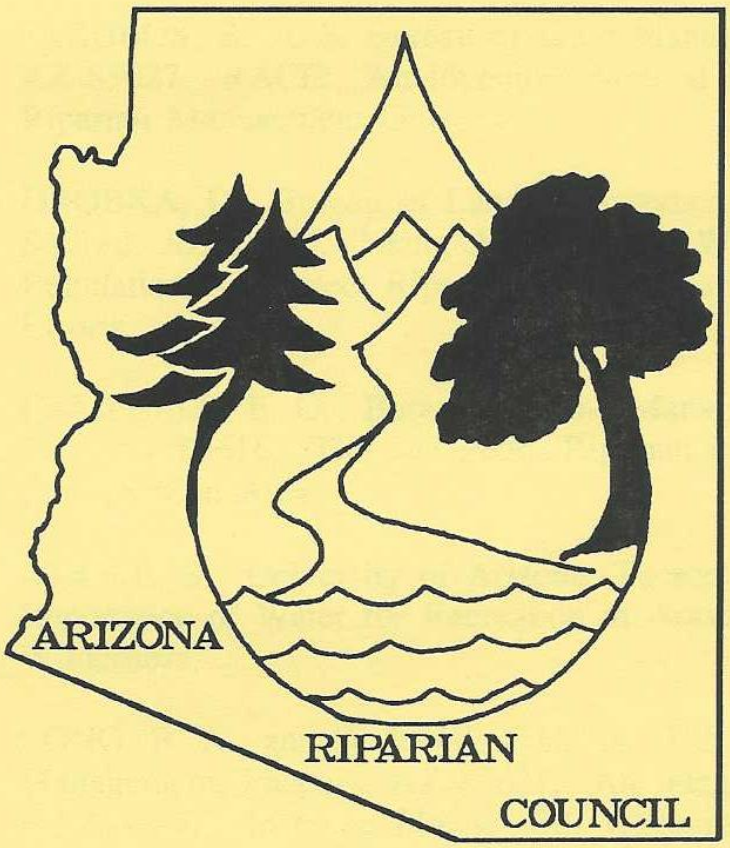
ARIZONA RIPARIAN COUNCIL

FOURTH ANNUAL MEETING
SUNRISE SKI RESORT
McNARY, ARIZONA
September 22-23, 1989



PROGRAM AND ABSTRACTS

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PROGRAM

FRIDAY, 22 September 1989

12:00-1:00 REGISTRATION

1:00-1:15 JAKUBOS, B. U.S. Bureau of Land Management, Phoenix, AZ 85027. RACE: An Inventory Method for Establishing Riparian Management Objectives.

1:15-1:30 DROBKA, D. Bureau of Land Management, Safford District, Safford, AZ 85546. Using Arizona State Water Laws and Regulations to Protect Riparian Values: Safford District Efforts.

1:30-1:45 CAMPBELL, E. G. Bureau of Land Management, Huachuca City, AZ 85616. The San Pedro Riparian National Conservation Area.

1:45-2:00 MOORE, S. University of Arizona, Tucson, AZ 85721. The Importance of Water for Recreation in Aravaipa Canyon Wilderness.

2:00-2:15 LONG, B. A., and D. McGLOTHLIN. U.S. Bureau of Land Management, Phoenix, AZ 85027. An Integrated Approach for Assessing Instream Flows: Bill Williams River, Arizona.

2:15-2:30 STROMBERG, J. C., and D. T. PATTEN. Center for Environmental Studies, Arizona State University, Tempe, AZ 85287-1201. Flow Needs for Growth and Maintenance of Woody Riparian Vegetation.

2:30-3:00 BREAK

3:00-3:15 RICHTER[1], B. D., J. C. STROMBERG[2], and D. T. PATTEN[2]. [1]Hassayampa River Preserve, Wickenburg, AZ 85358 and [2]Center for Environmental Studies, Arizona State University, Tempe, AZ 85287-1201. The Influences of Flooding in a Southwestern Riparian System.

3:15-3:30 BENNETT, P., and M. KUNZMANN. Cooperative National Park Resources Study Unit at University of Arizona, Tucson, AZ 85721. National Park Service Management of Riparian Habitat at Quitobaquito Springs, Organ Pipe Cactus National Monument, Arizona.

3:30-3:45 WOLDEN,[1] L. J., J. STROMBERG,[1] and H. RICHTER.[2] [1]Center for Environmental Studies, Arizona State University, Tempe, AZ 85287-1201 and [2]Hassayampa River Preserve, Wickenburg, AZ 85358. Restoration of Herbaceous Riparian Vegetation.

3:45-4:00 BAMMANN, A., and R. PARKER. Bureau of Land Management, Safford, AZ 85546. Survival of Riparian Trees Four to Nine Years After Planting.

4:00-4:15 RORABAUGH, J., S. DUNN, G. FERRIER, and G. GOULD. U.S. Bureau of Reclamation, Yuma Projects Office, Yuma, AZ 85366. An Overview of Bureau of Reclamation Riparian Revegetation Efforts on the Lower Colorado and Lower Gila Rivers, Arizona.

4:15-4:30 MARSH, P. C., and J. N. RINNE. Center for Environmental Studies and Forestry Sciences Laboratory, Arizona State University, Tempe, AZ 85287-1201. Fish Populations and Habitats of White Mountain Trout Streams, Arizona.

4:30-4:45 RUFFNER, G. A., F. B. BROWN, and R. A. JOHNSON. Ruffner and Associates, Prescott, AZ 86303 and Great Western Research, Inc., Mesa, AZ 85203. Dove Hunting and Saltcedar -- Natural Resource Economics of an Arizona Riparian System.

4:45-5:00 JOHNSON, R., and E. JOHNSON. National Park Service, University of Arizona Tucson, AZ 85721 and Arizona Game and Fish Department, Yuma, AZ. Ferruginous Pygmy-Owls in Arizona and the Peruvian Amazon.

5:00-5:30 BUSINESS MEETING

7:00 BUFFET DINNER

SATURDAY, 23 September 1989

8:00-5:30 FIELD TRIPS

Beginning at the Sunrise Ski Resort Lodge at 8:00 AM, groups will travel by bus (30 people/bus; box lunch provided by Sunrise Ski Resort) to several sites within the Apache-Sitgreaves National Forest and immediate vicinity. Site visits will examine:

- Soil Conservation Service Demonstration Project to control active gully erosion on State Trust lands. The first project of its kind funded by the State Legislature.

- Several grazing allotments on the Apache-Sitgreaves National Forest where management plans are underway or in preparation to address riparian management issues related to livestock/elk grazing in riparian zones.

- Phelps Cabin Research Natural Area and the Arizona Game and Fish Department's PS Ranch Wildlife Area, long-term riparian exclosures.

- Riparian management issues related to recovery efforts for Apache trout (*Oncorhynchus apache*) and Arizona willow (*Salix arizonica*).

Each site visit will include presentations and group discussions with personnel from the U.S. Forest Service, Arizona Game and Fish Department, and the Soil Conservation Service, along with local livestock permittees and regional ecologists.

BAMMANN, A., and R. PARKER. Bureau of Land Management, 425 E. 4th Street, Safford, AZ 85546. Survival of Riparian Trees Four to Nine Years After Planting.

Between 1981 and 1986 we planted 959 native riparian trees into 17 sites where the fate could be determined. Mortality of individual plants was determined for four species after four to nine growing seasons. Survival varied by species, planting location, and water quality.

Willow poles were most tolerant of site conditions -- with 18% overall survival. Individuals persist in all locations except where impacted by large floods or total desiccation. Cottonwood pole survival was similar to willows except in sites with high levels of dissolved salt -- 11% vs. 29%, respectively. Sycamore and walnut bare-root seedlings had 2% and 9% survival, respectively. In the future these species will be planted only in smaller drainages with low levels of dissolved salts.

BENNETT, P., and M. KUNZMANN. Cooperative National Park Resources Studies Unit at University of Arizona, Tucson, AZ 85721. National Park Service Management of Riparian Habitat at Quitobaquito Springs, Organ Pipe Cactus National Monument, Arizona.

When the National Park Service acquired Quitobaquito Springs in 1957, cattle grazing around the springs and pond were prohibited. This was the first of a number of well-intentioned resource management activities that were to have profound but often unforeseen consequences. The once shallow cienega-like pond was deepened, creating less than optimum habitat for the now endangered desert pupfish (*Cyprinodon macularius eremus*) as well as for the Sonoran mud turtle (*Kinosternon sonoriense*).

Ecological studies recently undertaken have provided data for restoration. Pupfish breeding has been satisfactory because a dense mat of water plants has provided a shallow false bottom suitable for egg laying. Turtle breeding habitat is less adequate because gravid females have difficulty leaving the steep-banked pond to nest. Several schemes for reducing pond depth, reed control, and for creation of a gently sloping shoreline are being proposed.

CAMPBELL, E. G. Bureau of Land Management, RR 1, Box 9853, Hauchuca City, AZ 85616. The San Pedro Riparian National Conservation Area.

On March 7, 1986 the Bureau of Land Management initially acquired 43,371 acres along the upper San Pedro River. On November 18, 1988, President Ronald Reagan signed into law the Arizona-Idaho Conservation Act designating a total of 56,431 acres (36 linear miles) on the upper San Pedro River as the San Pedro National Conservation Area. This remaining ecosystem constitutes some of the best in the desert Southwest. The outstanding riparian vegetation, wildlife, cultural, and paleontological values are of national significance.

Wildlife inventories over the first three years indicate that the upper San Pedro Valley has among the highest terrestrial biodiversity in the United States. Over 350 species of birds, 82 species of mammals, 47 species of reptiles and amphibians, and 14 species of fish have been recorded. Fully 70% of the birds listed by the Arizona Game and Fish Department in their *Threatened Native Wildlife in Arizona* (1988) occur within the San Pedro Riparian National Conservation Area.

The Bureau is mandated to manage these lands "in a manner that conserves, protects, and enhances the riparian area and the aquatic, wildlife archaeological, paleontological, scientific, cultural, educational and recreational resources." The final land-use plan which has recently been completed has been crafted to manage this significant area consistent with this mandate.

DROBKA, D. Safford District, Bureau of Land Management, Safford, AZ 85546. Using Arizona State Water Laws and Regulations to Protect Riparian Values: Safford District Efforts.

For years, Federal agencies have strived to protect and enhance riparian resources within the framework of their laws and regulations. The State of Arizona, however, offers several opportunities which present new strategies to protect aquatic resources.

The Arizona surface water code is a valuable tool for maintaining water flows for riparian resources as it includes fish, wildlife, and recreation as beneficial uses. The BLM's Safford District applied for an instream flow water right to assure water flow through the Aravaipa Canyon Wilderness, and has been granted an appropriate permit leading to the water right.

The State of Arizona's Administrative Code of Rules and Regulations, Section R11-18-303, offers protection for high-quality waters which possess outstanding ecological values. Using these regulations, Safford District filed for designation of Bonita Creek as a Unique Waters.

Water quality and quantity requirements for fish, wildlife, vegetation, and recreation must be evaluated by the applicant. Information used in each application was gathered over a period of 10 years by BLM, UA, ASU, USGS, and USFWS. Adequate research time and money is oftentimes unavailable to Federal agencies to conduct background studies. Many opportunities exist for university research in support of agency nominations for Unique Waters and instream flow. Research must be encouraged to ensure continuing efforts for the protection and enhancement of riparian resources.

JAKUBOS, B. U.S. Bureau of Land Management, Phoenix, AZ 85027. RACE: An Inventory Method for Establishing Riparian Management Objectives.

The Phoenix District, Arizona, Bureau of Land Management, has developed the Riparian Area Condition Evaluation (RACE) to inventory and evaluate the present condition of riparian areas within the District. The inventory, which began in summer 1988, will be ongoing for a five-year period.

There are three components to RACE: inventory, evaluation, and monitoring. Inventory consists of a description of physical and biological parameters of the stream, such as stream flow, streambed composition, and woody species regeneration. Streams are divided into segments, and all parameters are measured for each segment.

The evaluation of riparian area condition is based on four rating elements. These are streambank soil alteration, streambank vegetation stability, subsurface water status, and woody species regeneration. Each element has a quantitative rating from one to four, a rating of four is the best condition. A total rating of 12 or greater is considered a satisfactory riparian area. A total of less than 12 is considered unsatisfactory.

Riparian area monitoring in satisfactory segments will consist of revisiting photo points a minimum of every five years. In unsatisfactory segments, there will be additional monitoring such as yearly utilization studies in areas with poor woody species regeneration.

Phoenix District has 850 miles of possible riparian areas. By summer 1989, 252 miles of streams had been inventoried. Of the streams inventoried, 63 miles did not meet the criteria to be considered riparian. Of the riparian areas inventoried, 111 miles are in satisfactory condition and 78 miles are in unsatisfactory

JOHNSON, R., and E. JOHNSON. National Park Service, University of Arizona, Tucson, AZ 85721 and Arizona Game and Fish Department, Yuma, AZ. Ferruginous Pygmy-Owls in Arizona and the Peruvian Amazon.

The Ferruginous Pygmy-Owl (*Glaucidium brasilianum*) ranges from southern Arizona south through much of South America. This small, diurnal owl was a regularly reported breeding resident in cottonwood-willow (*Populus fremontii-Salix gooddingii*) riparian habitats throughout central and southern Arizona during the late 1800s and early 1900s. During the past few decades its numbers have been drastically reduced along the heavily dammed Gila-Salt-Verde river system, where they had been most common. The only known stable population today is located in Organ Pipe National Monument, where they occur in xeroriparian habitats, mostly saguaro-mesquite (*Carnegiea-Prosopis*) along large washes. Life history information for the species, e.g., food habits and habitat requirements, is large inadequate.

During June and July 1989, the senior author studied this species in floodplain and associated riparian habitats along secondary and tertiary rivers of the Amazon drainage near Iquitos, Peru. Individuals were especially common at the waterfront adjacent to villages and less common at the edges of clearings around villages back from a river. Birds were located both by spontaneous calls, especially shortly after sunrise, and by using vocal imitations. Territories for the species are approximately the same size in Organ Pipe and the Amazon, 100 m across.

LONG, B. A., and D. McGLOTHLIN. U.S. Bureau of Land Management, Phoenix, AZ 85027. An Integrated Approach for Assessing Instream Flows: Bill Williams River, Arizona.

The Bill Williams Riparian Management Area (BWRMA) begins at Alamo Dam and extends approximately 20 miles downstream to Planet Ranch in western Arizona. Flows in the Bill Williams River have been regulated by Alamo Dam since 1969.

In 1988, the BLM applied for an instream flow appropriation below Alamo Dam in response to the City of Scottsdale's filing for a right to all unappropriated releases from the reservoir. A study was conducted to assess water resource conditions in support of instream flow water rights. The approach that was used for quantifying water needs was based upon combining water balance techniques (assuming controlled inputs and measured losses and throughflow), channel cross-section data, and resource requirements.

A 29 cubic feet per second (cfs) loss in flow was calculated between Alamo Dam and Planet Ranch at a 100 cfs release in July 1988. Losses and gains within the reach were attributed to changes in underflow, transfers from the alluvial aquifer to the regional groundwater system, evapotranspiration, and water diversions. During releases of less than 50 cfs flows are subsurface near Planet Ranch. Well point data documented that prolonged releases of 10 cfs lowered water table levels to 12+ feet below the floodplain surface.

An average 25 cfs release flow was proposed to cover system losses and sustain present riparian conditions. An additional 150 cfs flushing flow in March was recommended for seed dispersal and basin recharge. A flow duration analysis was used to justify the availability of the requested flows. The

MARSH, P. C., and J. N. RINNE. Center for Environmental Studies and Forestry Sciences Laboratory, Arizona State University, Tempe, AZ 85287-1201. Fish Populations and Habitats of White Mountain Trout Streams, Arizona.

A suite of more than 30 trout streams in the White Mountains of eastern Arizona was surveyed during 1988-89. Fish collections for determination of species composition, size-class structure, and numerical and biomass densities were accompanied by quantitative estimates of 24 important stream and riparian parameters. Non-native rainbow (*Oncorhynchus mykiss*) or brown (*Salmo trutta*) trouts were predominant salmonids in most smaller, headwater streams, hybrids between rainbow and native Apache (*O. apache*) trouts were abundant in others, and "pure" Apache trout were rare or absent. Native minnows (Cyprinidae) and suckers (Catostomidae) were predominant in most larger, downstream reaches, where trouts were less common. Stream permanence, instream cover, and relative proportion of pool habitat appeared important determinants of total salmonid densities; these factors may be important in physical management of cold water streams of the region. Interrelationships between salmonid and native non-salmonid populations have yet to be fully explored, but may provide useful insights into biological determinants of respective species' abundances in various habitats.

MOORE, S. University of Arizona, Tucson, AZ 85721. The Importance of Water for Recreation in Aravaipa Canyon Wilderness.

The talk describes analyses that were conducted to determine the importance of water as an attribute of the recreational setting at Aravaipa Canyon Wilderness, Arizona, and the influence that reduced flows in Aravaipa Creek would have on visitors' perceptions of water quantity and quality. The research was conducted to be included in an application by the Bureau of Land Management to secure an instream flow right for Aravaipa Creek.

Possibly reflecting the uniqueness of a free-flowing stream in a desert region, water was most frequently ranked the most important element of the Wilderness Area, followed by peace and quiet, solitude, wildlife, and geology. Two water-based activities -- hiking and swimming -- were highly rated by the respondents as were a number of nature study activities based on the riparian habitat. A logistic regression model compared visitors' perceptions of water quantity and quality against actual flows. The model demonstrated that perceptions of stream flows may be grounded in reality: for each cfs drop in stream flow (below 23 cfs), the odds of indicating that one saw less water than perferred versus acceptable amounts of water increased by 45%. In simpler terms, as stream flows decreased, people became much more likely to indicate that flows were less than preferred. Another regression model related perceptions of water quality to actual stream flows. It indicated as flows decreased below 23 cfs, visitors become more likely to purify water from Aravaipa Creek.

RICHTER[1], B. D., J. C. STROMBERG[2], and D. T. PATTEN[2].
[1]Hassayampa River Preserve, Wickenburg, AZ 85358 and
[2]Center for Environmental Studies, Arizona State University, Tempe, AZ 85287-1201. The Influences of Flooding in a Southwestern Riparian System.

Although riparian system researchers intuitively understand the general role of flooding in these plant communities, very little quantitative analysis or physical modeling of these flooding effects has been undertaken. This paper describes a methodology for analyzing flood influences by utilizing vegetation monitoring along river transects and a sophisticated flood hydraulics computer model (HEC-2). The project is addressing important questions such as "What magnitude of floods will alter the physical structure and species composition of the plant community? How does flood timing during the growing season affect the germination of seeds and survival of seedlings?"

The flood hydraulics study as described provides an analysis method that is readily transferrable to other riparian systems, and anticipated results may offer some quantification of flooding characteristics which translate to any system composed of similar plant species. For instance, if mortality thresholds of such physical forces as flow velocity, depth, tractive shear stress, and stream power can be identified for selected riparian species, such information may be quite valuable to those engaged in restoration of disturbed systems and other applications.

RORABAUGH, J., S. DUNN, G. FERRIER, and G. GOULD.
U.S. Bureau of Reclamation, Yuma Projects Office, Yuma, AZ 85366. An Overview of Bureau of Reclamation Riparian Revegetation Efforts on the Lower Colorado and Lower Gila Rivers, Arizona.

Since 1977, Reclamation has planted over 32,000 trees and shrubs on 154 ha at 8 lower Colorado River sites and 2 lower Gila River sites. Honey mesquite (*Prosopis juliflora*), cottonwood (*Populus fremontii*), and Goodding willow (*Salix gooddingii*) were the most-commonly planted species. One-gallon plants were typically planted in augered holes and watered by drip irrigation for 7 to 42 months. Data on depth to groundwater, soil moisture, soil salinity and texture, and other factors were used to fine tune the revegetation techniques to the characteristics of each site. Costs for revegetation ranged from $24.00 to $138.00 per planted tree or shrub. Survival at the 10 sites varied from 24% to 86%. Growth is often slow. Weed, insect, and vertebrate pests have been responsible for a part of this mortality and slow growth, but many trees fail to grow or survive in the apparent absence of pests. Inconsistent results with the current planting methods have stimulated research into different techniques; including pole planting, various seeding techniques, flood irrigation, and sprinkler irrigation.

RUFFNER[1], G. A., F. B. BROWN[2], and R. A. JOHNSON[1].
[1]Ruffner Associates, 212 S. Marina Street, Prescott, AZ 86303 and [2]Great Western Research, Inc., 1540 E. McKellips, Mesa, AZ 85203. Dove Hunting and Saltcedar -- Natural Resource Economics of an Arizona Riparian System.

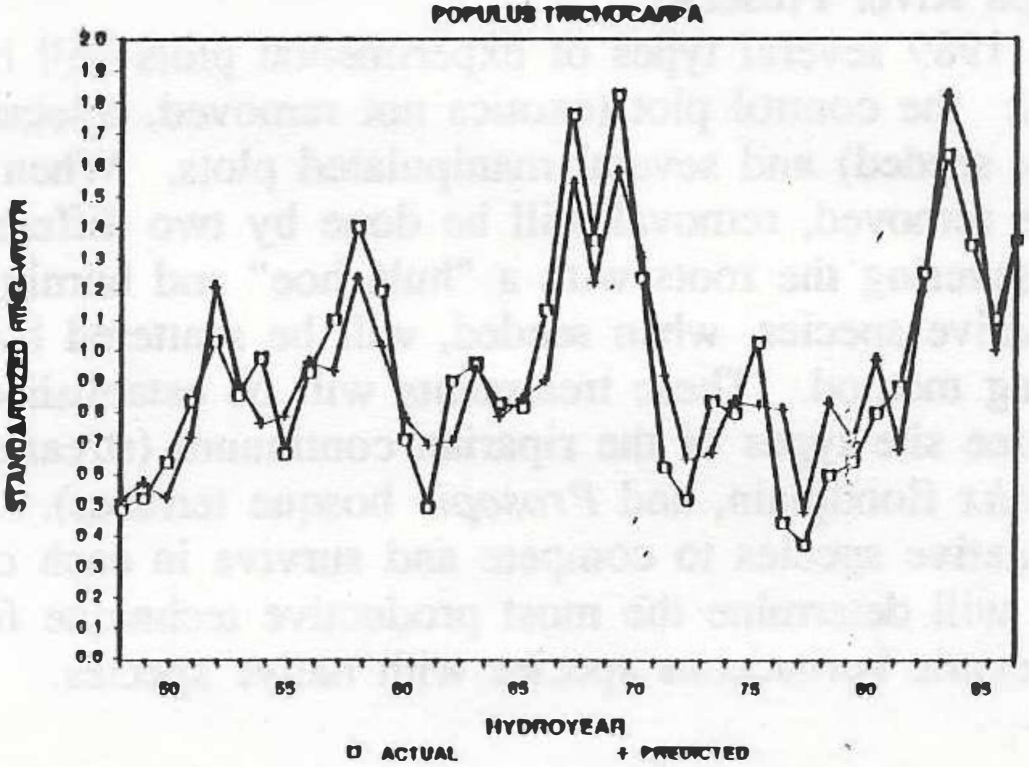
Saltcedar (*Tamarix chinensis*) is the dominant riparian species along the Salt, Gila, and Colorado Rivers in Arizona. This exotic plant species is an important nesting substrate for a number of native wildlife species, particularly White-winged Dove (*Zenaida asiatica*). By late summer approximately 126,000 adults hatch and fledge 189,000 young from nests in saltcedar along the portions of Arizona's three major river systems. The saltcedars preferred by nesting White-winged Doves are 15-35 feet tall with dense foliage. A variety of activities influence the availability of preferred saltcedar stands. In general, preferred nesting stands are a relatively rare habitat.

Over 71,000 hunter-trips are made each dove season by sportsmen in pursuit of White-winged Doves associated with saltcedar along Arizona's three major river systems. Of these 91% are trips by nonresidents. In 1988 dollars, residents spend an average of $39/hunter-trip and nonresidents expend an average of $52/hunter-trip. Dove hunting generates approximately 2.8 million dollars annually for the local economy of communities such as Buckeye, Gila Bend, Yuma, and metropolitan Phoenix. Prudent management and habitat development practices will be required to assure that this resource is perpetuated.

STROMBERG, J. C., and D. T. PATTEN. Center for Environmental Studies, Arizona State University, Tempe, AZ 85287-1201. Flow Needs for Growth and Maintenance of Woody Riparian Vegetation.

A methodology is described which allows determination of instream flows for growth and maintenance of one of the integral components of riparian ecosystems, the woody vegetation. Analysis of tree-ring data for two riparian tree species from an alluvial, aridland stream has revealed strong relationships between growth rates and hydrologic variables, indicating the utility of this methodology for developing models (Fig. 1) which predict the effects of flow reduction and calculate the flows necessary to sustain adequate rates of growth.

Fig. 1. Predicted growth of black cottonwood along Rush Creek, California, based on a model using stream flow and precipitation compared to actual growth.



WOLDEN,[1] L., J. STROMBERG,[1], and H. RICHTER.[2] [1]Center for Environmental Studies, Arizona State University, Tempe, AZ 85287-1201 and [2]Hassayampa River Preserve, Wickenburg, AZ 85358. Restoration of Herbaceous Riparian Vegetation.

Techniques for restoration of native riparian habitats are being developed at a river preserve in Arizona. Hassayampa River Preserve, the study site, was extensively grazed from the 1860s until 1987, with off-road vehicles disrupting the vegetation in the recent past. One effect of the grazing and vehicles has been the displacement of native herbaceous understory species by exotic herbaceous species.

The herbaceous species existing on the Preserve are presently being surveyed. Using the information gathered from the floristic survey, as well as historical accounts of native vegetation, several native grasses, forbs, and vines are being selected for seeding in experimental plots. Seeds for the plots are being collected at Hassayampa River Preserve.

In fall 1989 several types of experimental plots will be established: the control plot (exotics not removed, selected natives not seeded) and several manipulated plots. When exotic species are removed, removal will be done by two different methods (severing the roots with a "hula hoe" and burning). Selected native species, when seeded, will be scattered by a hand-broadcasting method. These treatments will be established in each of three site types of the riparian continuum (streamside, *Populus-Salix* floodplain, and *Prosopis* bosque terraces). The ability of native species to compete and survive in each of the treatments will determine the most productive technique for replacing exotic herbaceous species with native species.