Arizona Riparian Council

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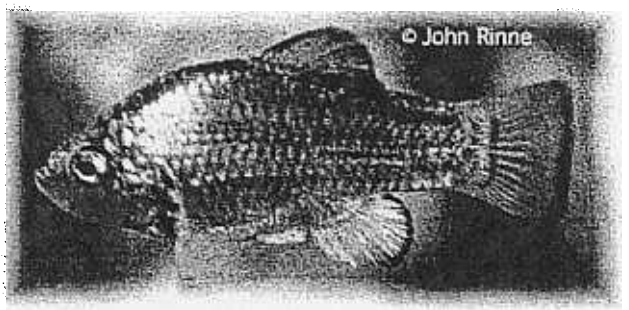
SOMETHING FISHY AT THE PHOENIX ZOO

Patricia A. Sowka, Department of Biology, Arizona State University

In spring 1997, the Phoenix Zoo took an important step in educating the public about the perils facing riparian habitats in Arizona. A new exhibit featuring the federally listed desert pupfish (*Cyprinodon macularius macularius*) was approved by the Zoo and funded by the Phoenix Area Office of the U.S. Bureau of Reclamation through Arizona State University. This exhibit is particularly useful in that it introduces the public not only to the existence of riparian habitats, but also to one of their native inhabitants, the desert pupfish.

Historically, desert pupfish were abundant in parts of southern Arizona, southeastern California, and northern Mexico, and essentially occupied much of the lower Gila basin and lower Colorado River system (Minckley 1973). Pupfish occupied diverse habitats which ranged from cienegas, springs, and streams to lake and river margins. Currently, the only naturally occurring populations of desert pupfish inhabit Quitobaquito Springs in Arizona, portions of the Salton Sea and its tributaries in California, and scattered localities along the Rio Sonoyta and in the Laguna Salada basin in Mexico (U.S. Fish and Wildlife Service 1993).



Due to habitat loss or modification, introduction of exotic fishes, and pollution, the desert pupfish has experienced a drastic decline and is now threatened with extinction (U.S. Fish and Wildlife Service 1993). Desert pupfish was officially listed as endangered by the U.S. Fish and Wildlife Service in March 1986.

The exhibit at the Phoenix Zoo is located in the Arizona Trail and is a replica of a cienega typical of the arid Southwest. Cottonwood (*Populus fremontii*) and willow (*Salix* sp.) trees lining a babbling stream and interpretive signage lead visitors to the pupfish exhibit. To give an impression of a natural spring system, materials indigenous to desert springs/cienegas were used. Natural granite boulders placed in an irregular arrangement in and around the pond and a small "seep" originating from the boulders give the impression of a natural pond. Planting of native plants such as cattails (*Typha* sp.), horsetail reed (*Equisetum* sp.), yerba mansa (*Anemopsis californica*), Huachuca water

Cont. on pg. 6.....Pupfish

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1998 Most Endangered Rivers in America

The following are the first 10 of American Rivers' list of 20 most endangered rivers in America.

1. Hanford Reach of the Columbia River (Washington State). **Threat**: Agricultural Development, Public Land Transfer, Nuclear Waste Contamination. Proposed development of this ecologically sensitive area could pollute the clear, clean waters of the reach and endanger unique king salmon runs harvested as far north as Alaska.
2. Missouri River (Montana, North Dakota, South Dakota, Nebraska, Iowa, Kansas, Missouri). **Threat**: Dams, Channelization. Once one of the world's most biologically productive waterways, the Missouri River today is little more than a stabilized barge canal that doubles as a storm sewer. Many Missouri River fish and wildlife species are presently at less than 10% of their historical levels.
3. Pocomoke River (Eastern Shore, Maryland). **Threat**: Factory Poultry Farms. Massive amounts of chicken waste produced by factory poultry farms are contaminating the Pocomoke. Runoff from farm fields coated with poultry manure stimulates the growth of *Pfiesteria*, a toxic microbe that, since 1996, has been killing fish and making swimmers and boaters ill.
4. Kern River (California, near Los Angeles). **Threat**: Small Hydropower Dams. Six small hydropower dams on the Kern produce minimal electric power while blocking the river's flow, destroying critical aquatic habitat, and harming the fish and wildlife that depend on the waterway. Despite the damage they cause, small dams like these will most likely be mislabeled "green" as utilities seek a competitive edge in California's newly deregulated electricity market.
5. Blackfoot River (Montana, near Missoula). **Threat**: Gold Mine. Pollution from a proposed cyanide heap-leach gold mine threatens to destroy the Blackfoot, made famous by *A River Runs Through It* and its world-renowned trout fishery.
6. Colorado River Delta (Mexico: Baja California, Sonora). **Threat**: Overuse of Water. So much of the Colorado River's water has been blocked by dams or diverted out of the riverbed into farm fields and cities that fresh water no longer flows to the once lush Colorado River Delta.
7. Chattahoochee River (Georgia— near Atlanta — Alabama, Florida). **Threat**: Development, Polluted Runoff, Sewage Overflows, Competition for Water Supply. The Chattahoochee is the poster child of polluted urban rivers. Vast amounts of pollutants — including untreated sewage, pesticides, excess nutrients, sediment, bacteria, and heavy metals — enter the river.
8. Lower Snake River (Washington). **Threat**: Dams. Dams on the Lower Snake have had devastating effects on the river, destroying wild salmon and steelhead runs in Oregon, Washington, and Idaho.
9. Apple River (Wisconsin, Illinois — about 2 hours from Chicago). **Threat**: Factory Hog Farms. Two factory hog farms which will house a total of 12,000 hogs are being built in the Apple River drainage basin. Spills and leaks of this untreated waste could contaminate waterways.
10. Pinto Creek (Arizona, 1 hour's drive from Phoenix). **Threat**: Copper Mine. One of the rarest and highest-quality streams in the Southwest, the Sonoran Desert's Pinto Creek would be destroyed if a proposed copper mine is built.

[Editors' notes: The information provided here is from the River Network's list server and was provided by American Rivers. It does not necessarily reflect the opinion of the Council or the Editors.]

SPECIES PROFILE

RESCUING DAMSELS IN DISTRESS: THE CONSERVATION OF DAMSELFLIES AND THEIR HABITAT

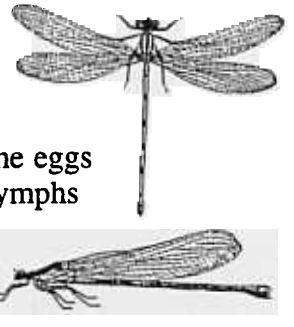
by Nancy E. McIntyre, Center for Environmental Studies, Arizona State University

Damselflies are slender and graceful relatives of dragonflies. Like their dragonfly cousins, damselflies are usually seen hovering around streams and lakes, darting about to catch mosquitos and other prey, and perching on a favorite reed or limb. Unlike dragonflies, damselflies are slower and weaker fliers even though they are capable of flapping their wings, unlike the spread-eagled, stiff-winged dragonflies. Both damsels and dragons may be brightly colored, especially the males, which may be turquoise, royal purple, kelly green, red, amber, or jet black. Females are usually more cryptically colored in brown or gray. However, both damsels and dragons also have a disturbing appearance reminiscent of *Jurassic Park*: a round head with disproportionately large eyes (dragonflies) or a T-shaped head and eyes (damselflies), a slender abdomen with what look like spines at the tip, and spindly legs. Despite their fearsome appearance, however, neither damselflies nor dragonflies bite or sting humans (even though both are often called "devil's darning needles," reported to sew up the mouths of sassy children, or so my mother often told me....).

"...often called 'devil's darning needles,' reported to sew up the mouths of sassy children, or so my mother often told me...."

Damselflies belong to the arthropod order Odonata, a cosmopolitan lineage that dates from the Jurassic Era (hence their ancient appearance!). This order is split into three suborders (Zygoptera: damselflies; Anisoptera: dragonflies; and Anisozygoptera: two species of "damsel-dragons" from Asia), based upon differences in wing structure. All damselflies live near bodies of water, with species-specific preferences in water-current speed. Females lay their eggs within the sub-merged stem of an aquatic plant. When the eggs hatch, the nymphs emerge from the stem and cling to the base of the plant or settle into the sediments, where they hunt for prey (other aquatic arthropods and even small fish) and are themselves hunted by larger nymphs, diving beetles, and fish. Depending upon the ambient temperature, a damselfly may exist as a nymph for many months and may even overwinter if the pond's surface freezes over. Once the nymph grows to a critical size, it climbs up a plant stem until it is out of the water. It clings to the stem while it undergoes metamorphosis within its exoskeleton. After several hours, the exoskeleton splits down the back and a winged adult emerges. The newly emerged adult, called a teneral, must wait for several more hours while its wings dry. During this vulnerable period, it may be picked off by a bird, frog, or even a dragonfly (which is not above eating its smaller cousins).

Once its wings dry, however, the adult damsel becomes a hunter itself and forages over many hundreds

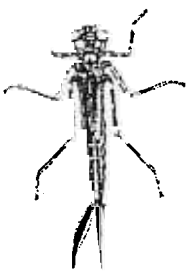


Damselfly female adults. Sketch from Borror, D. J., C. A. Triplehorn, and N. F. Johnson. 1989. An introduction to the study of insects. *6th edition, Saunders College Publishing, Ft. Worth, TX.*

of meters. Adults may disperse to colonize bodies of water several kilometers away. Both sexes of the tenerals are cryptically colored for several days after emergence while the last stages of metamorphosis are being completed, but with sexual maturity of the males comes their attractive colors. Males of many species defend a harem of females from the advances of other males in reproductive territories of several square meters in size. Adults usually live for only a few weeks before succumbing to predation or excessive heat or cold.

Damselflies occur on all six of the temperate continents, with approximately 640 species worldwide. One North American species that is restricted to California is federally listed as endangered and two others are considered "at risk," but many other species are also viewed with concern because of unknown population numbers and vulnerability from habitat destruction. Forty-nine species have been reported from Arizona, and eight of these (*Apansiagrion lais, Argia extranea, Argia lacrimans, Argia oenea, Argia pima, Argia sabino, Argia tarascana,* and *Enallagma semicirculare*) have been recorded from no other U.S. state (although all also occur in Mexico). Despite this diversity, surprisingly little is known about how damselflies respond to changes in riparian habitat. The nymphs of certain species are known to be sensitive to water clarity, very low pH, and low oxygen availability, but it is currently unknown how large-scale anthropogenic changes such as damming, draining, and development affect how adult damselflies colonize riparian habitats. How far will an adult travel to reach a suitably undisturbed habitat? Will it settle for something less suitable (and how much less)? How many changes to a riparian area's vegetation, current, or soils are needed to turn an area into one that may be colonized by adults but which is unfavorable to nymphal development? How can we manage riparian habitats so as to foster both adult damselfly reproduction and nymphal development? Because the habitat requirements for many damselflies are so poorly understood, we cannot be sure about the answers to any of these questions.

We can, however, try to minimize large-scale disturbances to riparian habitats until we have more knowledge as to how best to conserve damselflies. The acknowledgment that riparian habitats are among the most threatened throughout the world has recently led to a call by entomologists for more research on damselfly ecology and conservation. In Arizona, there are numerous research questions to be answered, providing many opportunities for studies by biologists and dedicated amateurs alike.



Damselfly nymph. Sketch from Borror, D. J., C. A. Triplehorn, and N. F. Johnson. 1989. An introduction to the study of insects. *6th edition, Saunders College Publishing, Ft. Worth, TX.*

Despite its aridity, Arizona has a surprisingly diverse array of damselflies. Damselflies perform a great service to humans by consuming injurious insects such as mosquitos, and they are a delight to the eyes. They are members of the complex food web of riparian habitats, serving as both predators of some animals and prey to others. They also require our help to cope with changes we incur to their riparian habitat.

Editors' note: Nancy E. McIntyre is a Postdoctoral Research Associate with the Center for Environmental Studies at Arizona State University. She may be reached at (602) 965-4019 or at nancy.mcintyre@asu.edu. *Additional information may be found in M. J. Westfall and M. L. May. 1996.* Damselflies of North America. *Scientific Publishers, Gainesville, FL. There are numerous web sites such as: http://www.clarku.edu/~tartiss/odonate.html.*

GIVING NEW LIFE TO AN ARIZONA STREAM

by Scott Bell, American Rivers Southwest Regional Office

*[*Editors' Note: *An update on the relicensing of Fossil Creek was given in the September 1997 ARC Newsletter. Since that update, American Rivers has become a key player in trying to restore the stream.]*

While this project. Most believe that the continued operation of the Childs-Irving Project will cause irreparable damage to the stream, native fish community, wildlife, and riparian area surrounding the stream.

A draft Environmental Assessment (EA) has been submitted with the preferred alternative to continue operation of both facilities, while continuing to divert 89% of the natural streamflow. American Rivers, the Arizona Riparian Council, and other conservation partners, initially provided comments to FERC regarding the relicensing of

American Rivers was granted Intervenor status by FERC on May 21, 1998, making it an official party to any proceedings. Based on the extensive criticism of the substance and legal sufficiency of the draft EA, American Rivers filed a motion that FERC conduct a new environmental review of the Childs-Irving Project that remedies the flaws identified by American Rivers, the Arizona Riparian Council, and other commentaries.

In filing the motion for a more comprehensive study, American Rivers focused on the following inadequacies of the draft EA:

- Failure to fully evaluate impacts to endangered species.
- Failure to fully assess impacts on travertine deposits.
- Inappropriate use of Instream Flow Incremental Methodology (IFIM) analysis.
- Failure to adequately consider project decommissioning as an alternative.

The draft EA downplays the beneficial effects that decommissioning this project would have on the resources in the area. The U.S. Forest Service (USFS) itself believes that decommissioning would be the best option for the natural resources of Fossil Creek, (USFS Comments, September 25, 1997).

It appears that the conclusion that decommissioning would not be a preferred alternative was made before analysis was conducted, and assumptions were made to support this conclusion. A more comprehensive environmental study must be performed to adequately assess the impact of continued operation of this project.

Cont. pg. 6.....New Life

New Life.....Cont. from pg. 5

American Rivers is urging the operator of the dams, APS, to "do the right thing" and voluntarily decommission the project. Opportunities to restore streams like Fossil Creek are rare. Decommissioning the Childs-Irving Project would not only benefit the natural resources, but all of the parties involved.

A final decision is expected by FERC early next year. For more information regarding Fossil Creek contact Mindy Schlimgen-Wilson at (602) 234-3946, ext. 12, or visit American Rivers website at www.amrivers.org.

Pupfish.....Cont. from pg. 1

umbel (*Lilaeopsis recurva*) [*Editor's Note:* this plant is also an endangered species; see *Species Profile* of our last issue Vol. 11, No 2], and sedges help give visitors an idea of what a Sonoran Desert spring might look like. Native plants also tie the pond to the stream that runs adjacent to the pathway through the Arizona Trail. Arizona ash (*Fraxinus arizonica*), desert hackberry (*Celtis pallida*), blue palo verde (*Cercidium floridum*), Arizona sycamore (*Platanus wrightii*), catclaw acacia (*Acacia greggii*), desert spoon (*Dasilyron wheeleri*), saguaro (*Carnegiea gigantea*), prickly pear (*Opuntia* sp.), and soaptree yucca (*Yucca elata*) are a few of the many native plant species found around the pupfish exhibit.

Approximately 30 native desert pupfish were collected from a stock maintained in the moat in front of the cheetah exhibit at the Zoo, and placed into the new exhibit in the Arizona Trail in the autumn of 1997. The fish have since spawned in the exhibit and juveniles are now abundant. In addition to the pupfish, native toad tadpoles, and a variety of aquatic insects (see *Species Profile* this issue to read about some) also have been observed in the pond.

Signs around the exhibit focus visitors' attention on entire riparian ecosystems rather than a single species. Problems related to dewatering, pollution, and introduction of exotic species are a few of the issues addressed by the graphics. The exhibit has potential for use as a "living laboratory" by local school or community groups. Topics such as succession, food chains, carrying capacity, etc. could be studied in this setting.

The desert pupfish exhibit serves more than a conservation (captive propagation) and education purpose, however. Visitors use strategically placed cottonwood logs adjacent to the pond as a place to rest beneath a mature mesquite (*Prosopis* sp.) tree and reflect while watching pupfish and many species of reptiles, birds, and mammals that inhabit the area.

LITERATURE CITED

Minckley, W. L. 1973. *Fishes of Arizona*. Arizona Game and Fish Department, Phoenix.

U.S. Fish and Wildlife Service. 1993. *Desert Pupfish Recovery Plan*. U.S. Fish and Wildlife Service, Albuquerque, NM.

Desert pupfish exhibit at the Phoenix Zoo.

LEGAL ISSUES OF CONCERN

Kimberly MacEachern, Law Offices of von Oppenfeld Hiser and Freeze, P.C.

WHAT THE NINTH CIRCUIT DID INSTEAD OF SUMMER VACATION LOWER COURT GRAZING PERMIT DECISION REVERSED

This may be one of the hottest summers on record — for the Ninth Circuit Court of Appeals that is. The court has been busy issuing opinions and two of their July 1998 rulings caught my riparian-trained eye recently. One case reverses a very progressive decision made in the Oregon district court that we reported to you in this space in January. A second sorts out a jurisdictional overlap which has the potential to hold some sway where more than one regulatory program governs an issue in a riparian area. These people obviously don't know the definition of summer vacation.

You may recall our discussion in the January issue about the Oregon Natural Desert Association's (ONDA) successful challenge of the U.S. Forest Service grazing permits without obtaining Clean Water Act (CWA) §401 certification from the state that water quality standards would be met. The district court agreed that a "discharge" can emanate from a nonpoint source as well as a point source; consequently issuing the uncertified grazing permit (cows and the effects of their presence generate a nonpoint source of water pollution) was a violation of the CWA. Well, you guessed it — the three judge panel of the Ninth Circuit Court of Appeals saw it the other way and reversed the decision [*Oregon Natural Desert Association v. Dombeck* 1998 WL 40771 (9th Cir. (Or.))].

The case came to the Ninth Circuit on Appeal by the U.S. Forest Service. The factual basis for the case does not leave any room for doubt that the cattle grazing in question does in fact result in pollution of Oregon's Camp Creek and the Middle Fork of the John Day River. But, the pivotal point was the definition of "discharge."

The CWA definition of "discharge of a pollutant" is any addition of any pollutant to navigable waters from any point source; the definition of "discharge" *includes* discharge of a pollutant [33 U.S.C. §1362(12) and (16) (emphasis added)]. ONDA argued that because "discharge" is defined as *including* point source releases, then it must include nonpoint sources as well. This court reasoned, however, that when taking a holistic look at the CWA, its purposes and policy, the interpretation that "discharge" includes more than point sources is simply not justified.

According to the court, when the 1972 CWA amendments replaced water quality standards as the sole means of regulatory control with the system of discharge limitation, nonpoint source was not directly regulated. Rather, a separate process of federal grants to the states through §208 Management Plans addresses nonpoint sources. Both the history and the statutory structure of §401 show that it relates only to the elimination of discharge consistent with effluent limitations, which only apply to point sources. The reference to water quality standards does not "sweep nonpoint sources into the scope" of §401.

Finally, the Court cites previous court decisions on the CWA in support of its narrow view of the term "discharge." Of note is the U.S. Supreme Court affirmation that the CWA supports regulating stream flows to protect fisheries [*PUD No. 1 v. Washington Dep't of Ecology* 511 U.S. 700, 114 S.Ct.1900, 128 L.Ed.2d 716 (1994), (also discussed in the January, 1998 issue)]. That case did not broaden CWA jurisdiction because it involved effluent discharge from a dam — a point source.

The Confederated Tribes of the Warm Springs Reservation of Oregon intervened as

Cont. pg. 10....Legal

Noteworthy Publications

Michelle M. Oleksyszyn, Department of Plant Biology, Arizona State University

Kauffman, J. B., R. L. Beschta, N. Otting, and D. Lytjen. 1997. An ecological perspective of riparian and stream restoration in the western United States. *Fisheries* 22(5):12-24.

The authors state the need for preservation and restoration of riparian areas, which are among the most highly valuable yet threatened ecosystems in the country. The goal of restoration should be to restore riparian areas, as much as possible, to their predisturbance condition. They encourage considering three main factors in restoration: soil and geomorphology, hydrology, and the biota of the area. In doing so, restoration will then take into consideration the structure, function, and processes of the whole system. A restoration program can be designed through answering the following four questions: (1) Which areas are intact and can be protected merely through preservation? (2) Which areas can be altered reasonably through relatively little effort and money? (3) Which areas will require large costs and effort? (4) Which areas are so degraded that restoration is not feasible? Based on the above assessment, preserved areas can be used to model restoration efforts on other areas of the river. Areas requiring little effort could be best maintained through passive restoration — that is, simply removing current pressure and disturbance. For example, removal of grazing or municipal pumping may be sufficient to encourage recovery — as riparian areas are resilient. The authors caution that use of passive restoration necessitates time before the success of the project can be determined. They suggest approximately 10 years before introducing human intervention, since premature interference could complicate recovery. If active restoration is required, reintroduction should involve native species and restoration plans should avoid introduction of exotic species, in-channel manipulation, or focus on only a specific reach of the channel. The authors discourage manipulation and encourage consideration of the whole watershed. They recommend that management decisions be based on the form, function, and productivity of the whole system to prevent affecting downstream processes. In addition to addressing the protocol for the creation of a restoration program, the article explains terms commonly confused with restoration such as creation, reclamation, mitigation, and enhancement.

Bowers, J. E., R. H. Webb, and E. A. Pierson. 1997. Succession of desert plants on debris flow terraces, Grand Canyon, Arizona, U.S.A. *Journal of Arid Environments* 36(1):67-86.

Successional information is well documented in general, but there is little known about succession on debris flows. The authors collected data on plant community composition, cover, and density in the Grand Canyon on debris flows that were between 5 and 3,1000 years old and had similar parent material. Debris flows are areas of sediment and assorted material that form under times of intense precipitation and are initially void of vegetation. They found that there was a definite relationship between the surface age of the debris flow and the plant community. The shorter-lived species were found on the youngest debris flows and the oldest debris flows supported vegetation much like the surrounding climax plant communities. The short-lived species were also most dense on the youngest surfaces and percent cover of long-lived species increased with the surface age. In addition to the surface age, debris flow size, predation, soil texture, post-depositional flooding, and climatic perturbations will be important in controlling plant community composition. Life-history traits such as life span, seed production, and seed dispersability will influence the success of each species on these sediments. The authors believe it is unlikely that recent debris flows will support a large seed bank. This may be another

explanation for the initial success of short-lived species. Finally, soil formation may play a controlling role in community development. Early debris flows lack cryptogramic crusts, which are thought to form after 55 years. The formation of these crusts may lead to later success of woody species by creating nutrient-rich, moist sediments.

Sanders, T. A., and W. D. Edge. 1998. Breeding bird community composition in relation to riparian vegetation in the western United States. *Journal of Wildlife Management* 62(2):461-473.

These authors compared the total abundance and species numbers of birds in three riparian plant communities of eastern Oregon from 1993-1994. The three communities examined were continuous mesic shrub, discontinuous mesic shrub, and xeric shrub. Total bird abundance was greater in the continuous mesic shrub communities than in either the discontinuous mesic or xeric shrub types. In fact, continuous mesic shrub provided maximum species richness, avian abundance, riparian-associated bird types, and total landscape level diversity. Woody species in riparian areas supported greater avian numbers and species than adjacent upland communities. A direct relationship existed between the densities of willow flycatchers, yellow warblers, and song sparrows (riparian-associated bird species), and willow volume. In addition, these species were completely absent from any community that lacked willows. The number and volume of mesic shrubs (especially willow species) can be used as an indicator for the strength of the avian population in that segment of the river. Finally, the authors state that a decrease in numbers of woody mesic species will lead to decreased numbers of total avian abundance, species richness, and abundance of riparian-associated bird species.

Legal.....Cont. from pg. 9

Plaintiff's and argued that the discharge from cattle was quite similar to a point source discharge and that it was splitting hairs to distinguish between cattle and manmade conveyances in defining a point source. But the court found no support in the statutory language for that argument.

Notwithstanding this decision, you will recall that Arizona had taken specific legislative action to require automatic §401 certification of grazing activities that meet the best management practices established by the state. ADEQ has not yet established those BMP's in rule as required by A.R.S. §49-201.01 and .02. But with this decision the matter may have less urgency.

In another Ninth Circuit summer development, Resource Investments, Inc. (RII) appealed a Washington state district court ruling that its construction of a solid waste landfill in a wetland area, although fully permitted under RCRA's landfill requirements, could not proceed without a dredge and fill permit pursuant to CWA §404, which the Army Corps of Engineers denied. The Corps rested its decision on the fact that RII had not demonstrated the lack of a less environmentally damaging alternative. The court reversed the lower court decision, reasoning that disposal of solid waste is regulated by EPA or the States under RCRA, which itself contains strong protections for wetlands, solid waste is not dredged or fill material as defined by the CWA and, finally, a Memorandum of Agreement between the Corps and EPA gives responsibility for the program to the EPA/States [*Resource Investments, Inc. v. U.S. Army Corps of Engineers* 1998 WL 46672 (9th cir. (Wash.))]. The reasoning in this case could have some impact in situations involving riparian areas where more than one regulatory program applies.

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

The purpose of the Council is to provide for the exchange of information on the status protection, and management of riparian systems in Arizona. The term "riparian" is intended to include vegetation, habitats, or ecosystems that are associated with bodies of water (streams or lakes) or are dependent on the existence of perennial or ephemeral surface or subsurface water drainage. Any person or organization interested in the management, protection, or scientific study of riparian systems, or some related phase of riparian conservation is eligible for membership. Annual dues (January-December) are $15. Additional contributions are gratefully accepted.

This newsletter is published three times a year to communicate current events, issues, problems, and progress involving riparian systems, to inform members about Council business, and to provide a forum for you to express your views or news about riparian topics. The next issue will be mailed in January, the deadline for submittal of articles December 15, 1998. Please call or write with suggestions, publications for review, announcements, articles, and/ or illustrations.

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CALENDAR

Desert Fishes Council Annual Meeting, November 12-15, 1998. Wahweap Lodge, Page, Arizona. For more information contact Phil Pister, Executive Secretary, DFC at (760) 872-8751; web site http://www.utexas.edu/depts/tnhc/.www/fish/dfc.

Conference on Shared Rivers: River Basin Management to Meet Competing Needs. Contact U.S. Committee on Irrigation and Drainage at (303) 628-5430, stephens@scid.org, or http://www.uscid.org/~uscid.

Getting the Job Done at the Ground Level. Sixth National Watershed Conference, May 16-19, 1999. Double Tree Hotel, Austin, Texas. For more information contact John W. Peterson, Executive Director, National Watershed Coalition at (703) 455-6886 or 4387 or jwpeterson@erols.com.

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