Arizona Riparian Council

Volume 14, Number 2 June 2001

Equal Footing, The Public Trust, and Arizona's Rivers

Joseph M. Feller, College of Law, Arizona State University, Tempe

The Arizona Legislature keeps trying to give away the State's rivers, and the Arizona Center for Law in the Public Interest keeps stopping them. In the latest round of this perennial struggle, the Center represented a wildlife conservation organization and three private individuals challenging recent legislation relinquishing the State's claims to all of Arizona's rivers except for the Colorado. The legislation was based on the findings and recommendations of a commission that had determined that none of the rivers save the Colorado was navigable when Arizona became a state in 1912. In *Defenders of Wildlife v. Hull*,[1] the Arizona Court of Appeals held that the commission's findings of non-navigability, and the Legislature's action based on those findings, were invalid because the legislation guiding the commission prescribed the wrong standards for determining navigability. Although the Center has won this round, more rounds are sure to follow, and the rivers' ultimate fate remains uncertain.

The Equal Footing Doctrine and the Public Trust Doctrine

The legal battle grows out of the history of land ownership in the western United States and centers around two related legal doctrines, the "equal footing" doctrine and the "public trust" doctrine. Arizona and other western states were carved out of land that the federal government obtained from Indian tribes, Mexico, France, and Britain through wars, treaties, and purchases. When states were created out of these lands, the federal government retained title to the public lands, with two major exceptions. First, the federal government granted each of the western states substantial areas of land (in Arizona, four sections out of every township) for the support of public schools. These lands, known as "state trust" or "school trust" lands (not to be confused with "public trust" lands, which are discussed below) can be sold or leased by the state to commercial or other interests, with the revenues from the sales and leases going to the schools.

Second, under an 1845 decision of the U.S. Supreme Court,[2] each new state took ownership of the beds of all waterways within its borders that were navigable at the time of statehood. This rule is known as the "equal footing" doctrine because it is based on the principle that each new state is a sovereign entity on an equal footing with the original 13 colonies. Ownership of land underlying navigable waterways, unlike title to ordinary dry-land real estate, was viewed as an incident of sovereignty, without which the new states would not have been truly equal to the old ones.

The states' ownership of riverbeds and lakebeds, however, came with certain strings attached. Since these lands are not ordinary real estate, they cannot be bought and sold like ordinary real estate. Instead, according to another decision of the U.S. Supreme Court (this one in 1892),[3] the state owns these special lands as a trustee for the benefit of the public so that the public may use them for commerce, fishing, and navigation. Under this "public trust" doctrine, the state may not sell or give away these lands except for purposes that benefit these public

Cont. on pg. 3.....Equal Footing

Inside This Issue

PRESIDENT'S MESSAGE

I hope all of you who attended found the annual meeting in Tucson to be beneficial and informative. I want to thank Cindy Zisner, Matt Chew, Marty Jakle, Theresa Pinto, Janet Johnson, Bill Werner, Julia Fonseca, and Doug Rautenkranz for helping put this meeting together and making this meeting the success that it was. The topic of urban riparian areas brought some interesting speakers and intriguing issues. Of the issues discussed, I found the problems of mosquito control and bird vs. airplane interactions associated with creating and maintaining urban riparian areas most interesting. Mosquito management requires aggressive measures to keep these potentially disease-carrying pests from invading and infecting surrounding communities.

As for issues of bird strikes, I heard several participants questioning the seriousness of this problem for Arizona. This is an issue we need to be aware of for both bird and human safety.

Recently the State budget was finalized, and despite efforts to maintain the statutorily required $5 million per annum for the Arizona Water Protection Fund (AWPF), the biennial budget that was adopted by the Legislature and signed by the Governor significantly reduced the funding for the AWPF by 75%, to a total of $2.5 million. These monies will be available in fiscal year 2003. This fund was created "...to maintain, enhance and restore rivers and streams and associated riparian habitats...". I guess there were too many other budget issues and the AWPF lost out. Hopefully this will not be the future trend.

At our annual meeting, we elected three members-at-large. These members attend Arizona Riparian Council Board meetings and assist in planning the fall and annual meetings as well as helping to direct the efforts of the Council. They will serve in this capacity until May 2004 and they are Matt Chew, Julia Fonseca, and Rodney Held. Matt was re-elected to this position and Julia and Rodney are first-timers. Welcome aboard.

Matt Chew has served two terms as ARC Member-at-Large. He generally describes himself as a birdwatcher gone horribly wrong. As such, he has been Natural Resources Planner for Arizona State Parks since 1993, has participated in various interagency riparian management and policy efforts, conducted and assisted with riparian avian and plant ecology research, and authored, coauthored and illustrated papers, articles and book chapters dealing with riparian topics. He holds B.S. and M.S. degrees from Colorado State University, where he specialized in interpreting riparian ecology and management efforts.

Julia Fonseca received a BA in geology and anthropology from Rice University and a Master's degree in geology at University of Arizona. Her involvement in Southwestern riparian systems began with fieldwork in Nevada in 1985. In her 14-year career with Pima County Flood Control District, she has conducted numerous investigations involving natural resource management, hydrology and hydraulics and water quality monitoring. She has also obtained surface water right certificates, and has overseen revegetation projects on District lands. She has coordinated interagency groundwater recharge feasibility studies, and led design and permitting for a CAP recharge project in Marana. Today, Julia assists the County Administrator's Office with the Sonoran Desert Conservation Plan. She also oversees management of the District's Natural Preserves on Cienega Creek and the San Pedro River. She is a member of the Arizona Native Plant Society, Arizona Riparian Council and Arizona Hydrological Society.

Rodney Held has been a Project Manager for the Arizona Water Protection Fund for 2 years. In this position, Rodney is responsible for negotiating, writing and administering grant contracts dealing with the restoration, maintenance, and enhancement of rivers, streams, and riparian habitats. Rodney previously worked for the Arizona Department of Environmental Quality as a Watershed Coordinator dealing with nonpoint source pollution issues, and as a Remediation Specialist for petroleum contaminated soils and groundwater. He also serves on the Arizona Envirothon Executive Committee. Rodney received a BS and MS in Environmental Resource Management from Arizona State University.

The next ARC Board meeting is scheduled for July 18th. One of the items for the Board to discuss is planning the fall meeting. The purpose of the fall meeting is to have ARC members and their families get-together for an informal camp-out in an area where an issue of interest associated with the riparian areas is occurring. On a flip chart at the spring meeting, people wrote down four areas as places to have this meeting; Martinez Canyon, Patagonia, Aravaipa Creek, and Springerville/Eagar. The Board will consider such things as the logistics necessary in holding a meeting in a particular place. As soon as the location is determined, we will notify everyone. If you have any ideas other than the four mentioned or if there are other issues you would like the Board to consider, please contact me or Cindy.

Kris Randall, President

Equal Footing.....Cont. from pg. 1

uses. Subsequent decisions of some state supreme courts have expanded the purposes of the public trust to include recreation, wildlife conservation, and environmental protection as well as commerce, fishing, and navigation.[4]

EQUAL FOOTING AND THE PUBLIC TRUST IN ARIZONA

Through most of Arizona's history, the equal footing and public trust doctrines were ignored except as they applied to the Colorado River. The beds of the Agua Fria, Gila, Salt, Verde, and other rivers were treated as ordinary real estate. Some of these riverbed lands, dried up by dams and diversions, were granted or sold to private individuals or corporations and came to be used for agriculture, industry, sand and gravel extraction, homesites, and other private purposes.

In 1985, however, the State filed a lawsuit in which it claimed ownership of the bed of the Verde River near Cottonwood because the Verde had been navigable when Arizona became a state in 1912. This lawsuit, along with statements by then-Governor Bruce Babbitt and his State Land Commissioner, Robert Lane, that Arizona might assert rights to the beds of other rivers that were navigable in 1912, created a stir among riverbed property owners, who feared that their land titles were in jeopardy.[5]

The landowners turned to the Legislature, which was sympathetic to their concerns and hostile to the public trust doctrine. The Legislature responded with a bill that promised to renounce the State's claims to any riverbed property along the Gila, Salt, or Verde Rivers in exchange for a payment of just $25 per acre. The same bill gave up the State's claims to all other riverbeds, except that of the Colorado, for no payment at all. The bill was signed into law by then-Governor Evan Mecham in 1987. (Previously, Governor Bruce Babbitt, vetoed an earlier version of the bill in 1986.)

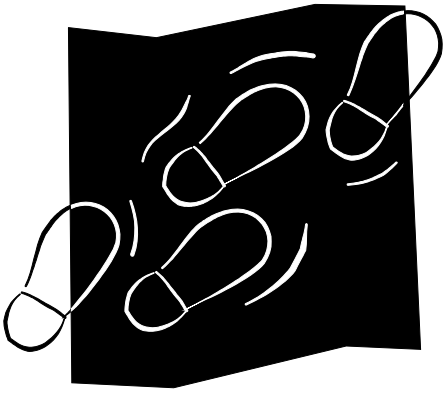
The Arizona Center for Law in the Public Interest went to court to challenge the Legislature's action, arguing that it violated the public trust doctrine. The Center also argued that the renunciation of the State's claims to riverbeds violated a clause of the Arizona Constitution, commonly known as the "gift clause," that forbids the State (and also counties and municipalities) from making "any donation or grant, by subsidy or otherwise, to any individual, association, or corporation."[6]

In its defense, the State argued that it was doubtful that any of Arizona's rivers other than the Colorado were navigable in 1912, and that it was therefore unlikely that the State would have succeeded had it tried to claim title to the beds of those rivers on the basis of the equal footing doctrine. Thus, the state argued, the act of the legislature renouncing such claims simply removed a cloud on the title to those lands, without giving up anything of real value.

The Maricopa County Superior Court concluded that, even if the rivers were navigable in 1912, the State had the power to relinquish its claims to the riverbeds. The Court therefore rejected the Center's claims and upheld the challenged legislation. In 1991, however, in *Arizona Center for Law in the Public Interest v. Hassell*,[7] the Arizona Court of Appeals sided with the Center and reversed the decision of the Superior Court. In so doing, it rendered Arizona's first major decision interpreting and applying the public trust doctrine.

The Court of Appeals first rejected the state's argument that the navigability of Arizona's rivers was so doubtful that the State gave up nothing of value when it disavowed its claims to them. Although the Court did not actually determine that any of the rivers were navigable at the time of statehood in 1912, it held that there was sufficient evidence of navigability that the State's interest in the riverbeds, "though still uncertain in value and extent, is sufficiently substantial to warrant gift clause and public trust analysis."

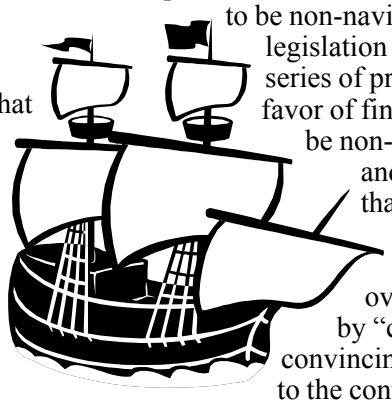
The Court then went on to analyze the plaintiff's claims that the Legislature had violated the gift clause and the public trust doctrine by renouncing the State's claims to all riverbeds in the state except that of the Colorado. The Court held that the gift clause and the public trust doctrine, considered together, require that any disposition of public trust property by the state must meet three conditions to be valid: (1) the disposition must serve a valid public purpose; (2) the state must receive fair consideration for the property; and (3) the disposition must be "for purposes consistent with the public's right of use and enjoyment of [trust] resources" and must "satisfy the state's special obligation to maintain the trust for the use and enjoyment of present and future generations." The Court found that the Legislature's renunciation of the State's claims to riverbeds met the first condition because it served the valid public purpose of removing a cloud on the title to thousands of parcels of land. But the Court determined that the Legislature's action did not meet the second condition because the Legislature had surrendered the State's claims to the riverbeds without making, and without establishing any mechanism for making, any determination of the value of those claims. Further-



more, the court held, the Legislature's action failed the third condition for a similar reason: the Legislature had made no attempt to determine the value of the riverbed lands for public trust purposes or to ensure that the public's ability to use those lands for such purposes would be maintained in the future.

WHAT IS A NAVIGABLE RIVER?

In *Arizona Center*, the Court of Appeals made clear that the Legislature was not free to simply abandon the State's claims to its riverbeds. But the Court also recognized that those claims are contingent; the State owns the bed of any given river if and only if that river is determined to have been navigable when Arizona became a state in 1912. Moreover, although the Court found that there was "substantial evidence from which a factfinder might conclude" that some of Arizona's rivers other than the Colorado were navigable in 1912, it did not determine that any of them actually *were* navigable.



After the Court issued its decision, the struggle between the Arizona Center for Law in the Public Interest and the Legislature turned to the issue of which, if any, of the rivers were navigable in 1912. Legislation enacted in 1992 created the Arizona Navigable Stream Adjudication Commission to gather information, hold hearings, and make determinations as to which rivers were navigable in 1912 and which were not. After the Commission made a preliminary determination that the Salt River was navigable, the Legislature in 1994 expressed its displeasure by reducing the Commission's role to making findings and recommendations, with the ultimate determinations left to the Legislature itself.[8] The 1994 legislation also adopted a set of standards and presumptions that virtually guaranteed that none of the rivers would be found to have been navigable in 1912.[9] It was these standards and presumptions that were challenged by the Arizona Center and found to be unlawful in the latest round of litigation.

The 1994 legislation declared that a river could be found to navigable only if it was used or susceptible of being used for both commercial trade and travel as of February 4, 1912, and that all ephemeral streams must be found to be non-navigable. The legislation also created a series of presumptions in favor of finding rivers to be non-navigable, and stipulated that the presumptions could be overcome only by "clear and convincing evidence" to the contrary. It instructed the Commission to presume that a watercourse was non-navigable unless "sustained trade and travel occurred both upstream and downstream in the watercourse" *and* such trade and travel supported a "profitable commercial enterprise" *and* vessels such as keelboats, steamboats, or powered barges were used on the watercourse as of February 4, 1912. Furthermore, even if a watercourse met these criteria, the legislature instructed the commission to nonetheless presume that it was non-navigable if there were any "impediments to navigation" caused by water diversions, bridges, fords, dikes, or other structures, *or* if the federal government did not regulate the watercourse under the Rivers and Harbors Act, *or* if "[t]ransportation in proximity to the watercourse was customarily accomplished by methods other than by boat." Most remarkably, the 1994 legislation required that if *any* "portion or reach" of a river had previously been determined to be non-navigable in a "public proceeding," then the *entire river* should be presumed to be non-navigable.

As later described by the Court, the presumptions and limitations in the 1994 act of the Legislature "mak[e] it almost impossible for an Arizona watercourse to be determined navigable." Given these presumptions, it is not surprising that the Commission found every river it examined – including the Gila, the Salt, the Verde, the Agua Fria, the Bill Williams, the San Pedro, and the Hassayampa – to be non-navigable. The Legislature then passed laws ratifying and adopting the findings and recommendations of the Commission, declaring the rivers to be non-navigable, and disavowing any claim of title to their beds based on the equal footing doctrine.[10]

Through the use of the Commission and the one-sided directions given to the Commission, the legislature had achieved the same result that it had attempted to achieve in the legislation struck down by the court in *Arizona Center for Law in the Public Interest v. Hassell*: it had nullified the equal footing and public trust doctrines in Arizona. But the Arizona Center for Law in the Public Interest was not about to give up. It joined forces with three private individuals and Defenders of Wildlife to take the Legislature to court once again, this time arguing that the presumptions and limitations in the Legislature's instructions to the Commission violated long-established federal standards for determining the navigability of rivers.

As in the previous litigation, the Center lost in the trial court but prevailed on appeal. On February 13, 2001, the Arizona Court of Appeals issued its decision in *Defenders of Wildlife v. Hull.*[11] The Court held that "the assessment of navigability for the purpose of determining title to land under watercourses at the time of statehood is a matter of

federal law rather than state law," and therefore the Legislature was not free to create its own standards of navigability in its instructions to the commission.

The federal standard is set out in an 1870 decision of the U.S. Supreme Court titled *The Daniel Ball*:

> Those rivers must be regarded as public navigable rivers in law which are navigable in fact. And they are navigable in fact when they are used, or are susceptible of being used, in their ordinary condition, as highways for commerce, over which trade and travel are or may be conducted in the customary modes of trade and travel on water.[12]

The Court found that many of the limitations and presumptions in the Legislature's instructions to the Commission were inconsistent with the *Daniel Ball* test for navigability. The Court noted that, under the *Daniel Ball* test, a river as a whole may be determined to be navigable even though parts of it are non-navigable, that non-commercial trade or travel may justify a finding of navigability, that trade and travel are not *both* required, that ephemeral streams can be determined to be navigable, that trade or travel need not be both upstream and downstream, that recreational use of a river can support a determination of navigability, that the existence of impediments to navigation or the predominance of other modes of transportation does not negate the navigability of a river, and that regulation by the federal government under the Rivers and Harbors Act is not a prerequisite to a finding of navigability.

Since the standards applied by the Commission pursuant to the Legislature's instructions were in conflict with the *Daniel Ball* test, the court concluded that the Legislature's actions based on the Commission's findings and recommendations were unconstitutional:

> We find that the particularized assessment necessitated by [*Arizona Center for Law in the Public Interest v.] Hassell* was neither performed in accordance with the applicable federal law nor done in a manner consistent with the public trust doctrine. When this assessment is so abrogated, public trust land may be forfeited. Potential forfeiture of the watercourse bedlands, by being functionally identical to the outright disclaimer in *Hassell*, is a violation of the public trust doctrine and the Arizona Constitution's gift clause.

MANY RIVERS TO CROSS

The battle over disposition of Arizona's rivers is far from over. Some of the parties on the losing side in *Defenders of Wildlife* have filed a motion for the Court of Appeals to reconsider its decision. If that motion does not succeed, it is likely that the same parties will ask the Arizona Supreme Court to look at the case.

Moreover, the decision in *Defenders of Wildlife,* like the earlier decision in *Arizona Center for Law in the Public Interest v. Hassell*, did not determine which, if any, of Arizona's rivers other than the Colorado were navigable in 1912 and are therefore subject to the equal footing and public trust doctrines. It merely decided that the Legislature's attempt to declare them all non-navigable by fiat was invalid. It is now up to the Legislature to craft a new process for assessing navigability, and it seems fair to assume that the results of that process will again be legally challenged by the Arizona Center for Law in the Public Interest and other environmentally oriented organizations.

WHAT ABOUT THE WATER?

To those concerned about riparian and aquatic habitat, the struggle over disposition of the *beds* of rivers may seem like a sideshow. Water is the crucial element that distinguishes rivers and streams from dry lands. Many of Arizona's rivers, even if navigable in 1912, have since been dried up by dams, diversions, and groundwater pumping and now provide little or none of the values – fishing, commerce, recreation, wildlife habitat – that the public trust doctrine should protect.

What role will the public trust doctrine play in the future of such rivers if they are ultimately determined to have been navigable at the time of statehood? According to one of the three Court of Appeals judges who decided *Defenders of Wildlife v. Hull*, the answer may be little or none. In a concurring opinion, Judge Jon W. Thompson observed that in western states such as Arizona, where water rights are governed by the doctrine of prior appropriation, the application of the public trust doctrine may be different than in eastern states that follow the doctrine of riparian rights. Specifically, he opined that "public trust purposes in Arizona would seemingly include private appropriation and exploitation." Therefore, according to Judge Thompson, "[i]t is not a foregone conclusion that lands underlying 'streams' that were navigable at the time of statehood but now contain little or no surface water could not be granted to private owners as this legislation seeks to do." If this view were to prevail, it is possible that the fight over navigability could turn out to be much ado about nothing.

There is, however, an alternative to Judge Thompson's view that the doctrine of prior appropriation modifies the public trust doctrine. The alternative view is that the public trust doctrine modifies the doctrine of prior appropriation. This view has

been set forth most authoritatively in the decision of the California Supreme Court in *National Audubon Society v. Superior Court*, more commonly known as the Mono Lake Case, where the Court held that the public trust doctrine is an inherent limitation on water rights obtained through appropriation.[13] According to the California Court, the state has the power and the duty to re-examine old water rights that were initially granted without consideration of the public trust, and to modify those rights if necessary to protect trust values. Moreover, the court held that the state's power and duty of re-examination extends to water rights on tributaries of navigable waters as well as on the navigable waters themselves.

So far, no case has been presented to the Arizona courts that would require them to decide whether to adopt the holding of the Mono Lake Case. But a 1999 decision of the Arizona Supreme Court, in a case challenging yet another attempt by the Legislature to quash the public trust doctrine, suggests that the doctrine does have some role to play in Arizona water law. In *San Carlos Apache Tribe v. Superior Court,*[14] the Court struck down a statute that declared that the public trust "is not an element of a water right" and that ordered courts adjudicating water rights "not [to] make a determination as to whether public trust values are associated with any or all of the river system or source."[15] In striking down the statute the Court declared:

> The public trust doctrine is a constitutional limitation on legislative power to give away resources held by the state in trust for its people. The Legislature cannot order the courts to make the doctrine inapplicable to these or any proceedings. . . . That determination depends on the facts before a judge, not on a statute. It is for the courts to decide whether the public trust doctrine is applicable to the facts. The Legislature cannot by legislation destroy the constitutional limits on its authority.

The question left open by the Court's decision is whether the "resources held by the state in trust for its people" include the water, as well as the beds, of navigable rivers. If the Court eventually adopts the affirmative answer given by its California counterpart in the Mono Lake Case, then the struggle over the ownership of Arizona's river beds could turn out to be but a prelude to a larger struggle over whether water should be returned to some of those beds that are now dry.

REFERENCES

1. *Defenders of Wildlife v. Hull*, 18 P.3d 722 (2001).
2. *Pollard v. Hagan*, 44 U.S. 212 (1845).
3. *Illinois Central Railroad v. Illinois*, 146 U.S. 387, 434 (1892).
4. *Kootenai Environmental Alliance v. Panhandle Yacht Club,* 105 Idaho 622, 632, 671 P.2d 1085, 1095 (1983); *Borough of Neptune City v. Borough of Avon-by-the-Sea*, 61 N.J. 296, 309, 294 A.2d 47, 54 (1972); *Marks v. Whitney*, 6 Cal.3d 251, 260, 491 P.2d 374, 380 (1971).
5. *Land Department v. O'Toole,* 154 Ariz. 43, 44 - 46, 739 P.2d 1360, 1361 - 63 (1987) (citing *State of Arizona v. Valley Concrete and Materials*, No. 45245 (Yavapai County Superior Court, filed April 26, 1985)).
6. ARIZ. CONST., art. IX, § 7.
7. *Arizona Center for Law in the Public Interest v. Hassell,* 72 Ariz. 356, 837 P.2d 158 (1991).
8. A.R.S. §§ 37-1123.
9. A.R.S. § 37-1128.
10. A.R.S. §§ 37-1129 to 37-1129.16.
11. *Defenders of Wildlife v. Hull*, 18 P.3d 722 (2001).
12. The Daniel Ball, 77 U.S. 557, 563 (1870).
13. *National Audubon Society v. Superior Court,* 33 Cal. 3d 419, 658 P.2d 709 (1983).
14. *San Carlos Apache Tribe v. Superior Court*, 193 Ariz. 195, 972 P.2d 179 (1999).
15. A.R.S. § 45-263.B.

SPECIES PROFILE

SONORAN MUD TURTLE (*KINOSTERNON SONORIENSE*)

by David H. Hall, School of Renewable Natural Resources, University of Arizona, Tucson

When people ask me what animals I study I generally respond "mud turtles." After a pause, the common reply is an anecdote regarding desert tortoises. I explain that while the desert tortoise is a fascinating animal I study a group of turtles that is largely aquatic. "In Arizona" they reply? This typifies the lack of public awareness regarding all of our native aquatic vertebrate fauna but, in particular, Arizona's mud turtles. Arizona is unique in all of the states from the Rockies to the Pacific to have within its borders three different types of mud turtles: the Sonoran mud turtle (*Kinosternon sonoriense*), the yellow mud turtle (*K. flavescens flavescens*) and the Arizona mud turtle(*K. arizonense*). Each one of these turtles has a fascinating natural history. I will focus on Arizona's most common one: the Sonoran mud turtle.

Mud turtles are freshwater turtles belonging to the strictly American family: Kinosternidae. Major features characterizing this group are having at least a pair of fleshy chin barbels (Fig. 1), a shell bottom or plastron with a front and rear lobe that are hinged to a middle section of the plastron. These hinges allow the turtle to close its shell from the front and rear. The familiar box turtle (genus *Terrapene*) also have plastrons that allow shell closure but in box turtles there is only one anterior (front) hinge. Mud turtles also have two pairs of musk glands located one on each side of the bridge (that portion of the turtle shell that connects the top to the bottom; Fig. 2). These musk glands exude an unpleasant (to humans at least) smelling fluid that gives many of the species common names such as musk-turtles, stink-jims or stink-pots. All mud turtles have webbed feet indicating their aquatic nature.

Fig. 1.

The Sonoran mud turtle's distribution is in Arizona south of the Mogollon Rim into the middle of Sonora, Mexico, and from the Gila River system in New Mexico west to the Colorado River. Its habitats include rivers, streams, reservoirs, and stock ponds. Although previously thought to be dependant on perennial water sources, recent research has determined that Sonoran mud turtles can withstand long periods of drought. They do this by seeking out terrestrial shelters or microhabitats that shield them from desiccation and there they enter a physiological state known as aestivation which allows their metabolic rate to slow down. In this way a Sonoran mud turtle can wait out drought periods, an adaptation well suited to the regions unpredictable and arid levels of precipitation. Published lengths of Sonoran mud turtles in aestivation are two weeks. My own research has shown radio-tracked individuals to aestivate for up to two months. As a result of this, Sonoran mud turtles are less obligate on totally perennial water sources than previously thought.

Fig. 2. Pen points to musk gland.

Sonoran mud turtles become active in the spring in most areas in the state, although some activity has been recorded during each month of the year. During spring, turtles are generally active in the afternoon hours. This activity period becomes crepuscular (early evening, early morning) during the late spring months. During the summer and early fall activity is generally nocturnal stretching into the midmorning hours. In contrast to this general pattern, populations found in stock ponds and reservoirs are largely diurnal.

I have documented three predation events in 18 years of studying these turtles. I watched during an early June rainstorm, beside a small intermittent stream, as a radio-marked female came out of aestivation only to be caught by a hooded skunk who quickly managed to chew off the turtle's head prior to my inadvertently interrupting the skunk. One late July night I watched a spotted skunk excavate a turtle out of a rock crevice and chew off her rear legs. As gruesome as these events were they were all part of the natural population interactions between predators and prey. The third predation event involved the apparent wanton shooting of mud turtles in a stock tank outside of Tucson. I found four floating turtle bodies with obvious bullet holes in their shells.

As in all turtles, Sonoran mud turtles lay eggs in terrestrial nests. Mating has been recorded starting

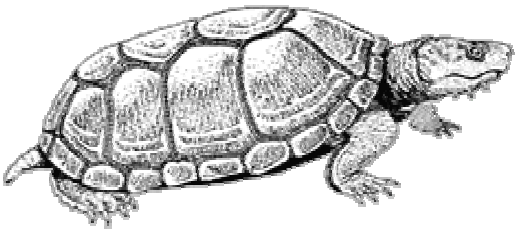
in March and to occur into October. There seems to be a mating lull during the height of the nesting season. Nesting has rarely been recorded. In the summer of 2000 I had eight females with radio transmitters attached and all nested at least once. Nesting began in July and peaked in mid-August. Two of these females nested more than once. Nesting in the canyon environments I study occurs upon the steep slopes of these canyons and movement to these sites happens at night. Predation on these nest sites may be high, as predators destroyed half of the nests. In the nests that survive the eggs develop to a particular point then enter a state of diapause where embryo development pauses. The embryos overwinter in the nests and development begins again in the spring as temperatures increase. In this manner the hatching of the eggs is apparently timed with the onset of the summer monsoon. Clutch size can be from 2-11 eggs depending on the size of the turtle. Hatchlings vary from 19-24 mm in carapace length (Fig. 3).

Adult Sonoran mud turtles have been found 4 km away from permanent water sources, indicating that they can travel long distances between habitats. In small canyon populations, however, movement of fully adult turtles is very restricted. All of the large female turtles that I have tracked for 18 years seem to confine their movements to specific pools and nesting sites. As a result their linear home ranges may not exceed over 50 m, and for 95% of the time they restrict their movements to within a single small pool. For adult males it quite the opposite. Movement may temporarily be limited to a specific complex of pools only to move to another set of pools a year or two later. Young males appear simply to wander through the streams pools. During times of drought Sonoran mud turtles will gather together in the remaining perennial pools or enter into astivation.

Fig. 3. Hatchling.

Because the Sonoran mud turtle is a secretive and little-studied animal, it has received limited interest in terms of management concerns. This turtle also thrives in manmade habitats such as stock tanks, golf course ponds, and effluent created wetlands. This apparent abundance is problematic. Manmade environments that mud turtles utilize are not designed to be turtle habitat. Stock tanks are temporary bodies of water, effluent wetlands are periodically drained and may be abandoned, and although golf course and park ponds may seem permanent they most likely are not in terms of species conservation. All the while, natural mud turtle habitats such as cienegas, streams, and rivers have been drastically reduced by man.

Other serious conservation issues regarding Sonoran mud turtles exist. Stock tanks on both public and private lands periodically silt up. These structures are essential for cattle grazing and silted-in stock tanks require dredging with heavy machinery. Because little thought is given to the aquatic organisms utilizing cattle tanks, turtles are not trapped out prior to the dredging. As a result, populations can suffer extremely high mortality due to injuries suffered during the dredging operation. I documented one stock tank population whose mean population estimates dropped from 800 turtles to 450 after a dredging operation. Although I only found 10 crushed turtles there were certainly many more crushed turtles buried in the sediment piles surrounding the stock tank. Another concern is how introduced species (fish, bullfrogs and crayfish) impact Sonoran mud turtles. Hatchlings may be the most vulnerable to these exotic predators and have been found in the stomachs of bullfrogs. Lab studies have demonstrated that crayfish will attack, kill, and consume hatchlings. How much effect crayfish introductions have on Sonoran mud turtle populations is unknown at this time. Sonoran mud turtles are wondrous animals, aquatic turtles adapted to living in one of the most arid parts of our nation. They should be appreciated and seen in the wild by all who choose to seek them out and given peace by those who choose not to. They should be protected by all.



LEGAL ISSUES OF CONCERN

Richard Tiburcio Campbell, Law Offices of Withey, Tobin, Anderson & Morris, Phoenix

THE U.S. SUPREME COURT'S SWANCC DECISION: CHARTING A NEW COURSE REGARDING "WATERS OF THE UNITED STATES"

On January 9th, 2001, the U.S. Supreme Court struck down the Army Corps of Engineers (Corps) "Migratory Bird Rule" and held that the Corps no longer has the authority to regulate "isolated waters" solely on the basis of their use by migratory birds. *Solid Waste Agency of Northern Cook County (SWANCC) v. Army Corps of Engineers*, 531 U.S. 159; 121 S. Ct. 675 (2001) (*SWANCC*). In other words, such waters are no longer considered "waters of the United States" as defined by the Clean Water Act (CWA), and are no longer subject to the jurisdiction of either the Corps or the Environmental Protection Agency (EPA). *SWANCC* has broader implications, however, and may significantly impact the ability of the Corps and EPA to regulate other "waters of the United States" such as those subject to EPA's National Pollutant Discharge Elimination System (NPDES) program or the Oil Pollution Act.[1] The impact of the *SWANCC* decision in Arizona will be significant, as the discussion below demonstrates.

BACKGROUND

Section 404 of the CWA prohibits "any person" from discharging "dredged or fill material," (a "pollutant") into "navigable waters" without obtaining a permit from the Corps.[2] "Navigable waters" are defined under the CWA as "the waters of the United States, including the territorial seas."[3] In 1974, the Corps defined "navigable waters" to mean:

> [T]hose waters of the United States which are subject to the ebb and flow of the tide, and/or are presently, or have been used in the past, or may be in the future susceptible for use for purposes of interstate or foreign commerce.[4]

Thus, the scope of the Corps' authority was initially limited to "navigable in fact" waters. In 1975, however, environmentalists prevailed over the Corps in a federal court case that held Congress intended to assert federal authority over the Nation's waters in a broader fashion.[5] As a consequence, the Corps adopted regulations in 1977 that defined "waters of the United States" to include not only waters that could be used for navigation, tidal waters, interstate waters, tributaries to jurisdictional waters, and wetlands adjacent to jurisdictional waters, but also "other waters".[6] Specifically, the "other waters rule" included:

> All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
>
> (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
>
> (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
>
> (iii) Which are used or could be used for industrial purpose by industries in interstate commerce.[7]

The impact of the SWANCC decision in Arizona will be significant, ...

In the preamble to a 1986 rule-making, the Corps attempted to clarify the scope of its jurisdiction under the "other waters rule" by defining "waters of the U.S." to include the following *intra*state waters:

> a. Which are or would be used as habitat by birds protected by Migratory Bird Treaties; or
>
> b. Which are or would be used as habitat by other migratory birds which cross state line; or
>
> c. Which are or would be used as habitat for endangered species;
>
> d. Used to irrigate crops sold in interstate commerce.[8]

The first two categories listed above constitute what has been referred to as the "Migratory Bird Rule" – although its status as a "rule" is questionable since the Corps issued it without the public notice and comment required under federal law.[9] Whether the Corps could assert jurisdiction over isolated waters under the Migratory Bird Rule was the issue facing the Supreme Court in *SWANCC*.

THE *SWANCC* DECISION

SWANCC involved a plan by a consortium of 23 suburban Chicago municipalities to locate a regional landfill on a 533-acre former sand and gravel mining site it had purchased. Ponds, ranging in size from one-tenth of an acre to several acres, with some several feet deep, had formed on the site in the 40 years since mining operations had ceased.[10] After discovering the ponds' use by migratory birds, e.g., a rookery for herons, the Corps asserted jurisdiction over the ponds pursuant to the Migratory Bird Rule and denied the consortium their Section 404 dredge and fill permit. The consortium subsequently filed suit in federal district court claiming that the Corps had no authority under the CWA to regulate isolated waters merely because they provided habitat for migratory birds, and, in the alternative, that the Migratory Bird Rule itself was unconstitutional because it involved activity that Congress could not regulate pursuant to its Commerce Clause powers. The district court, and, subsequently, the Seventh Circuit Court of Appeals, both agreed with the Corps that Congress had authority under the Commerce Clause to regulate intrastate waters under the CWA, and that the Migratory Bird Rule was a reasonable interpretation of the Act. The consortium then appealed to the Supreme Court.

In a 5-4 decision[11] the Court held that the Migratory Bird Rule exceeded the authority granted to the Corps by Congress in the CWA and that the Corps' jurisdiction over the isolated ponds in question was lacking.[12] Much of the Court's decision relied on its belief that the Act was originally intended to primarily cover traditionally navigable waters as defined by the Corps in its 1974 regulations ("[The government] put forward no persuasive evidence that the Corps mistook Congress' intent in 1974.").[13] The Court recognized, however, that Congress had evidenced an intent when it amended the CWA in 1977 to regulate at least some waters that would not be traditionally deemed as navigable, i.e., those that were "inseparably bound up" with such waters.[14] Thus, the Court did not overrule its 1985 decision in *U.S. v. Riverside Bayview Homes, Inc.*,[15] which affirmed the Corps' jurisdiction over wetlands adjacent to navigable waters. Justice Rehnquist instead distinguished that case from the facts in *SWANCC*: "It was the significant nexus between the wetlands and 'navigable waters' that informed our reading of the CWA in *Riverside Bayview Homes*."[16]

The government, in its defense, argued that the Court placed too much emphasis on the term "navigable," and suggested it had no independent significance in light of the Corps' broad mandate to protect the quality of the Nation's water.[17] The Court responded that although it had acknowledged in *Riverside Bayview Homes* "that the word 'navigable' in the statute was of 'limited effect' … it is one thing to give a word a limited meaning and quite another to give it no effect whatever."[18] The government countered that legislative history showed Congress' recognition of the Corps' authority to regulate isolated intrastate waters. The government noted Congress' rejection of a 1977 House bill that purported to strip the Corps' authority over such waters.[19] The Court, however, found the government's evidence did not adequately show a legislative intent to regulate isolated waters.[20] The Court also refused to give deference to the Corps' interpretation of the CWA because it remained unconvinced that Congress had ever clearly conveyed its acceptance of the Migratory Bird Rule.[21]

The consortium also argued that the Migratory Bird Rule was unconstitutional because it involved an activity that fell outside of Congress' Commerce Clause power, i.e., did not involve an activity that substantially affects *inter*state commerce. The government disagreed, and claimed that a substantial effect indeed existed because "millions of people spend over a billion dollars annually on recreational pursuits relating to migratory birds."[22] Rather than address this argument directly, the Court instead found that the CWA could be read so as to "avoid the significant constitutional and federalism questions raised…."[23] In the Court's view, the Act only reflects Congress' intent to regulate traditionally navigable waters and waters with a "significant nexus", i.e., "inseparably bound", to such waters. In other words, the Court found no evidence in the Act or its legislative history that indicated Congress intended to "push the limit of congressional authority" and "readjust the federal-state balance" regarding local land and water use to allow federal jurisdiction over isolated waters.[24]

In sum, the Court agreed with the Chicago consortium that the 1986 Migratory Bird Rule was an invalid assertion of jurisdiction under the CWA.

EPA AND CORPS JURISDICTION OVER WATERS OF THE U.S. AFTER *SWANCC*

As could be expected, the Corps and EPA have struggled with the implications of the *SWANCC* decision, and are exploring alternate bases of jurisdiction over waters of the U.S., including resort to the Commerce Clause, the tributary rule, the impoundment rule, and adjacency tests.

INTERSTATE COMMERCE CONNECTION OTHER THAN MIGRATORY BIRD USE

SWANCC would appear to clearly hold that the entire interstate commerce test, not just

the Migratory Bird Rule, provides an invalid basis for the Corps and EPA to assert jurisdiction over isolated waters. Rather, waters regulated under the CWA must have a "significant nexus" to traditionally navigable waters in order to be considered jurisdictional under the Act. Yet, a joint memorandum issued by EPA and the Corps issued just days after the *SWANCC* opinion suggests that the case does not preclude the regulation of isolated waters through the application of some other connection to interstate commerce other than migratory birds.[25] For example, the Corps' Los Angeles District recently issued a determination that the Salton Sea was a "waters of the U.S." due to its use by interstate travelers.[26] The Corps' reasoning in these instances would appear to be contrary to the intended impact of the case, which is best summarized by Justice Stevens' dissent in *SWANCC*: "In its decision today, the Court draws a new jurisdictional line, one that invalidates the 1986 migratory bird regulation as well as the Corps' assertion of jurisdiction over all waters except for actually navigable waters, their tributaries, and wetlands adjacent to each."[27]

TRIBUTARY RULE

The *SWANCC* case did not directly address the Corps' and EPA's broadly interpreted authority to regulate tributaries to waters of the U.S. (e.g., one recent opinion from Montana held that *SWANCC* did not prevent the Corps' regulation of a third level tributary of a navigable water).[28] However, *SWANCC* calls into question the line of federal decisions that have supported such broad interpretations of the tributary rule since these cases have often relied upon the now-discredited view that Congress intended to regulate everything it could conceivably reach under its power to regulate interstate commerce.[29]

SWANCC can also be expected to lead to increased scrutiny by the Corps and regulated parties in regard to whether the facts on the ground demonstrate that the water body is isolated or not. For example, a post-*SWANCC* Fifth Circuit case out of Texas found that plaintiffs suing under the Oil Protection Act for oil contamination to an intermittent creek did not sufficiently link the creek to an open body of navigable water to be considered a "waters of the U.S."[30] On the other hand, the Ninth Circuit, which encompasses Arizona, recently rejected an irrigation district's claim that its canals were isolated by a system of gates from the natural streams to which they discharged, and so fell outside EPA's regulatory jurisdiction under *SWANCC*. The court instead found the district liable for discharging herbicide into the canals without a NPDES permit.[31] In Arizona, many ephemeral washes eventually drain into waters that are presently considered navigable under federal and state law (e.g., the Colorado, Gila, Salt, and Agua Fria), and the tributary connection may often be clear. However, it can be expected that instances will arise where no actual evidence of a surface connection between the ephemeral wash and a navigable stream exists. In such cases, the tributary connection could be considered severed, and the upstream wash classified as an isolated water.

IMPOUNDMENTS OF WATERS OF THE U.S.

An impoundment of water, or tributary to such impoundment, may at times appear to be an unregulated isolated water. However, an impoundment of waters of the U.S. is still considered jurisdictional, as are tributaries thereto.[32] Whether the Corps or EPA may claim jurisdiction over an impoundment of water will depend on the facts of the case. Again, however, the development of the impoundment rule has been premised on a string of cases relying on the interstate commerce clause test and therefore is also open to question in light of *SWANCC*.[33]

ADJACENT WETLANDS

SWANCC did not overrule *Riverside Bayview Homes*. Thus, environmental groups assert that *SWANCC* has left unaffected the Corps' and EPA's ability to assert jurisdiction over adjacent wetlands, which has been broadly interpreted. For instance, in *U.S. v. Banks*[34] a Florida federal court held that wetland located one-half mile from navigable water were "adjacent". In the *Leslie Salt* case, a federal court in San Francisco held that wetlands that drain through one-quarter mile of man-made culverts into a tidal arm of the San Francisco Bay were "adjacent".[35] However, the federal courts have also expressed limitations to what may be considered adjacent. For example, in *U.S. v. Sargent County Water Resources Dist.*,[36] a North Dakota federal court found that the fact that wetland drained into another water through a seven-mile long maze of drainage ditches was insufficient by itself to establish adjacency.

Although adjacent wetlands are still considered waters of the U.S., *SWANCC* will lead to more factual challenges to the Corps' adjacency determinations. For example, there is currently an ongoing dispute over a post-*SWANCC* wetlands adjacency determination made by the Corps' San Francisco District in regard to the proposed Westwind business park's impacts to nearby wetlands in Sonoma County, California. The District is justifying its adjacency determination on the belief that if the wetlands are filled there will be "an observable and incremental impact" on two nearby tributaries.[37] The Westwind developers, on the other hand, argue that in light of the *SWANCC* decision, the waters are not subject

to the Corps' regulations because they "fulfill few wetlands functions", are isolated, and have no interstate commerce connection.[38] When the Corps' headquarters in Washington sided with the developer, EPA elevated the status of the permit to a "special case" pursuant to its Memorandum of Agreement (MOA)[39] with the Corps. Under this MOA, EPA has veto power over ACOE in regard to determinations of the geographic jurisdictional scope of waters under the CWA.[40] The outcome of this matter is still pending.

CONCLUSION

The *SWANCC* case represents a radical change in how the CWA is interpreted. EPA has indicated that it will also issue needed guidance shortly in conjunction with the Corps, the federal Council on Environmental Quality, and the Justice Department.[41] Also, the *SWANCC* case is on remand to the district court whose decision could be significant if it finds another proper basis for Corps jurisdiction. It is also important to note that some States are implementing their own wetlands protection laws in response to *SWANCC* (e.g., Ohio[42] and Wisconsin[43]). No such legislation has yet to be considered by Arizona's lawmakers.

1. See *D.E. Rice v. Harken Exploration Co.*, 2001 U.S. App. LEXIS 7462, *18 (5th Cir. April 25, 2001) (affirming applicability of *SWANCC* decision to OPA issue).
2. 33 U.S.C. §§ 1311(a), 1344(a), 1362(12).
3. 33 U.S.C. § 1362(7).
4. 33 C.F.R. § 209.120(d)(1).
5. *NRDC v. Callaway*, 392 F. Supp. 685 (D.D.C.).
6. 33 C.F.R. § 328.3(a).
7. Id. at § 328.3(a)(3).
8. 51 Fed. Reg. 41206, 41217 (Nov. 13, 1986).
9. *See* Administrative Procedures Act, 5 USC § 533.
10. *SWANCC*, 121 S. Ct at 678.
11. Justices Antonin Scalia, Clarence Thomas, Anthony Kennedy and Sandra Day O'Connor joined Rehnquist. Justices David Souter, Stephen Breyer, Ruth Bader Ginsberg and John Paul Stevens dissented.
12. *See* 121 S. Ct. at 678.
13. *Id.* at 680.
14. *See*, *id.* at 680 (*quoting Riverside Bayview Hom*es at 134).
15. 474 U.S. 121.
16. *Id.* at 680.
17. *Id.* at 682.
18. *Id.*
19. *Id.*
20. *Id.*
21. *Id.* at 683.
22. *Id.*
23. *Id.* at 684.
24. *Id.* at 683, 684.
25. "Supreme Court Ruling Concerning CWA Jurisdiction Over Isolated Waters", posted on the Corps' Los Angeles District website January 19, 2001.
26. *Memorandum for the Record*, from Chief, Army Corps of Engineers, South Coast Section to Chief, Army Corps of Engineers Regulatory Branch (dated Jan. 24, 2001).
27. 121 S. Ct at 685.
28. *U.S. v. Buday*, 2001 WL 363702 (D. Mont., April 11, 2001)
29. *See, e.g.*, *Quivira Mining Co. v. EPA*, 765 F.2d 126 (10th Cir. 1985).
30. *D.E. Rice v. Harken Exploration Co., supra*; *see* also *Friends of Santa Fe County v. LAC Minerals*, 892 F. Supp. 1333, 1357 (D.N.M. 1995) (finding evidence that arroyo is a "waters of the U.S.", including its designation as an "intermittent stream" in USGS topographic map, was inadequate where no showing was made that water actually reached tributary to navigable water, or was reasonably likely to do so again).
31. *Headwaters, Inc. v. Talent Irrigation Dist*., 243 F.3d 526 (9th Cir. 2001).
32. 33 CFR § 328.3(a).
33. *See* EPA Decision of the General Counsel No. 7, *In Re Central Illinois Public Service Company*, dated April 8, 1975 (Regarding the Coffeen Lake impoundment: "Recent court decisions indicate that traditional concepts of navigability have been abolished as a controlling factor in determining whether a body of water constitutes 'waters of the U.S.' and that Congress intended to assert jurisdiction under the Act over all waters to which its power extends under the commerce clause of the Constitution.")
34. 873 F. Supp. 650, 658-659 (S.D. Fla. 1995); aff'd, 115 F.3d 916 (11th Cir. 1997), *cert. denied*, 118 S.Ct. 852 (1998)
35. 896 F.2d at 358-359
36. 876 F. Supp. 1081 (D. N.D. 1992) (dicta).
37. *See* letter from ACOE San Francisco District to Robert Szabo, counsel for the Westwind, dated February 12, 2001.
38. *See* Letter from Robert Szabo, counsel for Westwind, to ACOE San Francisco District, dated January 26, 2001.
39. *Memorandum of Agreement Between the Department of the Army and the Environmental Protection Agency Concerning the Determination of the Geographic Jurisdiction of the Section 404 Program and the Application of the Exemptions Under Section 404(f) of the Clean Water Act*, dated January 19, 1989.

40. *See* EPA Region IX *Memorandum from Alexis Strauss to Robert Wayland*, EPA Headquarters, dated March 29, 2001, and *Approval of Region IX Requested Special Case Designation*, Memorandum, from EPA Headquarters to EPA Region IX, dated April 11, 2001.
41. *SWANCC*, 2001 U.S. App. LEXIS 6271 (March 29, 2001).
42. State of Ohio News Release (April 17, 2001).
43. "Wetland squabbling irritates McCallum," *Milwaukee Journal Sentinel* (April 18, 2001).

THANK YOU WILD OATS MARKET!

Wild Oats Market is a community market that has a long tradition of giving back to the communities which support them. They contribute a substantial portion of their profits to not-for-profit humanitarian and environmental groups through a variety of programs. Wild Oats innovated and currently sponsors 5% Days. On selected days during the year, all of the stores donate 5% of the day's pre-tax sales to local not-for-profit organizations. The Council has been selected to be a recipient and Kim McGlothlen, Regional Marketing Coordinator for Arizona/Nevada, has presented the Council with $1,615 donation. The donation will be used to help print our fact sheets that are distributed at environmental education fairs and to teachers to help educate children about the importance of riparian areas.

Wild Oats Market, Inc. operates a nationwide chain of natural foods markets in the U.S. and Canada, currently operating 109 stores in 23 states and British Columbia.

Stores in the Phoenix/Scottsdale area are found at:

3933 E. Camelback Road
13823 N Tatem Blvd.
7129 Et Shea Blvd

In the Tucson area at:

7133 Oracle Road
3360 E Speedway
4751 E Sunrise Drive

BIOCONTROL BEETLES SET FREE TO TACKLE SALTCEDAR

By Kathryn Barry Stelljes

Chinese leaf beetles (*Diorhabda elongata*) are beginning official duty as the first biological control agents released into the environment against saltcedar (*Tamarix* spp.). These invasive trees, which can grow up to 30 feet tall, infest more than 1 million acres along western waterways. In addition to crowding out native plants, saltcedar can increase soil salinity, divert natural streamflow and increase wildfire frequency.

Unprecedented monitoring of the beetle and its impacts began in July 1999, when the insects were put out in large cages at 10 locations in six western states.

Scientists first released the beetles from field cages last week near Seymour, TX, and Pueblo, CO. They plan to make other releases near Bishop, CA; Fallon, Lovelock and Schurz, NV; Delta, UT; and Lovell, WY. Additional nursery cages are being established at new sites near Woodland and King City, CA.

Biological control agents are often released directly into the environment. In this case, the U.S. Department of Agriculture and cooperating scientists are watching these beetles closely to ensure their establishment and to evaluate their impact, population growth and safety.

This information has been used to ensure that the biocontrol project protects all native species in the area, including the southwestern willow flycatcher, *Empidonax traillii extimus*. In some locations, these endangered birds nest in saltcedar that has crowded out their native willow nesting sites.

Biological control is expected to slowly reduce saltcedar, allowing beneficial plant and animal species to reestablish in severely infested areas. Other planned activities include continued monitoring of the insects, plants and associated wildlife, and studies to facilitate revegetation with native plants.

The project, initiated and coordinated through USDA's Agricultural Research Service, operates in conjunction with a consortium of more than 30 federal, state, and local agencies; universities; and private organizations. The team received a $3 million grant in 2000 from the USDA's Initiative for Future Agriculture and Food Systems for work on a complex of invasive weeds, including saltcedar.

ARS is USDA's chief scientific research agency. Scientific contacts: C. Jack DeLoach, ARS Grassland, Soil and Water Research Laboratory, Temple, TX, phone (254) 770-6531, FAX (254) 770-6561, deloach@brc.tamus.edu; Raymond I. Carruthers, Exotic and Invasive Weeds Research Unit, ARS Western Regional Research Center, Albany, CA, phone (510) 559-6127, FAX (510) 559-6123, ric@pw.usda.gov.

Editors' Note: This information was obtained from ARS's website at http://www.ars.usda.gov/is/pr/2001/010522.htm

NOTEWORTHY PUBLICATIONS

Jere Boudell, Department of Plant Biology, Arizona State University

Drezner, T.D., P.L. Fall, and J.C. Stromberg. 2001. Plant distribution and dispersal mechanisms at theHassayampa River Preserve, Arizona, USA. *Global Ecology and Biogeography* 10:149-162.

Understanding the how and why of plant distributions can help us better understand ecosystem and community dynamics, which can lead to better management practices and restoration methodologies. Many variables affect plant distribution, e.g., depth to groundwater, soil texture and nutrient content, climate, light quantity and quality, and disturbance regimes. However, few studies have focused on the relationship between plant dispersal syndromes and plant distribution at the community level. Drezner et al. investigated the relationship between plant dispersal syndromes and plant distribution at the Nature Conservancy's Hassayampa River Preserve, Wickenburg, AZ.

The Hassayampa River is a free-flowing low-elevation river with high flood flows in relation to its base flow. A perennial reach is located on the Preserve. Drezner et al. selected 29 plots along the perennial reach for study. They completed two vegetation surveys. For each of the 67 species observed, the dispersal syndrome (how each species is dispersed) was determined from herbarium specimens by reviewing fruit and seed morphologies. Dispersal information was also collected through extensive literature research. Species were classified into air, water, animal, other, and none dispersal categories.

Drezner et al. then used statistical analysis to determine if dispersal syndrome varied by height above channel, distance from channel, vegetation cover density, and wetland indicator scores (probability of a species occurring in a wetland). Of the 67 species assessed, >75% were animal dispersed. They found that wind-dispersed species are found in equal abundance in communities located 0 to 2 m above the channel and those >2 m above the channel. However, animal-dispersed species comprise a greater proportion of the vegetation cover in communities located 2 m or higher above the channel. Water-dispersed species, such as *Veronica anagaliis-aquatica,* were found only at the channel edge. Wind-dispersed species occur primarily within 25 m of the channel, whereas animal-dispersed species occurred in higher proportions in communities located 25 m or more away from the channel. The animal-dispersed species tended to occur in communities with greater overall vegetation cover. Conversely wind-dispersed species were found in greater proportions in communities with lower cover values. Of the obligate wetland species, most were water dispersed. Over 55% of the obligate upland species were animal dispersed and 15% were wind dispersed. A higher proportion of wind-dispersed species occur in *Populus-Salix* forests. Animal-dispersed species were present in greater abundance in *Prosopis*.

The authors suggest several conclusions based upon their results. Perhaps because animals can carry species farther away from the channel and higher up on the floodplain, the animal-dispersed species are located in higher proportions. Or, maybe seeds are dispersed in similar proportions, but environmental conditions favor the survival of species with particular types of dispersal syndromes.

When managing or restoring plant communities, it is beneficial to know how plants are assembled and structured in different communities. From this investigation, it seems that water-dispersed species are found on stream edges, wind-dispersed species are primarily found in *Populus-Salix* forests, and animal-dispersed species are found in *Prosopis* forests.

Marchetti, M.P. and P.B. Moyle. 2001. Effects of flow regime on fish assemblages in a regulated California stream. *Ecological Applications* 11(2):530-539.

River regulation affects many aspects of riparian ecosystems. However, one component of riparian ecosystems that can influence management of flow regimes is the maintenance of fish populations. The authors investigated the effects of natural restoration of flow regimes on fish assemblages. During their 5-year study, the study area experienced several years of unusually dry weather followed by several years of unusually wet weather.

Eight study sites were located on the lower Putah Creek in Yolo County, CA. Like many rivers in the Southwest, the stream has high flows in winter and low flows in summer. Much of the water from the stream has been diverted for the past 40 years. During drought years, the stream can be dry. The stream is intensely managed for cold-water trout. The fish community consists of mostly exotic species. Native species are stratified by elevation into assemblages of 1 to 7 species. Juvenile and adult fish were surveyed in early spring and late fall from 1994-1998. Twelve environmental variables were measured including canopy cover, streamflow, conductivity, temperature, and percentage of habitat as pools and riffles.

Of 35 species of fish collected, 13 were native. Statistical analysis revealed that the native and exotic species separated by environmental variables. Most of the native species were found in areas with a high canopy cover, high streamflow, low conductivity, cooler temperatures, and fewer pools. The exotic species had completely opposite associations. Upstream sites were associated with the variables correlated with native species.

Native species increased and exotic species decreased when Putah Creek was naturally restored to a more natural flow regime by the unusually wet weather. Marchetti and Moyle suggest that adaptive management could alter flow regimes to support native fish communities. During wet years, only the amount required to maintain the summer base flows need to be released to support native populations. To maintain native species populations during dry years, larger pulses need to be released during the winter months. The authors also suggest that vegetation cover might need to be increased in areas with low canopy cover.

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 September, the deadline for submittal of articles is August 15, 2001. Please call or write with suggestions, publications for review, announcements, articles, and/or illustrations.

Paul C. Marsh
Department of Biology
Arizona State University
PO Box 871501
Tempe, AZ 85287-1501
(480) 965-2977; FAX (480) 965-2519
fish.dr@asu.edu
or
Cindy D. Zisner
Center for Environmental Studies
Arizona State University
PO Box 873211
Tempe AZ 85287-3211
(480) 965-2490; FAX (480) 965-8087
Cindy.Zisner@asu.edu

The Arizona Riparian Council

Officers

Kris Randall, President . . . . . (602) 207-4509
randall.kris@ev.state.az.us
Janet Johnson, Vice President . . . . . (602) 225-5255
jjohnson/r3_tonto@fs.fed.us
Cindy Zisner, Secretary . . . . . (480) 965-2490
Cindy.Zisner@asu.edu
Theresa Pinto, Treasurer . . . . . (602) 506-8127
tmh@mail.maricopa.gov

At-Large Board Members

Matt Chew . . . . . (602) 542-2148
mchew@pr.state.az.us
Julia Fonseca . . . . . (520) 740-6350
JFONSECA@dot.co.pima.az.us
Rodney Held . . . . . (602) 417-2400 X7012
rjheld@ADWR.STATE.AZ.US

Committee Chairs

Classification/Inventory
Roy Jemison . . . . . (505) 766-2017
rjemison@fs.fed.us
Education
Cindy Zisner . . . . . (480) 965-2490
Land Use
Marty Jakle . . . . . (602) 640-2720
Protection/Enhancement
Kris Randall . . . . . (602) 207-4509
Bill Werner . . . . . (602) 789-3607
bwerner@gf.state.az.us
Water Resources
Jeff Inwood . . . . . (480) 970-0508

CALENDAR

The American Fisheries Society's 131st Annual Meeting, 2001: A Fisheries Odyssey, 19-23 August 2001. Hosted by the Arizona-New Mexico Chapter and Western Division of the American Fisheries Society. Crowne Plaza Hotel, Phoenix, AZ. If you have any questions about registration, please contact Pam Sponholtz, the registration chair, at Reg2001@gf.state.az.us or at 602-789-3898.

The 33rd Annual Meeting of the Desert Fishes Council, will be held 15-18 November 2001. The meeting will be hosted by U.S. Fish and Wildlife Service and Sul Ross State University (SRSU) and take place at University Center, SRSU, Alpine, TX. Questions about the meeting may be addressed to Nathan Allan at nathan_allan@fws.gov.

BT5 1005
Center for Environmental Studies
Arizona Riparian Council
Arizona State University
PO Box 873211
Tempe, AZ 85287-3211