ranch in Montana, after Duncan retires from the Center for Environmental Studies at the end of June. Among Duncan's many contributions to riparian studies and protection was the forming of the Arizona Riparian Council with Chuck Hunter. Eva has also been deeply involved in riparian issues in many capacities. The Patten's will be sorely missed, although they have not cut all ties and will maintain a home in Tempe, for frequent visits to family, meetings with students, and committees on which Duncan continues to serve. ARC extends its gratitude to Duncan and Eva and wish them the best of everything.

NEW WETLAND HABITATS

Tres Rios Wetlands Demonstration Project

Madeline F. Goddard
City of Phoenix

The Tres Rios Wetlands Demonstration project consists of the construction of three wetlands systems at and adjacent to the 91st Avenue Wastewater Treatment Plant. The Hayfield Site will consist of two wetland cells of about 3 acres each. The Cobble Site (4.4 acres) will consist of two oxbow-shaped cells. The Research and Plant Propagation Cells will consist of 12 cells of about 0.3 acres each. The purpose of the project is to determine the capability of wetlands to further remove contaminants from treated wastewater and to improve the riparian ecosystem existing downstream from the plant.

Design and development of the research plan was accomplished by CH2M Hill, City of Phoenix, United States Bureau of Reclamation (Bureau) and an advisory panel consisting of federal, state and local government officials and interested private citizens. The project was advertised for bid on January 10, 1995. A Notice to Proceed was issued on February 23, 1995.

The contractor, Archon, Inc., was the low bidder at $1,195,000. Mobilization was immediately followed by the clearing and grubbing of the three sites. Berms have been rough graded. Diversion structures are being formed and poured. Construction is currently 33% complete and is scheduled for final completion on July 24, 1995.

This project is jointly funded by the Bureau and the Multi-Cites Subregional Operation Group (SROG) for an estimated total cost of $3,000,000. The Bureau will contribute half of the funding, $1,500,000 and SROG will fund the remaining $1,500,000.

Students Help Make Tucson Constructed Wetlands a Reality

Plans for a constructed wetlands in Tucson are moving forward rapidly, with the help of students from Pueblo High School and several schools in the Amphitheater School District.

The Pueblo students have produced very interesting videos documenting the citizen participation elements of the project.

The Amphi students (grade 4 - gifted program) developed a computer program telling about wetlands, posters, models, a "Meet the Marshians" T-shirt, and other materials about wetlands. Their recommendations to a receptive Tucson City Council included a strong statement about the importance of a wetland as a peaceful refuge from the noise of the city. The Council vowed to urge student involvement in other city projects.

Town of Gilbert Wins Wetland Award

The Town of Gilbert's *Groundwater Recharge and Wildlife Habitat Project* won the Governor's Pride in Arizona Award (Environmental Leadership category) and the Best Project Award from the Arizona Planning Association in 1994.

This innovative project enhances a 75-acre recharge pond area with marsh vegetation along the pond margins and upland vegetation on pond slopes. Wildlife roosting and nesting structures, interpretive exhibits and wildlife viewing blinds provide were designed and implemented by Jones and Stokes Associates. Future plans include a hummingbird and butterfly interpretive garden along with more revegetation.

This project was funded largely through grants from the Arizona Game and Fish Heritage Fund.

A sample drawing from the Gilbert Wetland interpretive displays. (courtesy: Jones and Stokes)

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habitat is attributed to urban and agricultural encroachment, woodcutting, water diversion, channelization, livestock overgrazing, groundwater pumping, and hydrological changes resulting from various land-use practices.

Proposed critical habitat for the pygmy-owl in Arizona encompasses riparian thickets, forests, and woodlands along streams, rivers, and ephemeral drainages within the following areas:

(1) 13 miles along the Salt River from Stewart Mountain Dam to Granite Reef Dam;

(2) 24 miles along the Verde River from Bartlett Dam to the Verde/Salt River confluence;

(3) 60 miles along the San Pedro River from Soza Canyon to the San Pedro/Gila confluence;

(4) 26 miles along the Santa Cruz River from Interstate 19 to Avra Valley;

(5) 76 miles along several tributaries of the Santa Cruz River within Pima County;

(6) 8 miles along Arivaca Creek near the town of Arivaca;

(7) 17 miles of the Gila River commencing from the confluence with the San Francisco River;

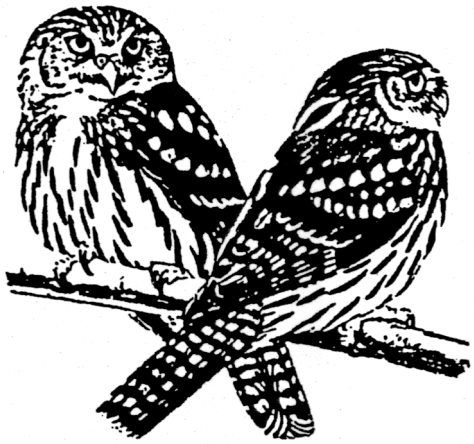
(8) 6 miles of Bonita Creek in Graham County; and

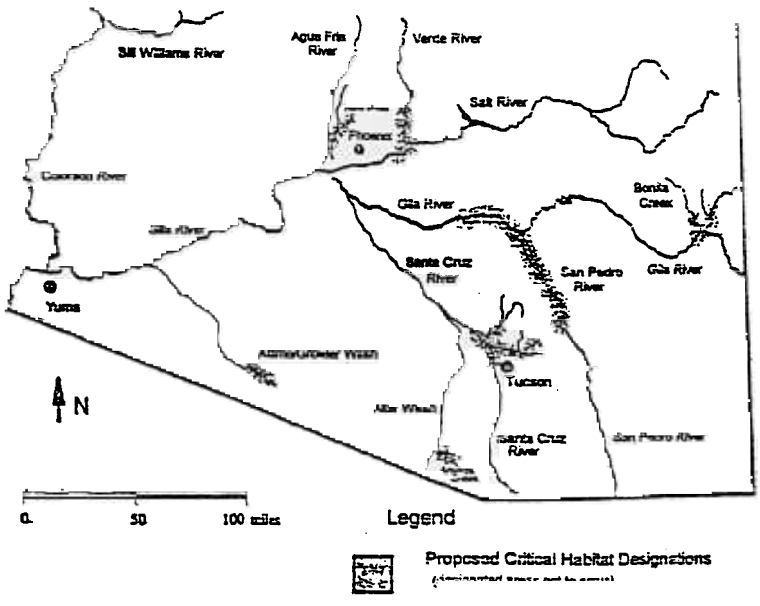
(9) 17 miles along the New River.

In all, a total of 290 miles of stream and river, including the 100-year floodplain and 100 meters laterally adjacent to the 100-year floodplain, is being proposed as critical habitat in Arizona. No critical habitat is being proposed throughout the remainder of its range.

Regardless of whether or not this species is actually put on the endangered species list, there are two important messages with this 911 call. First, long-term survival of the cactus ferruginous pygmy-owl may be in jeopardy if appropriate actions are not taken not only to help protect this species where it presently occurs, but also to protect its current and potential habitat. Perhaps even more importantly, another strong signal has been sent that the biological integrity of our riparian areas is threatened by the various land use activities listed above.

This is not the first time that a species which utilizes riparian habitat for all or part of its life cycle has been proposed for listing under the Endangered Species Act. One of the common threads between the southwestern willow flycatcher (*Empidonax traillii extimus*), bald eagle (*Haliaeetus leucocephalus*), Yuma clapper rail (*Rallus longirostris yumanensis*), Canelo Hills ladies'-tresses (*Spiranthes delitescens*), Huachuca water umbel (*Lilaeopsis schaffneriana* ssp. *recurva*), Sonora tiger salamander (*Ambystoma tigrinum stebbinsi*), and 18 species of native fish which occur in Arizona, is that all of these





Proposed critical habitat

species have been listed as endangered or threatened or have been proposed for listing. In addition, all of these species utilize riparian, wetland, or cienega habitat for foraging, nesting, or roosting habitat, or rely on the presence of this habitat as an integral part of maintaining the integrity of the aquatic ecosystem on which they are dependent. There are also many other riparian species which are awaiting status surveys to determine their condition. It is time for all of us to realize that the listing of individual species is not just a sign that a species long-term survival is potentially threatened by man's activities, but it is also an important message that the integrity of the habitat is threatened as are the habitat benefits to humans.

The time frame for making any final decision on listing the pygmy-owl is currently unknown. On April 10, 1995, President Clinton signed a bill which prohibits the Service from making any final determinations for species or critical habitat designations for the remainder of the federal fiscal year (through September, 1995). The Service will continue to accept comments within the designated comment periods and hold public hearings for all applicable species.

Author's Note:

The southwestern willow flycatcher which was covered in the last ARC newsletter was listed as endangered without critical habitat on March 29, 1995. The proposal to designate critical habitat for this species is under further review.

The Service did not list the Arizona willow (*Salix arizonica*), but worked out an innovative recovery plan with landowners.

SOME FREE PUBLICATIONS

Water Resources in the Upper Santa Cruz River Basin. Jana Fry (Arizona State University) and Luis Ernesto Cervera (El Colegio de la Frontera Norte). March 1995.

The booklet is packed full of information about water supply and water quality in the Upper Santa Cruz River basin. It is available in Spanish or English from the Center for Environmental Studies at Arizona State University. (602) 965-2975.

Southwestern Riparian/ Wetland Expertise Directory (Arizona, Colorado, Nevada, New Mexico and Utah). Barbara Tellman and Roy Jemison. WRRC and U.S.D.A. Forest Service. April 1995.

This is a directory of people working on riparian/wetland research in the Southwest. Brief information about publications, projects and areas of expertise is given. Order from the U.S. Government Printing Office # 1995-674-899/25054 or WRRC.

Field Manual for Water Quality Sampling. WRRC. March 1995.

This handy bilingual guide to water sampling is printed on waterproof paper to extend its field life and contains information on sampling protocols and techniques on both sides of the border. Single copies free to organizations who will really make use of it. Call for prices for individuals and on multiple copies.

Where to Find Water Expertise at State Universities in Arizona (1995 revised edition). Barbara Tellman. WRRC. May 1995.

This is a completely updated version of a useful guide to water experts at Arizona Universities.

Where to Find Information on the History of Arizona Rivers. (A computerized bibliography). Barbara Tellman, Rick Yarde and Mary G. Wallace. WRRC. June 1995.

A comprehensive listing of more than 1500 sources of information dealing with the history of Arizona's rivers is presented both on read-only computer disk and hardcopy. Topics covered include geology, biology, archaeology, history, hydrology and many others. The hardcopy version is mostly intended for places such as libraries. You will find the computer version more versatile for personal use.

Water Center Publications on the World Wide Web

You can also obtain the four WRRC publications above through the World Wide Web, along with much other water information. The data bases are fully searchable on the Web and all publications may be downloaded. Call Ken at WRRC for Web information, (520) 792-9591.

To order WRRC (Water Resources Research Center, University of Arizona) publications, call (520) 792-9591 or FAX your request to (520) 792-8518.

TUCSON PLANT MATERIALS CENTER PROGRAM FOR THE SOUTHWEST DESERTS

Bruce Munda
Plant Materials Center
Natural Resource
Conservation Service

This article will provide information about the Tucson Plant Materials Center (Center) including its background, mission and function, how we release plant materials, technology we are using to work with native plants, our Long Range Plan, current projects and our work with buffelgrass.

Background

The Center was constructed in 1934 by the Civilian Conservation Corps. The first manager was Dr. F.J. Crider who oversaw the Center's activities from 1934 to 1937. Another noteworthy manager was Louis P. Hamilton who supervised the Center from 1939 to 1965. The Center's service area is comprised of the Mojave and Sonoran deserts of Arizona, California, Nevada and portions of New Mexico and Utah. The Center is one of 25 Plant Material Centers nationwide and is administered by the Natural Resources Conservation Service (NRCS), formerly the Soil Conservation Service.

Mission and Function

The mission of the NRCS plant materials program is to assemble, test, and release plant materials for conservation use; determine techniques for their successful use; provide for their commercial increase; and promote the use of plant materials to meet conservation needs.

In 1937 Dr. Crider described the Center's function as:

. conducting plantings and evaluations of new plant collections, both native and introduced;

. maintaining evaluation records on the performance and manner in which the plant materials are handled;

. and, based on their performance for erosion control on rangeland, producing sufficient seed to conduct supplementary plantings on ranges and for use by the agricultural community.

Today, our screening process differs very little. We collect plants based on priorities and needs, both native and introduced. These collections are initially planted and evaluated at the Center with promising collections increased vegetatively or by seed. The increased material is then planted and evaluated at various sites that are located within or similar to those areas intended for the plant's eventual use. These plantings usually involve comparative evaluations with materials that are currently in use. If the plant exhibits desirable characteristics it is released for commercial production and public use. We define "plant" as either an individual collection or a composite collection representing a plant population.

Plant Release Process

At this point a brief discussion of our "release process" for native and introduced plants, is appropriate. During our testing process we maintain evaluation records and summarize these in our annual Technical Reports. These data are then used to select and support the release of a plant for commercial production. There are five categories under which we can release a plant. These are: Source Identified, Selected, Tested, Cultivar and Germplasm. The first three categories are for plants that have had no purposeful genetic manipulation, i.e. basic plant breeding methodologies. The last two categories imply, but do not require, that some form of purposeful genetic manipulation has been conducted.

A "Notice of Naming and Release Document" is prepared documenting the plant's history, identity, performance and environmental considerations associated with its intended use. The Release Document is then sent to the Chief of the NRCS, Administrator for the Agricultural Research Service and the Director of the Agricultural Experiment Station for their review and signatures. The Agricultural Experiment Station assists in the development of seed certification standards for the new release. Rarely is a plant released if all three agencies do not sign the Release Document. The Plant Materials Program initiated the above procedures in the early 1960's.

Prior to the 1960's a formal plant release process did not exist. Plants with desirable characteristics were given to local farmers or ranchers and they produced seed for public use. Environmental considerations were added in November 1993 to evaluate introduced germplasm for potential toxic and/or invasiveness qualities which are undesirable with regards to the plant's intended use. Plants exhibiting undesirable qualities will be removed from the testing program. In the past the Center has eliminated numerous plant collections from its program due to their toxic and/or aggressive characteristics. Since 1987, three of four releases have been native. These are: 'Santa Rita' fourwing saltbush (*Atriplex canescens*, var. '*Santa Rita*') 1987, 'Rocker' tanglehead (*Heteropogon contortis*, var. '*Rocker*'), 1993, and 'Stevan' plains bristlegrass (*Setaria macrostachya*, var. '*Stevan*') - 1994. The fourth release, an introduced species, was 'Seco' barley (*Hordeum vulgare*, var. '*Seco*')- 1987.

Technology

Prior to the 1980's equipment was not available which could effectively harvest and condition native plants that had chaffy or fluffy seed appendages. In 1987 the Center purchased a Flail-Vac seed harvester which can efficiently harvest most of our native grasses. In 1991 a Brush

Machine was purchased to condition chaffy or fluffy native seeds so they could be used in seed planting equipment. We have compared nonconditioned seed with Brush Machine conditioned seed and found Brush Machine conditioned seed to have higher total germination with no significant decrease in time to 50% germination. Other technology includes a cooperative project with Dr. Steven Smith, University of Arizona, Plant Sciences Department, in the development of a native plant breeding method called Convergent-Divergent Improvement. This method is being used to develop populations of native, cross-pollinated plants which, based on a given target area, would have a high degree of genetic variation and potentially increased establishment success. So, not only are we working on ways to produce native plants, we are also evaluating methods that, when seeding is necessary, will minimize the effect on the genetic makeup of an existing plant community. In reference to genetic engineering this Center and other Centers have no plans or capabilities to engage in genetic engineering such as gene splicing.

Long Range Plan

In 1993 the Center's seven-year Long Range Plan was revised based on the needs and concerns of our primary customers, the Natural Resource Conservation Districts and their cooperators, land users including farmers, and ranchers.

The Long Range Plan identified six major priorities and needs. These are:

1) Active Farmland: Develop summer legumes for cover crops, develop low water use cover crops; evaluate and document benefits associated with cover crop use in hot deserts; identify legume cultivars applicable to Arizona.

2) Idle Farmland: Improve and expand information on plant materials for use in rehabilitating idle farmland; determine appropriate seeding mixes and methods to achieve desired goals; identify species for rehabilitation to provide cover, weed suppression and provide an economic return; identify and develop species for use in Critical Area Stabilization in the Mojave Desert.

3) Mineland: Evaluate and/or develop salvage and establishment technology for the Mojave Desert; identify acid tolerant plants for the Sonoran and Mojave deserts; develop management and maintenance methods for rehabilitated sites; define rehabilitation success for the Bureau of Land Management and the mining industry to determine revegetation success for bond release in Nevada; improve interagency efforts in mineland reclamation.

4) Rangeland: Improve and enhance basic biological information on native plants having rangeland applications; and development of improved native plant materials for special rangeland applications.

5) Homesites and Public Use Areas: Develop information on water consumption of plants used in landscape situations to improve irrigation management and reduce water usage; develop information on native plant response to typical landscape management practices; screen plant material that can withstand periodic flooding.

6) Intermittent Waterways: Develop information on native plants for dry wash stabilization and wildlife applications in the lower Sonoran Desert and lower Colorado River Valley.

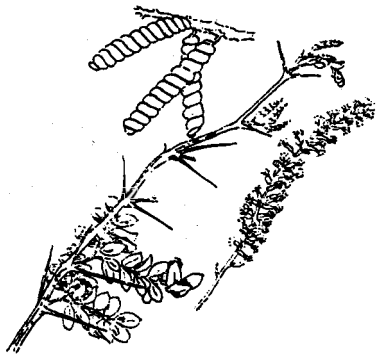
Current Projects

The Center is currently working on the following projects:

1) Yuma Proving Grounds; evaluating the use of transplants (three container sizes, and three irrigation regimes) of four native species for disturbed area revegetation.

2) Cyprus Tohono Mine; revegetation of spoil piles with native species.

3) Native Ecotype comparison trials; these trials are being conducted to measure differences in establishment and persistence between indigenous and non-indigenous



ecotypes. Data from these trials could support the use of local or non-local ecotypes in revegetation projects. One trial is being conducted in cooperation with the National Park Service, Joshua Tree National Park and a separate trial at Caliente, Nevada in cooperation with local Conservation Districts and the Bureau of Land Management.

4) Lower Colorado Riparian Revegetation Project; The goal of this project is to locate and identify native, salt-tolerant ecotypes of cottonwood (*Populus* spp.), willow (*Salix* spp.), quailbrush (*Atriplex lentiformis*), and mesquite (*Prosopis* spp.), to augment the Bureau of Reclamation revegetation plans for the lower Colorado River. We are in the third year of this project with good salt tolerance data being collected.

I would like to discuss the impetus for this article, buffelgrass (*Pennisetum cilliare*). The Center has periodically evaluated buffelgrass (T4464). It was brought into the U.S.A from the Turkana Desert of northern Africa. It was tested and informally released from the SCS Nursery in San Antonio, Texas in 1946. Seed was initially increased by local growers and later through commercial growers. T4464 was and is used to serve the need for a productive, easy to establish range and pasture grass in the semi-tropical and tropical areas of the southern United States and northern Mexico. In Arizona, T4464 did not persist at elevations of 3,000 feet or higher. The Center conducted evaluations between 1983 and

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THESES AND DISSERTATIONS

Thesis Practicum Course Evaluates Water Resources of Cienega Creek

L.G. Wilson
University of Arizona, Department of Hydrology and Water Resources

During the Fall Semester 1993, the Department of Hydrology and Water Resources (HWR), initiated a thesis practicum managed by HWR faculty. The course enables a team of five to six HWR students to complete a Master's thesis within a year by working cooperatively on a common project. The topic for the first year was a water resources evaluation of the upper Cienega CreekBasin, encompassing riparian reaches within Pima County's Cienega Creek Natural Reserve. A summary of some of the salient observations from the first year follow.

Bill Ellett's geophysical survey of the basin determined the relationships between the depth of bedrock and its geometry and the occurrence and movement of water in the basin. He concluded that shallow bedrock and Pantano rocks block ground water flow on the northwest edge of the basin forcing it to the surface to generate perennial flow in the Preserve. He also hypothesized the existence of a structural trough channelling ground water from the upper Cienega Creek Basin into the San Pedro Basin.

Damaris Chong-Diaz developed a computer-based groundwater flow model to simulate the effects of groundwater development on surface water flows in the basin. Her model demonstrated that exploitation of ground water in the basin will seriously jeopardize perennial flow in the Preserve.

Howard Graun's mass-transport model of ground and surface waters upstream of the perennial flows in the basin delineated processes controlling ground water chemistry in the basin. Specifically, his studies quantified the chemical evolution of ground water within the aquifer, showing Cienega Creek waters originate in the upstream alluvial basin.

Clayton Matt's institutional assessment of the basin determined that State and local policies may have a negative effect on the riparian reaches of the basin. Thus inasmuch as the basin is almost entirely outside the Tucson Active Management Area (TAMA), State policy allowing new wells outside an AMA based on "direct and appreciable" affect would mean almost unlimited groundwater development. Similarly, local zoning policy offers the potential for extensive growth, and concomitant water demand in the basin.

A senior honors thesis by Beth Ann Kurtz developed a hydrologic budget for the watershed.

The second team project, initiated during the Spring 1995 semester, is assessing surface water, hydrogeology hydrogeochemistry, and water-policy interrelationships in the upper Cienega Creek Basin. The overall objective of the project is to develop ground-water flow, geochemistry and water-policy models to determine the effects of alternative management policies/scenarios on surface-ground water interactions in the riparian reaches of the basin.

Abstracts

Geologic controls on the occurrence and movement of water in the lower Cienega Creek Basin.
Bill Ellett

The occurrence and movement of water in lower Cienega Creek Basin is controlled mainly by the depth of bedrock and its geometry. Gravity data collected in the basin and its margins was inverted to model geologic cross-sections. Depths from these model cross-sections were then contoured to generate isopach maps and a depth to bedrock map. These maps indicate a depth of over 1,800 feet in the northwest portion of the basin and a thick wedge of denser, less permeable Pantano rocks in the same area. Shallow bedrock and Pantano rocks are thought to block ground water flow on the northwest edge of the basin and force it to the surface to generate perennial flow in Cienega Creek Natural Preserve. In addition, the possible existence of a structural trough that may channel ground water from the upper basin into the San Pedro Basin was detected with gravity data. Temperature and electrical conductivity data support the hypothesis that the source of perennial flow in Cienega Creek Natural Preserve is simple overflow from the lower basin and that the intermittent flow in the Preserve is due to variations in the thickness of the stream channel alluvium.

A hydrogeochemical evaluation of the lower Cienega Creek sub-basin, Pima County, Arizona.
Howard Graun

Mass transport modeling of ground and surface waters upstream of perennial Cienega Creek, Arizona, delineate processes which

control ground water chemistry in this arid alluvial basin. NETPATH modeling shows that the aquifer is open to CO_2 flux, and that dissolution of gypsum, redistribution of carbonate minerals, and cation exchange of Ca^{2+} for Na^{+}, control the evolution of ground and surface water chemistry. Calcium bicarbonate waters which recharge the basin margin, evolve to calcium-sulfate waters during passage through the alluvial aquifer, and produce a quantifiable chemical evolution of ground water within the aquifer. Evaluation of a 10-year data base, plus the clarification of controlling chemical processes, allow a reinterpretation of the source of Cienega Creek waters, which is shown in this study to be the upstream alluvial basin. These findings are corroborated by an-associated geophysical study which confirms a basin flow pattern parallel to the flow path assumed by this investigation.

Water resource administration of lower Cienega Creek near Tucson.
Clayton Matt

The Cienega Creek watershed is located about 20 miles southeast of Tucson, Arizona. The watershed is about 457 square miles in size and contains two perennial stream reaches. Each stream reach, one in the upper basin and one in the lower basin, supports a riparian area complex consisting of a variety of plant and animal life, including endangered species. This thesis reviews the physical and institutional factors responsible for the current condition of the lower riparian area, with regard to water resources and water resource management. Moreover, this thesis discusses the threats to the riparian area from a water resource management perspective, and considerations for future management aimed at maintenance of the riparian area.

Modeling of stream aquifer interaction in lower Cienega Creek basin using a finite element technique.
Damaris Chong-Diaz

This report examines the lower Cienega Creek Basin and the potential impact of nearby commercial development on the perennial stream. Perennial flow and shallow water levels support various riparian species which shelter many types of insects and wildlife. Important riparian indicators for water table levels are cottonwood trees. A finite element technique was used to model surface water groundwater interactions in this system.

Hydrologic budget for the Cienega Creek watershed.
Beth Ann Kurtz

The purpose of this project was to determine a water budget for the Cienega Creek Watershed. Precipitation values were estimated based on the U.S. Weather Bureau's Climatological Data for Arizona. Evapotranspiration was determined based on an empirical equation by Turc and by the FAO Modified Blaney-Criddle Method. Average surface water flow was determined based on USGS gage 0948600. Recharge for the basin was calculated based on the above factors, assuming the change in storage to be zero. It was determined that most of the precipitation during an average year evaporates. Precipitation during a "wet" year appears to be enough to support perennial flow during "dry" years.

1995 Heritage Grants Workshops

It is time to think about applying for Arizona Game and Fish Heritage grants. Workshops will be held throughout the state with information on funding programs for habitat, public access, environmental educations, school grants and IIPAM (identification, inventory, acquisition, protection and management of sensitive habitat). Grant application manuals will be available at the workshops.

July 5 - Cottonwood
July 11 - Mesa
July 18 - Pinetop
August 1- Flagstaff
August 3 - Phoenix
August 15 - Yuma
August 22 - Kingman
August 30 - Tucson
August 31 - Sierra Vista

All locations except Sierra Vista have sessions from 1:00 - 4:00 p.m. and 5:30-8:30 p.m. Sierra Vista has only the evening session.

If you plan to attend a session or just want more information, call (602) 789-3520.

NEWS BRIEFS

Cook's Lake Update

Diane Laush,
Bureau of Reclamation

Cook's Lake, a wooded wetland, is located 1.5 miles north of the confluence of Aravaipa Creek and the San Pedro River in Pinal County, Arizona. Acquisition of the site by the Bureau of Reclamation (Reclamation), was proposed as Clean Water Act, Section 404, compensation for the loss of 22 acres of wetland habitat from construction of New Waddell Dam and modification to Camp Dyer Dam. As of March 1995, approximately 62 acres of buffer area and 25 acres of the core wetland (including the spring source) have been acquired. Negotiations for the remaining 63 acres of wetland from ASARCO, Incorporated (ASARCO) are nearly complete. Acquisition is expected by Fall 1995.

Cook's Lake has long been recognized by resource agencies as a unique habitat, worthy of protection. It is one of only a few wooded wetlands located in Arizona. Reclamation, in conjunction with a small group of private, State and Federal agencies is preparing a Management Plan for the area to encompass the 150-acre Reclamation-owned and an adjacent parcel owned by ASARCO. Upon completion of Reclamation's mitigation requirements and implementation of the management plan for a 5-year period, management control of Reclamation's property will be transferred to the Bureau of Land Management (BLM).

Some of the restoration activities include: preparation and implementation of the management plan, removal of livestock grazing, installation of monitoring wells, replacement of perimeter fencing, restoration of a breached dike, construction of a water control structure and weir, and a botanical inventory of the area.

Verde Cooperative River Basin Study Begins

On March 24, 1995, a cooperative agreement was signed on the White Bridge, launching "a new era of cooperation among those interested in the future of the Verde River and its watershed."

Signers included representative of four state agencies, five federal agencies, Salt River Project, the Verde Watershed Association (VWA), and various Natural Resource Conservation Districts.

For more information, contact the VWA at P.O. Box 280, Camp Verde AZ 86322. You can also request a free subscription to their newsletter, *The Confluence,* at the same address.

Gila Box Advisory Committee

Six positions on the Advisory Committee have been filled by the Safford District of the Bureau of Land Management, with approval from Secretary of Interior, Babbitt. Local rancher Jeff Menges was reappointed. Dan Fischer of Willcox represents expertise in riparian ecology, wildlife and recreation. Steve Marlatt, a Willcox 7th grade teacher was chosen for expertise in environmental education and wildlife. Gayle Hartmann of Tucson was chosen for expertise in cultural resources and recreation. Safford Mayor, Van Talley, represents Graham County and Gary Jones, of the Phelps Dodge Corporation represents Greenlee County.

Honeybee Canyon Revisited

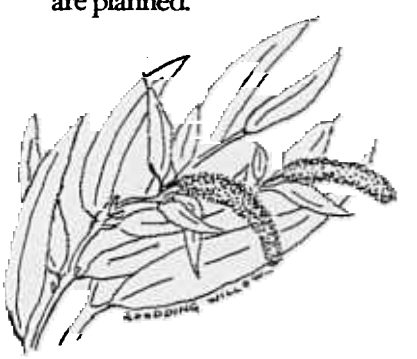
An Oro Valley Task Force is examining multiple water supply issues for the town. At the first of a series of public meetings, "Assured Water Supply" and Honeybee Canyon were the focal points.

Panelists (University of Arizona hydrologists the Tucson AMA Director, a Arizona Department of Environmental Quality representative and the Rancho Vistoso consultant agreed that pumping from Big Wash downstream would not affect the flow in the Canyon. There was less agreement on whether the stream should be considered ephemeral or intermittent.

Some panelists felt that a more serious threat to the Canyon would come from nearby land clearing and urban runoff.

Citizen participants expressed concern about the overall effects of groundwater pumping to the Oro Valley area, including Big Wash and Canada del Oro the effects of pumping other than in Big Wash.

The Task Force will continue to look at long-term water supply issues and whether Oro Valley should endeavor to achieve "Assured Water Supply" locally as well as satisfy AMA requirements on paper, which they can do through recharge exchange credits outside of the area. Several more public meetings are planned.



Water Protection Fund Grants Manual Available

The Water Protection Fund Commission has been diligently working to get their new grants program underway. The application manual has been approved and people may now apply for funds for specific restoration or research projects. Public meetings will be held throughout the state during the month of June.

Funding categories are:

Water acquisition, capital projects and other specific measures - acquire CAP water or effluent to protect or restore rivers and riparian habitat by restoring appropriate hydrological conditions.

Water conservation - develop, promote and implement programs designed to conserve water (outside Active Management Areas) to maintain, enhance or restore riparian areas.

Research and data collection - conduct research related to maintenance, enhancement or restoration of Arizona's rivers, streams and associated riparian habitats.

Some criteria

Projects must benefit Arizona rivers or riparian habitats. They may focus on a single river, multiple rivers or watersheds. Acquisition projects must have long-term sustainability. Several types of research projects aimed at learning more about riparian health and restoration are acceptable. The complete criteria are itemized in the manual

Application procedures

Any person organization, government agency or political subdivision may apply. Packets and manuals may be obtained from the Arizona Water Protection Fund commission, Arizona Department of Water Resources, 500 N. 3rd St., Phoenix AZ 85004. Proposals are due by on August 1, 1995. Applicants will be notified by December 1, 1995. Call Tricia McCraw for more information on the workshops or grants at (602) 417-2460.

Information Sought on Golf Courses and Chemicals

Last summer, Debbie and Mike Feibus became concerned about a new golf course which was about to open in their Cave Creek neighborhood. Their concern was not over golf balls breaking their windows, but over possible use of herbicides and pesticides. The golf course manager readily shared information with them about what chemicals he planned to use starting in late August, including - Round-up, Surflan, and ProGrass. Debbie and Mike were concerned about health effects on their three-year old son who enjoyed playing in the nearby wash, and about the effects on wash wildlife. Golf course managers assured them that the chemicals would not run off the land and that the chemicals quickly break down.

The Feibuses asked an Arizona Department of Environmental Quality (ADEQ) official what could be done to assure safety. ADEQ agreed to test the wash for the three chemicals listed above before application began and then again after the first winter rains. The initial tests were negative. The wash was again tested in January after rains had caused the wash to run. The ADEQ report came back in May, showing detectable levels of Surflan, although below the Action Level.

The Feibuses consulted their physician who advised that the child not be allowed to play in the wash, where he might ingest chemicals. They read literature showing that exposure to common garden chemicals has led to increases of such maladies as brain tumors and leukemia. They also wonder about the impacts on wash wildlife.

They are concerned that the longer the golf course uses these chemicals and others, the more materials will collect in the wash and possibly combine to form other compounds. They have not found much written about this problem. They were amazed to learn that ADEQ has no jurisdiction to regulate chemical use by golf courses or even monitor such use, as it does over chemical use by agriculture.

If any reader of this story can provide the Feibus family with more information about chemical use on golf courses, they would appreciate information. Does anyone know of runoff problems on other golf courses, especially with natural washes nearby? Please contact them at (602) 488-5231 or FAX (602) 488-1449 if you have suggestions or information.

SUCCESSFUL 1995 ANNUAL MEETING IN PAYSON

About 100 people attended the 9th Annual Meeting in Payson in May. The morning speakers were invited to talk about riparian protection or restoration efforts in Arizona. The afternoon technical session of submitted papers included a great range of topics.

Morning Speakers

The first morning session focused on local, state and national perspectives. **Stephen Jones, Desert Land Trust,** discussed a local preservation project in the Cave Creek area. **Jim Walsh,** Arizona Nature Conservancy lobbyist, summarized events in the 1995 Legislature making us \aware of the difficulty of maintaining environmental protection in the current political climate. **Ron Hooper** of the United States Bureau of Land Management (BLM) discussed several significant BLM riparian programs.

Following this, **Buzz Walker** discussed the City of Payson's recharge/ parks project, an effort to secure a water supply while providing recreation and habitat.

Judy Gignac, Bell Vista Water Company, described the disappointing results of attempts to deal with Sierra Vista's growing water demand while preserving the San Pedro River.

Placido dos Santos, Arizona Department of Water Resources, talked about ways the new Santa Cruz Valley Active Management Area plans to use its new powers to preserve flow in the Santa Cruz River.

Technical Session

Norris Dodd - Recovery of riparian ecosystems and threatened native fish in east central Arizona - role of the Heritage Fund

John Rinne - The effects of fire and its management on Southwestern (USA) fishes and aquatic habitats: monitoring and research.

Steven Danzer, D.P. Guertin, and Roy Jemison - Riparian vegetation types in mountain streams in Southeastern Arizona.

Kimberly Buck, and Lawrence Stevens - Spatial and temporal waterbird distribution in the Colorado River downstream from Glen Canyon Dam, Arizona.

Michelle Alexander and John Rinne -Monitoring effects of wildfire in riparian aquatic ecosystems: large organic woody debris.

Rick Yarde - The use of beavers as a tool for riparian habitat restoration.

Tom Cain, L. Mathews, J. Stefferud, G. Loomis, and R. Martin. - Fossil Creek: restoring a unique ecosystem.

Marie Sullivan - A recommended wetlands definition, recognizing the value of riparian areas as separate systems.

Jim Donovan, E. Glomski, and B. Parlette - Towards watershed conservation: a model for community-based riparian conservation in Prescott, Arizona.

Paul LeBrun - Rio Salado, Salt River, Arizona, environmental restoration.

Gary Ahlborn, William Davilla, Barbara Moritsch, and Brian Mihlbacher - The Tonto Creek riparian unit riparian habitat monitoring study - preliminary analysis.

Field trip participants view the Buck Springs project with Al Medina.

John Swett - Revegetation efforts along the lower Colorado River.

Don Manthe, and N. Ash - Constructed wetlands for nitrogen removal in Kingman, Arizona.

Posters

Patti Fenner, Janet Eubanks, Jeff Griswold, Carol Savin, Scott Underwood, and Adrienne Gibson - High school cooperative stream monitoring program update.

Alvin L. Medina and Daniel Neary - Geomorphological response of a montane riparian habitat to interactions of ungulates, vegetation, and hydrology.

Brooke Parlette, E. Glomski, and Jim Donovan - Riparian restoration: an educational avenue to engage people in riparian conservation.

Copies of all abstracts are available from Cindy Zisner at (602) 965-2490.

Field Trips

Members participated in two Sunday field trips to learn about:

The Dude Fire - the aftereffects of the fire and regeneration of flora and fauna, led by Robert Ingram, Tonto National Forest and John Rinne, Rocky Mountain Forest and Range Experiment Station; and

Buck Springs - watershed restoration work and research conducted by the Forest Service in the Blue Ridge Ranger District, led by Alvin Medina, Rocky Mountain Forest and Range Experiment Station.

Business Meeting

Members voted to increase the annual dues to $15. Minor changes in the bylaws were also adopted. Treasurer, Diane Laush reported that ARC is solvent and maintains an average balance of between $2500 and $3000.

Current officers Kris Randall, Ruth Valencia, Cindy Zisner, and Diane Laush were re-elected, as were board members Russ Haughey and Marie Sullivan. Matt Chew replaced Duncan Patten.

Center from page 7

1989 to identify a strain with potential cold hardiness. These trials included 19 high elevation collections from southern Africa and a previous strain numbered 9003686. These collections did not look like common buffelgrass T4464. Foliage was bluish green, were more robust and coarser plants, some produced short rhizomes, exhibited little to no movement within seeded plots and had straw-colored seed heads. 9003686 and the other collections were officially dropped from the program in 1991 due to decreased interest from users, poor seed production, an extensive buffelgrass breeding program at Texas A and M and increased environmental concern.

I hope this article has shed some light on our program and our work with buffelgrass. If you have questions or comments please call, write or make an appointment to visit the Center. Visitors are always welcome! We are still located at 3241 N. Romero Road in Tucson and our phone number is (520) 670-6491.

ARC Supports Referendum on HB 2319

At the Annual Meeting, ARC members voted to support a referendum to overturn a law the Legislature passed this year giving the Governor power to fire his appointees to many Boards and Commissions at will. Among the 110 boards and commissions affected are the Arizona State Parks Board, the Game and Fish Commission, the State Board of Education, and the Residential Utility Commission. The Board of Regents was excluded. Allowing this law to pass would seriously erode the independence of commissioners and board members, hampering attempts to manage for species protection and riparian preservation.

A coalition of many concerned groups has formed, including hunting and fishing groups, environmental groups and others. More than 55,000 valid signatures are needed by mid-July to place this on the ballot. It would then be "on hold" until the 1996 statewide elections.

ARC donated $100 to this cause. Your help is needed. Please help gather signatures and raise money. Contact Citizens for Public Representation at (602) 224-6155 in Phoenix or (520) 740-0380 in Tucson. Volunteers are especially needed in the rural areas.

Noteworthy Publications

Pat Ellsworth
Section Editor

BOOKS

Biswas, A.K., M. Jellali, and G. Stout. 1994. *Water for Sustainable Development in the Twenty-first Century.* Oxford University Press. 290 pp.

The authors take a global view of water resources planning and management, looking ahead to a world in which there is greater demand for water and increasing problems with water quality.

Bolling, D.M. 1994. *How to Save a River: A Handbook for Citizen Action.* Island Press. 300 pp.

Bolling is co-founder of Friends of the Russian River. Here, he provides detailed how-to's for citizen groups organizing to protect a river.

Environmental Careers Organization. 1993. *The New Complete Guide to Environmental Careers.* Island Press. 364 pp.

This revised edition includes chapters on environmental education, waste management, pollution control, wildlife management, parks and outdoor recreation. There is also job-hunting information such as required education, internships, and career strategies.

Environmental Data Research Institute. 1994. *Environmental Grant-making Foundations: 1995 Directory.* 750 pp.

This guide to 600 independent, community, and corporate foundations that give environmental grants is extensively cross-referenced. The profile for each foundation includes the organization's history and philosophy, the application process, sample grants, and limitations.

Graf, W.L. 1994. *Plutonium and the Rio Grande: Environmental Change and Contamination in the Nuclear Age.* Oxford University Press. 352 pp.

The author, who is at Arizona State University, offers a history of the disposal of plutonium from Los Alamos National Laboratory into nearby canyons leading to the Rio Grande. The book includes extensive appendices, maps and photos.

Johnston, B.R. (ed.) 1994. *Who Pays the Price? The Sociocultural Context of Environmental Crisis.* Island Press. 264 pp.

The rights of the powerless (the poor, minorities, indigenous peoples) to health, resources, and environmental quality are repeatedly violated in the name of national security and economic interests. Based on a study by the Society for Applied Anthropology, this book looks deeply at the human experience of environmental crisis. Material is drawn from many economic and geographic contexts.

Pieterse, A.H. and K.J. Murphy. 1990. *Aquatic Weeds: The Ecology and Management of Nuisance Aquatic Vegetation.* Oxford University Press. 616 pp.

The book has three parts. The first part deals with concepts such as ecology, flow resistance, and relationship between aquatic weeds and public health. The second part deals with aquatic weed control. The third part considers aquatic weed problems on various continents.

Lamb, B.L. 1995. Criteria for evaluating state instream flow programs: deciding what works. *J. of Water Resources Planning and Management.* 121(3).

Lamb examines the question of evaluating the effectiveness of state instream flow programs . His criteria are public confidence, certainty proper administration, expense and outcome in-stream.

McCormick, F.H., B.H. Hill, L.P. Parrish and W.T. Willingham. 1994. Mining impacts on fish assemblages in the Eagle and Arkansas Rivers, Colorado. *J. of Freshwater Ecology* 9: 175-179.

There were significant differences in fish assemblages among sites impacted by mining and control or recovering sites. Low species richness at all sites made it difficult to apply the Index of Biotic Diversity. However, a native fish, the Paiute sculpin (*Cottus beldingi*), may well serve as in indicator species in this area. Sculpins disappeared from sites adjacent to mining influences though they were numerous a few hundred meters upstream.

Anyone interested in becoming the editor of this section should notify Jeff Inwood at (602) 263-9522.

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 $15. 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 Fall Issue will be mailed in September, with the deadline for submittals August 1, 1995. Please call or write with suggestions, publications for review, announcements, articles, and/or illustrations. Information on computer disk (any type) or via E-Mail is preferred.

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Protection/Enhancement::	vacant
Water Resources: Andy Laurenzi	(520) 622-3861
Newsletter: Jeff Inwood	(602) 263-9522

To join the Arizona Riparian Council, contact

Cindy Zisner at Arizona State University Center For Environmental Studies Tempe AZ 85287-3211

(602) 965-2490

Annual dues are $15.

Calendar

Healthy Watersheds and Clean Water: Coexisting with Limited Resources and Competing Values. Aug. 29-30, Southern Utah University, Cedar City. Contact Jack Wilbur at (801) 538-7098.

Arizona Hydrological Society Annual Symposium (with sessions on riparian restoration/preservation, constructed wetlands, and sustainable hydrology, among many others). Tucson Sept. 14-16. Contact Barbara Tellman (520) 792-9591.

Riparian Symposium: Desired Future Conditions for Southwestern Riparian Ecosystems Sept. 18-22. Albuquerque. Contact Doug Shaw at (505) 842-3256.

Arizona Native Plant Society Annual Meeting. Sept. 30-Oct. 1. Safford. Contact Julia Fonseca at (520) 792-2690.

Seventh Annual Forest Congress. Feb. 19-24. Washington D.C. Pre-meeting gatherings planned to help develop a year-long assessment of National Forest Policy. Contact Dan Smith (202) 667-3300 (x208).

Gila Watch Programs. Various dates. Upland plant communities workshop, Odenology workshop, Main Diamond stream restoration, Kid's Stream Team camps, etc. Call Gila Watch at (505) 388-2854 for full information.

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