Restoring Connections

Newsletter of the Sky Island Alliance Vol. 7 Issue 2 Spring-Summer 2004

Dragoon Mountains, West Stronghold Canyon. Photo by C.S. Fly, 1883, courtesy of the Arizona Historical Society.

Same site, 2002. Photo by David Hodges.

Change

in the Sky Island Region, deep time to near future

plus...

Sky Island Alliance

Protecting Our Mountain Islands & Desert Seas

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Sky Island Alliance is a non-profit membership organization dedicated to restoring and protecting the unique diversity of the Sky Islands of Southeastern Arizona, Southwestern New Mexico, and Northern Mexico.

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From painting by Henry Cheever Pratt, 1855

Many Thanks to Our Contributors!

Walt Anderson, author, artist, and Prescott College teacher; tremendously talented local poets Wendy Burke, Eric Magrane, and Susanna Mishler; Leonard DeBano and Peter Ffolliott, University of Arizona professors and long-time biology and management researchers; David Coblentz, geologist and former SIA board member, now at the Los Alamos National Labs; Julia Fonseca, hydrologist and long-time Sky Island activist; Sarah Johnson, administrative staffer for the Upper Gila Watershed Alliance in Gila, New Mexico; Ken Lamberton, award-winning and prolofic Tucson-based science and nature writer; Dennis Pepe, owner of Tucson's excellent Green Fire Bookshop; Kathy Pitts, exclusive Flora and Fauna columnist for *Restoring Connections*; Susan Shobe, stellar organizer with the Coalition for Sonoran Desert Protection; Ann Wendland, creative writer and superb pastry chef who has just abandoned us to live in Colorado; and, of course, the SIA staff.

Seeking SIA newsletter submissions:

Send us your poetry, your words of wisdom, your art!

We want to keep this newsletter filled with inspirational, informative material, and we'd like your help! Do you write poetry? Draw, sketch, paint, or photograph? Like to address regional conservation issues? Review books or websites? Anything that relates to the Sky Islands region is fair game! You can respond to items in our recent newsletter, comment on your experiences as a volunteer or conference-goer, etc. Also, let us know if you'd like to be a regular contributor, e.g. with a column each issue. The deadline for our next newsletter is September 1, 2004. Material submitted after that date may be saved for subsequent issues. Please email submissions to newsletter@skyislandalliance.org, or mail them to Sky Island Alliance attn: Gita, P.O. Box 41165, Tucson, AZ 85717. Resolution of digital images should be at least 300 dpi if possible, but we can work with some lower-resolution images. Miss our restaurant reviews? That's because no one sent us any! You know there are some great eats out there. Give your favorite small-town restaurant a boost by writing it up and letting us promote it!

A Sky Island Decade: *Transitions, transformation, and priorities for the future.*

Life has got a ha bit of not standing h itched. You got to ride it like you find it. You got to change with it. If a day goes by that don't change some of your old notions for new ones, that is just about like trying to milk a dead cow.

~ Woody Guthrie

Many of the beliefs I once held as sacrosanct are either no longer relevant or my thinking on them has changed. I would like to think of this as a natural progression that comes with age and maturity but that's only a part of what has transpired. A decade of changes in the world and in our region have had at least as much influence on me.

Recently, our volunteers returned from a SIA field weekend with alarming news. An inholding, just within the remote Peloncillo Mountain Wilderness, had been subdivided and lots were being sold. They even met several potential buyers at the end of a long, bad dirt road. Unfortunately, these sorts of developments are happening with greater frequency.

This has led me to rethink my position on a much-debated argument in the rural West – cows vs. condos. The parameter of this debate is that you must have one or the other - take your choice. These days I find I cannot ascribe to the absolutism that is so common on both sides of this issue. I once thought this concept a myth, and that remote areas were in little danger of development. I no longer believe this to be true, at least not here in the Sky Islands. Those who would sacrifice nearby private lands to developers to achieve cow-free public lands are misguided, as are those who feel that keeping every rancher in business will prevent subdivisions. This issue is more complex than that. Over time, some lands become too valuable to not subdivide and develop.

Sky Island Alliance's success as an organization relates to our ability to understand such complexities and attack problems with fresh ideas. How we as a society and a region adapt to change will determine the fate of the unique natural heritage of our Sky Islands. Many people seem unable to adapt to this changing world. I look around and see folks on all sides, using ideas, strategies and tactics that worked well ten or twenty years ago. That world no longer exists. Successful people, groups, and movements adapt to changes; those who don't become irrelevant.

Changes:

Explosive population growth is driving change here in the Sky Islands. 300,000 people moved here during the past ten years. Many are moving to what we once regarded as remote places. The advent of such modern conveniences as efficient solar power, satellite TV, phone and internet, combined with the retirement of the first wave of baby boomers has fueled much of this rural migration.

An added impact has been the vast human migration moving north through the Sky Islands. Unfortunately, there is no simple answer to this complex issue. In reality, this is more an economic policy issue than a conservation issue. The impacts to wildlife and wildlands are a result of economic pressures in Mexico. Until this larger issue is addressed, people will continue to move north, looking for a better life, and their impacts will continue – as will the equally large (sometimes larger) impacts caused by the attempts to control this flood of people.

Positive change has occurred as well. In 1994, there were few conservationists or groups, working on Sky Island issues. We are one of a number of groups that have opened offices and hired staff. Today these groups collectively employ more than 100 people, have more than 100,000 members, and spend millions of dollars every year on conservation in this region.

Today, many more private landowners are actively involved in conservation, with easements becoming an important tool. Landowners in Sonoita started the Sonoita Valley Planning Partnership. Working with the Empire-Cienega Ranch, Sonoran Institute, BLM, and the Nature Conservancy, these folks envisioned a National Conservation Area at Las Cienegas and facilitated its creation in Congress. In the southeast corner of Arizona and the Bootheel of New Mexico, local ranchers formed the Malpai Borderlands Group. The MBG has been instrumental in keeping that region free of development through the use of conservation easements, while reintroducing fire into their region. The Gray Ranch, at 321,000 acres, is the largest private landholding in the Sky Islands. Managed for conservation by the Animas Trust, the Gray has an active fire program and also serves as a Grassbank for neighboring ranches when they need to rest their range.

Research and knowledge has surged during this period. The amount of on-the-ground information that now exists in this region is impressive, not only when measured against a decade ago but when compared with other regions across the West. This increase in knowledge is critical to managing the region well.

Much progress has been made within federal land management agencies. Under new leadership, conservation become much more of a priority within the Forest Service. Folks who cared were given more latitude to improve the condition of the lands they managed, and many of those who didn't care were replaced. Agency professionalism improved greatly. A similar transition took place within the Interior Department. To their credit, here in the Sky Islands these management professionals have been able to resist the worst attempts of the Bush administration to plunder our natural resources.

The Future:

Our region is a patchwork of land designations, including private, state trust, and federally managed public lands. Acheiving landscape-level conservation here will require tackling challenges of all these land types together, but each must be adressed using strategies taylored to its own threats and opportunities.

Private lands are the greatest priority for conservation in the Sky Islands, particularly in southern Arizona. This is where we stand to lose the most in the shortest time. The Sonoran Desert Conservation Plan is a great start for Pima County but the Santa Cruz, Sonoita, San Pedro, Sulpher Springs, San Bernardino, San Simon, and Gila Valleys are also threatened. The Sonoita Valley Planning Partnership and the Malpai Borderlands Group have developed excellent models that could be expanded into other valleys, though that will require attracting more conservation funding to the region. This can only happen if all parties (NGO's, land management agencies, and private landowners) work together

State lands make up much of our region's lowlands. These areas are often intermingled with private lands. In Arizona, citizens have long called for protection of these lands, with diverse interests fighting over this issue for as long as I can remember. We must get beyond this stalemate and move forward with meaningful protection of these critical landscapes.

On federally managed *public lands*, 12 million acres of public lands (four BLM districts and four National Forests) in the Sky Islands will undergo *management plan revisions* during the next five years. The Coronado National Forest is especially critical, as it quickly becomes an urban recreational playground. Many of you probably remember a proposal from the early 90's that would have turned the Coronado into a National Recreation Area. Though soundly rejected by the public, we've slowly moved in that direction, without the official designation. We must be diligent in this planning process to ensure conservation is the priority. We still have the opportunity to ensure these lands remain wild landscapes. One only has to look to California's national forests to glimpse our own future if we screw up this new forest plan.

Where do we go from here?

I remain optimistic about our chances to protect our Sky Islands. In traveling the West and talking with other conservation planners, it's obvious the on-the-ground knowledge, science, and collaboration here, is unparalleled.

We can never lose sight of how quickly our world is changing. It's not enough to keep up with change — if you can't stay in front, it'll run you over. We must think in terms that are compatible with the world that we live in, not longing for some past world that may or may not have existed. All the pieces are in place to achieve something meaningful, here and now. It's up to all of us who care, to work together and make this happen. I'm confident we will.

~David Hodges

Note: I was only able to briefly touch on topics here that deserve more in-depth discussion. Watch upcoming issues for more perspectives on Coronado National Forest planning process, State Lands reform, Cows vs. Condos, the Border, and why the National Public Lands Grazing Initiative is beneficial for conservationist, ranchers, and open space. Please contact me at dhodges@skyislandalliance.org, or PO Box 41165, Tucson, AZ 85717, if you have any feedback on this article; and of course, you can always call me at 520-624-7080.

Brian Fairrington, The Arizona Republic

Off-Road Vehicles: A Growing User Conflict

by Matt Skroch, SIA Field Programs Director

Thirty years ago most people had never seen an ATV. Once relegated to the farm or ranch, these go-anywhere machines are now changing the face of outdoor recreation as we know it. User conflicts between motorized and non-motorized recreationists are at an all-time high. Environmental impacts from off-road driving have risen to an unprecedented level and are becoming a top priority of our federal land management agencies. Public lands are inundated with the high whine of the two-cycle engine.

The common name for these machines has changed through the years. Originally marketed as "all-terrain vehicles" (ATVs), this name gave way to "off-road vehicle" (ORV), apparently as an industry response to lawsuits from injured riders and drove on terrain that the vehicles could not handle. ORV has now given way to OHV (off-highway vehicle) as the industry has come under pressure for promoting destructive off-road driving.

Whatever you call them, these machines can do it all for our growing population of attention-deficit males who seek their adrenaline fixes on the weekend. They offer a sense a freedom, individuality, and power that caters well to those who wish to fast-forward their experience on public lands. ORV enthusiasts say they do more and see more on top of the machines.

In 1990, there were more than 500,000 ATVs in Arizona. Data is not available on how many there are today, but sales tend to increase by 30 percent every year based on statistics from 1995 to 1998 (ASPB 2000). Rarely does one venture onto public lands today without hearing or seeing one–they are becoming a ubiquitous presence across the landscape. While their prevalence permeates our recreational experiences, data shows that most people don't ride them. In fact, non-motorized users out number motorized users by a margin of more than two to one on public land trails (ASPB 2000).

The motorized versus nonmotorized conflict begins with the fact that ATVs are noisy. Most people who hike, horseback, backpack, bike, or hunt on our public lands do not want to hear these obnoxious machines. Enjoying the outdoors, to them, includes peace and quiet. Though ORVs are utilized by a minority of recreationists, they tend to affect a larger proportion of all users than non-motorized activities. It's one thing to pass someone on the trail and say, "Hi", it's another to hear the drone of an ORV for 15 minutes before they come down the trail, then choke on their dust and listen to the engine whine for another 15 minutes while they continue on.

One place to escape motorized impacts is on federally designated Wilderness, but only about 11 percent of our 39.9 million acres of public lands are designated as such (and mountain bikers can't use these areas). Most of the remaining 35.4 million acres of public lands is open to ATV use. On our National Forest lands, not only is the vast majority of land open to ORV use, more than half is open to cross-country travel–you can drive not just on trails and roads, but anywhere you'd like (USDA 2003).

To alleviate conflicts between users and reduce environmental impacts, land management agencies are slowly moving toward sorely needed restrictions on ORV use. The Coronado National Forest is the only National Forest in Arizona that generally does not allow cross-country travel. The remaining five National Forests are currently moving toward similar restrictions. The most pressing needs are not only laws restricting ORVs, but also adequate enforcement to uphold the newly formed restrictions.

While clubs such as the Tucson Rough Riders advocate responsible ATV and four-wheel drive use, most off-roaders don't subscribe to organized groups. Responsible use groups have not been able to control the actions of rogue individuals. Responsible riders in these groups have no way to impose appropriate behavior on riders outside their groups. That, along with complex and contradictory laws regarding ORV use results in an uninformed, irresponsible constituency of off-roaders who either do not know or do not care about ORV rules and regulations. Regardless, there's nobody out there writing tickets or enforcing the law. As we have reported many times, the Coronado National Forest (the one that does *not* allow ORVs off of roads) now has more than 1,000 miles of illegally created wildcat roads–mostly created by ATVs, then used by four-wheel drive trucks. Our public land management agencies are managing beyond their means.

The dust has not yet settled in the debate over how ORVs will be managed for the future. Right now, agencies are playing catch up, trying to get a handle on how to best manage current ORV levels while use continues to skyrocket. Inside and outside of the conservation community, there is growing frustration over the widespread impacts of these machines. Whether ORVs will be restricted to much smaller areas, whether land agencies will eventually be able to enforce their regulations, or whether these machines will become a thing of the past on public lands remains to be seen. While we think that their use may be appropriate for portions of our public land, land managers must ensure that other users' experiences aren't negatively impacted and that our natural resources will remain intact for future generations.

Citations:

Arizona Trails 2000: State Motorized and Nonmotorized Trails Plan. January 2000. Arizona State Parks Bulletin.

Arizona Five-Forest Initiative Draft Environmental Impact Statement for Cross-Country Travel for OHVs, 2003. US Department of Agriculture.

Forest Service to Adopt Strong Rules for Off-Road Vehicles?

by Trevor Hare, SIA conservation biologist

The U. S. Forest Service says they will take national action to control problems caused by dirt bikes, ATVs, and other off-road vehicles. Last year, Chief Dale Bosworth identified unmanaged motorized recreation as one of the four great threats to National Forests. In recent meetings with the Natural Trails and Waters Coalition (NTWC), the Forest Service said they will propose new rules that prohibit cross-country motorized travel and restrict dirt bikes and ATVs to designated roads and off-road vehicle routes. Sky Island Alliance is joining NTWC and other members of the conservation, hunting, and quiet recreation communities to push for strong reform that will protect public lands and water while restoring the rights of others to enjoy our national forests.

Sky Island Alliance will be meeting with Forest Service officials to discuss what rules should be adopted and enforced for off-road vehicles on the National Forests of Arizona and New Mexico. Please contact Trevor Hare at (520) 624-7080 or trevor@skyislandalliance.org if you want better enforcement of off-road vehicles or if have a story to share about this issue.

Historic note on ORVs:

In the 1970's presidents Nixon and Carter both forecasted intensifying conflicts among users and damages to soils, streams, and wildlife as ATVs gained popularity. In response, they issued Executive Orders 11644 (Nixon) and 11989 (Carter, adding to and clarifying Nixon's order). These orders instructed the federal land managers to control ORV problems by designating where ORVs would and would not be allowed, and by systematically monitoring and mitigating ORV impacts. A congressional investigation in 1995 found that agencies had not fulfilled these orders, although some were taking steps to do so (General Accounting Office report RCED95-209).

According to this federal investigation, the fact that managers are still not systematically monitoring damages and conflicts continues to be one of the biggest problems with ORV management. Without consistent monitoring, an agency cannot show whether damage is increasing or decreasing, or whether their actions are sufficient to control the problems at hand. Absence of monitoring also makes it difficult for agencies to get the resources they need to manage ORVs properly.

Until the agencies do implement better monitoring, it's up to you to let the land managers know when you find ORV damage or your wildland experience is degraded by ORV traffic. Report incidents to your local Forest Service or BLM office, or contact Trevor to have your incidents reported with others.

Pima County May 18th Open Space Bond Election

by Susan Shobe, Coalition for Sonoran Desert Protection

After almost six years of work, 2004 could be the biggest year yet for Pima County's Sonoran Desert Conservation Plan (SDCP). The County is nearing completion of this landmark effort to plan for future growth throughout the region in a manner that protects our natural environment – our land, our water, and our way of life – and also meets the requirements of the federal Endangered Species Act.

Sky Island Alliance has been working diligently on this issue with other local conservation groups to ensure that the final plan gives adequate protection to our region's natural resources.

On May 18th, Pima County will hold a bond election, and voters will have the chance to put the plan into action through Question #1: *Sonoran Desert Open Space and Habitat Protection; Preventing Urban Encroachment of Davis-Monthan Air Force Base.*

This questionwould provide $164.3 million to protect lands that have been identified as important under the SDCP, and lands that have been identified as having important community open space values. It would also provide $10 million to prevent new housing from being built near Davis-Monthan Air Force Base. To date, Pima County has not proposed any other significant funding source for the Sonoran Desert Conservation Plan.

With Pima County growing at a rate more than *double* the national average, our precious natural areas are at risk from over development. We must take steps now to protect our open space, unique wildlife, clean air and water before it's too late.

Question 1 is a once-in-a-lifetime opportunity to shape the future of our community and protect what's best about Pima County for our children and theirs. Please be sure that you and your family and friends know about this election and VOTE!

For more information, or to find out how you can help those working to pass Question 1, please call *Friends of the Sonoran Desert* at (520) 321-1900 or visit their website at www.OpenSpaceBond2004.org.

Jeff Parker, Florida Today

Population: Resident One Million

continued from back cover

In 1999 Robbyn Abbitt and colleagues from the University of Idaho took a closer look at species vulnerable to extinction in the US. To simplify matters they considered only two well-known groups, birds and butterflies, whose diversity patterns very often reflect what is going on with other animals and plants. Abbitt and company charted species with greatly restricted ranges – in this case, birds found in 38 or fewer US counties and butterflies found in 15 or fewer counties – to produce a map showing the number of small-range species in each county. To this map they added measures of each county's population growth and growth-related habitat loss. This combination provides a unique window on the geography of vulnerability. It paints a picture of the regions in which we stand to lose the most species from our national heritage if we do not act quickly to protect habitat, or, from the other side, a picture of where immediate habitat protection will most benefit our nation's long-term biodiversity. The results: counties in southern Texas, California, Florida, and Arizona—particularly those in the Sky Islands—lit up like road flares.

By and large, developing a chunk of land results in a permanent loss of habitat. Rarely do Gila monsters or Gila chub return to thrive on the streets of a new subdivision. Habitat can also be degraded slowly, incrementally; this becomes a more subtle yet widespread result of population growth and development. Wildcat roads, illegal dump sites, and non-native species tend to increase in outlying areas as nearby towns turn into cities ringed by sprawling suburbs. Even low-impact activities like firewood gathering, target plinking, and off trail hiking turn into threats when thousands of people engage in them every week.

The population of southern Florida is more than six million while southern Texas boasts two of the 10 largest cities in the US. And southern California—well, as Ed Abbey once wrote, "I've never been to Los Angeles; I figure it'll come to me."

Ultimately population growth will have to be curbed if we are to retain all our glorious natural diversity over the long term, but local people rarely have the power to grind such huge, powerful forces to a halt on a dime. Perhaps our most effective approach is to use informed planning, creative management and education to weaken the link between population growth and habitat loss.

As western residents we value our freedom, the ability to drive to a campsite, to build a fire, to tramp through the brush to a secret swimming hole. But we also value the integrity of our public lands. If we realize that ultimate freedom and a healthy ecology are mutually exclusive—that we cannot continue to do whatever we want, wherever we want, without damaging the land we care about—we can begin to change our behavior and design systems that guard against the slow deterioration of the land.

Like turning an ocean liner, these changes must be made before the inertia of population growth is so strong as to resist change altogether. The population of southern Florida is more than six million while southern Texas boasts two of the 10 largest cities in the US. And southern California—well, as Ed Abbey once wrote, "I've never been to Los Angeles; I figure it'll come to me." By contrast, the Sky Islands claim little more than a million people concentrated in a handful of cities. Our numbers are increasing but we have by no means reached the density of people and vulnerable species found in South Texas, Florida, and California. Instead we stand at a threshold of opportunity, one that may have slipped by other states years ago.

To safeguard the landscape beyond our cities we must tailor our activities to the vulnerability and ecological value of the land. Some key habitats that are still open to full-on development will have to be set aside—something Pima County voters have a chance to invest in on May 18th. We must also favor the lowest impact pursuits in the most sensitive and biologically rich lands and confine destructive pursuits like ORV use to smaller and less ecologically valuable tracts. Misuse or damage on our public lands must be met with targeted closure until management funds can be gathered and new protective strategies chosen. Better still, as our demographic and political makeup changes we have a chance to shape the attitudes and habits of new arrivals. A sense of entitlement and a recalcitrant streak run through the resident who has grown used to doing as he or she pleases, but not so the newcomer. Perhaps when Pima County's one-millionth citizen and his or her family do arrive they will tread lightly on the land, understanding that they follow in the steps of many and are breaking trail for many more. And perhaps our land managers will find a way to help them.

An Immodest Proposal: Double the Diversion of Gila River Water?

by Sarah Johnson, Upper Gila Watershed Alliance

Hold in mind the image of a dry river bed. No river flow, just rocks trapping small pools that shrivel each day in the hot May sun, until, in June, they give up their last drops. In the Cliff-Gila valley, this is how long stretches of the Gila River look every year. The valley's economic needs divert enough water to the irrigation ditches that in the dryest season the river is forced to do without and wait for the rains (which in all of 2003 totalled only about six inches). With the rains, the river flows again, but meanwhile, stretches of riparian vegetation and all their dependent species have suffered the shock of privation. It's clear that the balance of economic and ecologic needs is tenuous.

This is one of numerous concerns that the Gila Conservation Coalition has raised about a New Mexico Interstate Stream Commission (ISC) proposal currently before the state and the US Congress (Senate Bill 437, HR 885). As part of a bureaucratic poker game that's been in play for decades, it is proposed that some Arizona users of Gila River water be sought out for a trade: an annual 18,000 acre feet (af) of their Gila water rights in exchange for an equal amount of Colorado River water. If willing users can be found, and if this arrangement would not harm other Gila River users, then, by terms stipulated in the 1968 Central Arizona Project, or CAP, New Mexico can hold back this amount of the Gila for itself. Those Arizona users involved in the exchange would receive their share of the Colorado through a yet-unbuilt appendage of the vast CAP canal infrastructure. On the New Mexico side, "holding back" the Gila water would not involve damming but pumping it in high flood events to an offstream storage facility, perhaps on Mangas Creek, a Gila tributary in the Burro Mountains.

The acre-foot amount being discussed is "consumptive use," meaning the net rather than gross amount: once the water's used it's used, unlike that which is diverted and then returned as surplus to the river. "Use" is the operative word. New Mexico law has it that water must be "put to beneficial use"—used, in other words—or forfeited. This "use it or lose it" framework has created a sense of urgency about this proposal for some parties involved, despite a host of unanswered questions.

First a yardstick. What does 18,000 af mean? 16,849 af is the current allocation of consumptive use water rights in New Mexico's Gila and San Francisco River watersheds. So the proposal seeks to more than double that. It's not the amount of water that would change (though under continued drought conditions it would). It's twice the stack of poker chips to be redeemed against the same old till. Allocations of water would more than double. Remember that dry river bed?

Ecological Concerns:

In addition to the already commonplace dewatering of the Gila River by the precedence given to economic over ecologic needs, let us consider the uniqueness of the upper Gila River. Contrast the irrigation ditch that is the Rio Grande: its flow micromanaged and its natural flood regime curtailed, its riparian forests are so degraded that in many places they are little more than monocultures of invasive, water-guzzling saltcedar. The Gila, on the other hand, has a relatively intact flood regime. With every snowmelt and monsoon rain it swells, and there is room for it to spill its banks. The effect of this is vigorous riparian forests that support an astonishing variety of birds and other wildlife, including several state- or federally-listed threatened or endangered species.

This is the picture under current water allocations. To add another 18,000 af of consumptive use could imperil this biological treasure. We can find a vivid example in the 1950s, when prolonged drought created irrigation shortages. The response was drastic removal of the competing interest—cutting down riparian forest—that resulted in serious erosion of devegetated stream banks, as well as streamside habitat loss.

Social Concerns:

We can once again look to the Rio Grande for a sobering image. The battle taking place there over the silvery minnow's water needs pits neighbor against neighbor and drives a bitter stake into the heart of the community. Such could be the case here were water use doubled, with competing users litigating over the seniority of their rights, and advocates for economic and ecologic priorities in similar contention. The ecosystem and species that depend upon it would almost certainly be the losers.

New Mexico would still have obligations to a number of downstream Arizona users. Arizona communities above the San Carlos Reservoir, near Phoenix, are not eligible for Colorado River water and would continue to depend on their allotted Gila River flow, which New Mexico would be compelled to deliver. One of these communities, the San Carlos Apache Reservation, is the most senior water-right holder of the entire upper Gila.

Economic Concerns:

We return to the word "use." Why use it? An extra 18,000 af—what for? The Southwest New Mexico Water Supply and Demand Plan, drafted in 2002, forecasts, to the year 2040, growth and demand in a range of categories: irrigated agriculture, livestock, public water supply, domestic, commercial, industrial, mining, and power. In every one of these cases it can be argued that a combination of reasonable efficiency measures and the purchase and application of no more than 20% of unused, idle water rights would provide more than enough water, and at much less cost than if obtained through the "capture" of additional Gila River water. (The mining industry in particular has tied up the rights to an enormous amount of water that it doesn't now use and isn't forecasted to use.)

Exactly how much less a cost is difficult to judge, however, because no detailed cost or cost/benefit analysis has been presented. Only a single figure has been put forward, and that is an annual bill to New Mexico of $1,332,000 (or $74 per acre-foot) for delivering Colorado River water to those Arizona users involved in this exchange. Construction estimates for New Mexico's diversion system are less precise—$220 to $300 million—perhaps because the construction requirements are unknown. Many additional unknown costs will apply to New Mexico's delivery system. For example, if Columbus, 70 miles from the Gila River, were to receive water, as has been proposed, a tremendous infrastructure would be required.

A cost-benefit analysis was last done, by the Bureau of Reclamation, in 1987 when a proposal was on the table to build Conner Dam in the Middle Gila Box. Results of that analysis were enough to squelch the project.

Building the dam, the Bureau predicted, would run up a bill nearly twice that of purchasing existing available water rights; furthermore, dam proponents had not demonstrated sufficient local need.

Local need is an unanswered question in the present situation as well. The regional water plan mentioned earlier foresees the greatest water need in expanding irrigated agriculture in Catron, Grant, and Hidalgo Counties. Yet ISC staff have publicly stated that only municipal and industrial applications could possibly pay for this water, which would come burdened with the price tag of its diversion and delivery. The home of municipal and industrial applications is not the Gila valley. The water, then, would most likely be pumped out of the valley, to Silver City and Deming.

Finally, no ecological mitigation costs—let alone purely ecological costs—have been addressed at all. The original CAP agreement did authorize funding for mitigation efforts—to counteract harmful consequences of CAP delivery system construction—but Congress has never actually appropriated any such funds.

Process Concerns:

This proposal is clearly a matter of great public importance with great potential consequences, yet the public has largely been denied access to the discussion. To date, the meetings held to consider the proposal have not been publicly announced, and local conservation groups that did find out about them have been repeatedly refused an official place at the table (though the ranching community, for one, is well represented in the soil and water districts, which have a prominent seat). ISC staff have gone before Congress, but concerned local citizens interested in reading their testimony have been stymied in their search, and were only able to obtain—with difficulty—preliminary drafts.

It seems reasonable to expect a thorough, public airing of many urgent questions, including the following: What specific sites have been identified for both

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"Son of CAP" Threatens Gila River

by Julia Fonseca, hydrologist

The Gila River in New Mexico is one of the few major streams left in the Southwest that hasn't been dammed or pumped dry for water supply. It provides life for native fish and wildlife, including imperiled species such as the loach and spikedace minnows.

The 1968 legislation for the Central Arizona Project (CAP) authorized the Secretary of Interior to contract with New Mexico to divert up to 18,000 acre-feet of water over a 10 year period from the Upper Gila, its tributaries, and underground water sources. Studies were done to propose storage dams to hold the water—Hooker and Conner dams—but because there was never any promise to subsidize the effort with federal funds, the likelihood of any new Gila River system dams has seemed as remote as the construction of the long-ago authorized Charleston Dam on the San Pedro River. Until now.

The New Mexico Interstate Stream Commission (ISC) wants your tax dollars to *capture and divert an average of 18,000 acre-feet of water per year from the Gila River.* Other entities have their eye on the San Francisco River, an important tributary.

New Mexico's delegation is negotiating with Arizona's Senators to amend the Arizona Water Rights Settlements Act (Senate Bill 437). ISC wants $150 million in federal tax revenue to capture and export Gila River water over the Continental Divide to Silver City, Deming, and other areas. To avoid litigation with downstream water rights holders, largely Native American, New Mexico seeks to have them recompensed with—what else?—rights to more CAP water!

One likely diversion location is the Gila-Cliff Valley reach. This reach has cottonwood forest and wetlands dependent on river flows and shallow underground water. These forests are known to support some of the highest densities of birds on the continent (apart from large flocks of colonial species like blackbirds). The area includes large concentrations of the endangered Southwestern willow flycatcher, coexisting with well-managed ranching and agriculture.

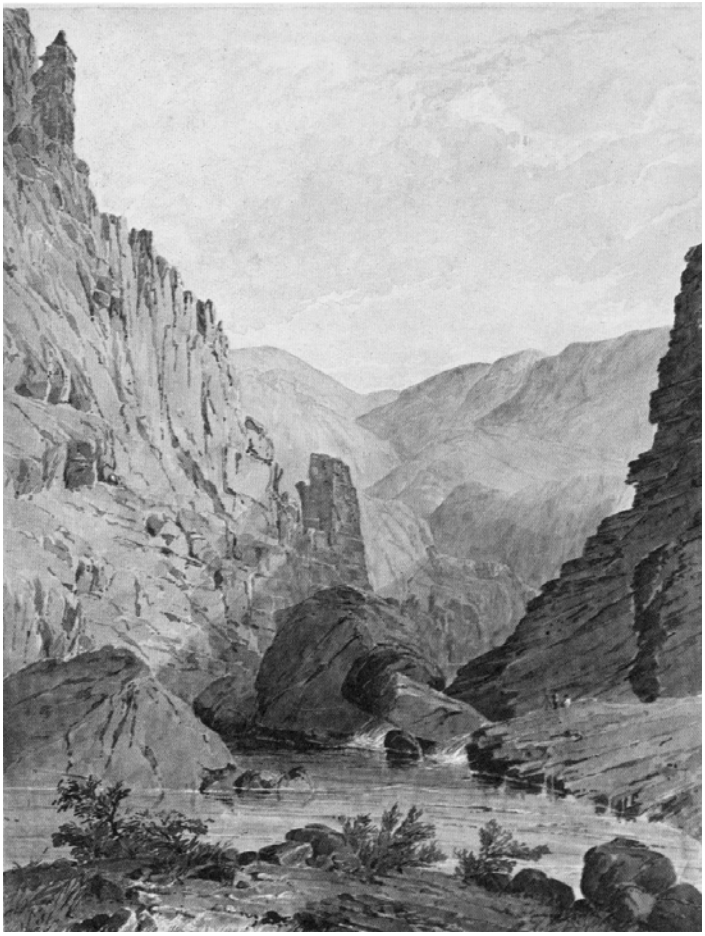
The most likely way that water would be exported from the valley seems to involve groundwater pumps and possibly a surface water diversion dam on private land. These could feed into a storage dam to be constructed on a tributary. No specific proposal has been made public, and nothing precludes the money from being used to construct storage dams, well fields and pipelines elsewhere on the Gila, San Francisco River, or other tributaries.

Regardless of how or where the diversion is taken, the water for wildlife, vegetation, nutrient cycling, and other river functions would be diminished. Flows of the Gila and San Francisco Rivers are also important for recreation.

This project has such a low benefit to cost ratio that it will not be built without a substantial helping of federal pork-barrel spending. Bureau of Reclamation (BOR) has declined to build the project. A 1987 BOR study concluded that insufficient demand existed at that time to justify building it. The more recent Southwestern New Mexico Regional Water Plan suggests the area's future water needs can be met by increases in efficiency and use of water rights that are expected to be idle.

New Mexico residents are concerned about their repayment obligation and rightly so. Actual details of the cost and repayment obligation for any New Mexico part of the funding are hazy—what is certain is that $150 million in federal funding will be insufficient to cover the cost. The cost might be spread out among four counties, by creating a new taxing authority to contract for the water. The annual delivery, operating and maintenance costs could amount to two million dollars, and unlike the CAP, there is no cheap (i.e. federally subsidized) energy to run the pumps. Various private entities are said to be interested in running the operation, but not in financing it.

Discussions of this proposal have largely occurred in New Mexico, among parties who might contract for the water. Conservation groups have been almost entirely shut out of these discussions. No draft environmental impact statement has been prepared for the current proposal. Environmental impacts of the diversion would not be analyzed until after the legislation is passed and funding is made available to the federal agencies to do so. Once funding is approved, there is little leverage to stop or change a project even if environmental assessments shows severe negative impacts. Mitigation costs would be borne by federal taxpayers.



Watercolor by border explorer and artist Seth Eastman, "Great Canon, River Gila," 1854.

Take Action:

The CAP has been damaging enough. The AWRSA (Senate Bill 437, H. R. 885) must not injure another free-flowing river of the desert Southwest. Contact Arizona and New Mexico elected representatives, including Senators Kyl and McCain (US Senate, Washington DC, 20510; mccain@mccain.senate.gov) and the various Arizona Congressional reps (U. S. House of Representatives, Washington, DC, 20515; www.house.gov/writerep). They are key players in the AWRSA negotiation, as are Senator Jeff Bingaman (senator_bingaman@bingaman.senate.gov) and Senator Peter Domenici (domenici@senate.gov/resources/contactform.cfm).

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the pumping/diversion and the storage of Gila River water? What negative consequences might this long-term pumping have for the groundwater levels, vegetation, and wells? How would these actions affect threatened and endangered species along the Gila and its tributaries? How much water is really available? Who will pay, and how? Who will arbitrate the inevitable disputes? Is the "use it or lose it" policy appropriate to this situation? If water is exported outside the watershed, what good does it do the citizens of the Gila River, and what are their added taxes buying them?

These are broad outlines of the troubling questions raised by the Gila Conservation Coalition, a group of concerned local citizens and conservation organizations. This proposal seems to be a massive public works project that excludes the public, that comes saddled with an equally massive financial burden, with potentially disastrous—yet largely unexamined—ecological consequences, and that is to be built on a shaky platform of unproven need. This proposal has also expressed little interest in alternatives. There is firm ground, however, for believing that the alternatives are plentiful, and right under our feet.

Research for this article was done by the Gila Conservation Coalition (GCC). For more information and updates, call the GCC at 505-388-3763. A fact sheet is also posted on the Upper Gila Watershed Alliance web site, www.ugwa.org.

A River Once More

by Ken Lamberton, Tucson-based author

On the afternoon of the winter solstice, Daniel Preston and Renee Red Dog of the Tohono O'odham Nation stand in the rain on an earthen berm above the Santa Cruz River thirty miles north of Tucson. The smell of burning sage merges with the tonic-scent of wet creosote. At one of the first water-harvesting basins created at the site, fifteen observers, jacketed and sweatshirted against the chill, huddle around a potted blue paloverde sapling. As Daniel blesses the tree in the O'odham language, a worker slips it into the ground

Next, the group climbs down the soft bank to the river. Daniel, wearing his trademark bolo tie, speaks about the need for a blessing in this place, how his ancestors once drew life from the Santa Cruz and how now life has begun to return here, turning full circle. He asks everyone to face east and then he and Renee begin to chant, praying for strength and guidance for the people who are working diligently to heal the land.

photo by Kendall Kroesen

Santa Cruz River, in a stretch of effluent-based perennial flow

Ten months later, my wife, Karen, and I search the restoration site for the "hobbit hole," the name our 15-year-old daughter gave to her planting design. Melissa had an idea that her plants should benefit from both rainwater and the provided irrigation and that the inevitable weeds shouldn't interfere with either. The result was a cloverleaf pattern of six catchment basins, each one banked and sloped to receive and hold the greatest amount of moisture while channeling it to the roots of her seedlings—a yucca, a creosote bush, a saltbush, a blue paloverde tree, and two bunch grasses.

We worked together for most of the day last December, our faces burnishing red from sun and exertion. It wasn't the most efficient use of our time—six tiny plantings in the center of an old cotton field where volunteers were digging hundreds of holes in sandy loam the color and texture of cocoa powder. But it was our project, our small part toward restoring 1700 acres of tumbleweeds to a habitat more suitable for wildlife along the lower reaches of the Santa Cruz River.

The weeds have grown tall, Karen and I notice, and they obscure Melissa's hobbit hole. At first I think that nothing has survived, but then I see a small yucca, blue-green against the dead-blond vegetation. Alive. The creosote is more than twice its original size, and even the paloverde has new growth.

Ann Phillips, the restoration project's manager, gave us a tour of another area of the site earlier this morning, after Karen and I helped a group of new volunteers, the first of the season, plant dead trees on a berm above the opposite side of the river. "We're having trouble with rodents chewing on the irrigation lines," she explained. "The dead trees will give hawks a place to perch and hopefully deal with the rodents."

Ann's ideas are innovative. She's a visionary. She sees possibility in barren fields. Ann has been involved with the Santa Cruz River Habitat Project since 1999 when she worked as a contractor for the Tucson Audubon Society. After studying sustainable living (permaculture) with Kevin Dahl, an ethnobotanist and director of Native Seeds/SEARCH, she began looking for a project to put her ideas to practical use. She found it here.

Beginning with an assessment of the site that focused on the use of sustainable design principles, Ann and a team conservation biologists mapped local characteristics like topography, soil type, and temperature. With this information, together with historical records and input from botanists, she selected appropriate plants. The result was a list of 69 species of trees, shrubs, cacti and succulents, wildflowers and grasses, which she divided into plant guilds according to species that grow well together. For example, Melissa's paloverde tree would both fix nitrogen in the soil and provide cover for the saltbush and creosote, which in turn would offer shelter and food for birds and mammals.

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I learned about the Santa Cruz River restoration project from the *Vermilion Flycatcher*, the Tucson Audubon Society's monthly newsletter, which ran an article about the program and the need for volunteers. Because of my interest in the river, and particularly my heart for redeeming hopeless cases, I decided to participate and bring along my family, if Karen and our three daughters were willing. On a Saturday morning in October, my oldest daughter, Jessica, and I joined Ann Phillips, two of her staff, Kendall Kroesen and Rodd Lancaster, and a group of volunteers at some abandoned cotton fields near Pinal Airpark.

photo by Kendall Kroesen

Melissa, dad Ken, and the "hobbit hole"

The warm air smelled of dust and effluent, the latter of which formed a dark ribbon along a cottonwood- and willow-hemmed channel immediately to our northeast. The channel is human-made, we learned, bulldozed after the flood of 1993 stripped the region clean of vegetation and left behind a plain of sand and mud. Since engineers reclaimed (or *re-created*) the river channel, cottonwood and willow, with invasive trees like tamarisk, have sprouted and surged into thirty-foot galleries at the river's margins while the silted fields became a cropland of tumbleweeds. Here, because of two sewage treatment facilities upriver, the Santa Cruz flowed once again, the river given a second chance by Tucson's unwanted wastewater. As a result, the area was ripe for restoration.

That Saturday, I worked with Jessica along the riverside berm, digging holes to plant a little redemption in my own landscape. We enhanced natural water basins for catclaw, white-thorn acacia, brittlebush, four-wing saltbush, and sacaton grass grown in two-foot sections of four-inch PVC pipe by Mountain View High School students. Kendall, wearing a beard and khaki Nature Conservancy hat, explained that the tubular "pots" encouraged long taproots, which improved the seedlings' survival rate.

On a later trip to the river, my whole family joined me. In March, with temperatures near 75 degrees, my three daughters and I worked the berm, flattening tumbleweeds, digging up Johnson grass, and planting mesquite trees. Karen took photographs of the staff and volunteers. With the sun warming my winter skin and the taste of the land on my lips, it felt good to raise blisters in the company of family and friends.

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Now, in this new season, Karen and I stand next to the hobbit hole admiring one small effort to heal the land. Daniel Preston's ancestors knew how to cooperate with the Santa Cruz to make this extreme place into a human landscape, something modern people have forgotten, or never tried learn, until recently. In fact, this region is a lesson in extremes; travelers here a hundred and fifty years ago called this a waterless "Ninety Mile Desert" and write of trails marked by wagon graves and cairns of human bones. The stories remind me that we live in the desert by grace, and that our presence becomes more tenuous as the rivers go.

It is significant to me that our restoration work of the Santa Cruz should begin here, some distance before the river finally expires, dilating and sinking into the earth. The river, which has never been much more than a meager, ephemeral stream, has had a tough life. From its headwaters in southern Arizona's San Rafael Valley, its journey into Mexico, its release back into Arizona and subsequent use and abuse by the state's formerly two largest economies, to the cutting of its canopies and erosion of its banks and its treatment as a sewer for Tucson, the Santa Cruz has suffered like our lowest class of citizens. As if poverty were a crime.

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A Cooper's hawk turns ragged circles above our heads, over a sere land slashed open by a bright green invitation. Desert rivers are like this, gushing with extravagant promises that evaporate before your eyes. Oases without water on their way to becoming oases without trees. Once, the Santa Cruz was one of southern Arizona's major arteries, a place to take the desert's pulse. It could be again.

I think about redemption, what it means in terms of people's patience and sacrifice and dedication, and I imagine how this place could look in fifty years. I see a mesquite bosque crowding the margins of a living thread—a free-flowing Santa Cruz River—connecting wildlife and habitats for hundreds of miles of Sonoran Desert from Mexico to central Arizona. I see into the past, the way the river once was. And at the same time I see into our future.

This essay is an excerpt from Ken's upcoming book Redeeming the Santa Cruz. *We run it here as part of a special Protected Area Profile series highlighting exceptional land management in our region.*

Deepening the Time Scale: A Puzzle in Sycamore Canyon

by Walt Anderson, Prescott College

Though each organism is inherently a time traveler, its genes a partial chronicle of its evolutionary history, we may be the sole species to be able to reflect on that deeper history. People with deep imaginations can visualize the ape in our behaviors, the prototypical vertebrate in our embryos, the symbiotic merger reflected in our mitochondria. Some can look at a hillside and envision it as a product of tectonic upheavals, erosional incisions and depositions, the lithification that turned sediment into rock that has weathered into a substrate supporting juniper, cactus, and spiny lizard. With some training, there is hope for those of us who don't normally see so well. Our temporal blinders may be lifted, our spirits uplifted by the joys of discovery and insight. Informed imagination–that greatest of time machines–can take us further toward understanding the Sky Islands than mere physical descriptions ever will. Join me, then, for a little time travel, not to see it all (who has time?), but for a sample of how informed imagination works.

In the western part of the Sky Islands lie the Pajaritos, rolling hills of Madrean oak woodland that continue similar formations galloping northwest across the landscape from near Imuris, Sonora. The range lacks major peaks or well-maintained roads, so it is not on the minds of most people exploring southern Arizona, at least not for casual tourism. To a naturalist, however, a trip to Sycamore Canyon is an essential biodiversity pilgrimage. The canyon is noted for unusual birds, reptiles, amphibians, and plants and as a corridor through which drugs and undocumented border crossers traffic. My friend and student, Craig Childs, and I have come for the former, not the latter.

Sycamore Canyon is a biodiversity hotspot, an intersection zone. The narrowness of canyon walls, the presence of cool-air drainage, and the moderating effects of the water create a biogeographic inversion. Species of plants and animals typical of higher elevations occur at the lowest elevations anywhere within their ranges, often within a short distance of desert organisms you might find in the arid hills around Tucson.

Craig and I follow the stream into the Upper Box, what Rick Taylor calls a "tortuous stone vise." We spider carefully across slick rock with deep pools of water below; this barrier discourages the faint and infirm from further exploration unless they are willing to get wet. We scramble up the rock face to the right, then continue climbing up a steep side drainage known as Arch Canyon. Craig, a skilled, practically fearless climber, ascends the cliffs with practiced ease. I grip faint projections and spindly plants for support as I labor up the near-vertical faces of rock down which water stains lead to gouged-out plunge pools or *tinajas*. I can imagine myself sliding or tumbling far down into a *tinaja* that would hold my crumpled form until the residue would be swept out by the force of a flash flood. Cheery thought. But if I get out of this alive, surely I will be one of a very few to have ascended this obscure and remote side canyon.

High in this narrow defile, we reach a deep but highly isolated pool. To our amazement, there are fish, Sonoran chubs (*Gila ditaenia*), seemingly doing quite well in this *tinaja*. It seems impossible that they could have swum up here, even in the most extreme flood, for the high waterfalls surely must be impassable barriers. It's also doubtful that a tornado or waterspout could have transported the fish here, even though fish have been noted falling from the sky in other parts of the country. Could a bird have lifted fish or eggs up here? Could people have done it? That seems very unlikely, for this is a *hard* place to reach, and little bitty chubs are not what fishermen would introduce anywhere, especially into a pool that must be isolated when the rest of the creek dries up. A puzzle to ponder.

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Over a year later, that puzzle still on my mind, I asked W. L. Minckley, who knew fish distributions within the Sky Island area better than anyone, about this puzzle. I first asked if he or any other native fish expert might have moved the fish to this *tinaja*. No, he hadn't had a thing to do with it. His guess was that the fish were there before the canyon was. What? Yes, if you go back a few million years, this canyon would not yet be eroded and sculpted into its present form. The tributary then would have had continuous connection; the canyon as we see it now did not yet exist. He's seen this up near the Grand Canyon, too: an isolated fish population high in a side canyon up which no fish could possibly swim today. The carving action of the Colorado River there and Sycamore Creek here pulled a fast one on the fish living in those ponds.

Sycamore Canyon, Pajarito Mountains, home of the Sonoran chub

photo by Walt Anderson

The implications are staggering. If this scenarío is true, then the fish there today are descendants of thousands of generations of chubs for which that pool was their entire universe. The droughts and floods that must have occurred over those several million years never did completely dry or scour out the life of the pool. Genetic continuity of the fish is completely dependent on aquatic continuity. One demographic failure would have cut off the line, and today we would see a fishless pool and assume that it always had been that way.

Craig and I had looked at this isolated population and wondered how fish could have gotten up there. We were thinking in terms of dispersal. Minckley's hindsight went a lot deeper. His reasoning didn't limit itself to the major landscape changes that we know occurred throughout the Southwest in the late 1800s. Nor did he focus on the events of the last 10,000-20,000 years, as many biogeographers do. Why get hung up on the late Pleistocene? Minckley saw that the evolution and distribution of fishes in the Southwest are part of a longer saga, perhaps mostly formed in the past 29 million years since the North American Plate collided with the East Pacific Rise. Tectonic activity (mountain building, rifting, etc.) and subsequent erosion may have isolated once-connected populations or moved them around. What we currently perceive as barriers to dispersal may be immaterial to how fish got somewhere. Minckley told me: "Modern fishes are thus much older than conditions under which we find them today."

Minckley and collaborators in 1986 gave another remarkable example of how geology may have shaped modern fish distributions. The Arroyo Chub, *Gila orcutti*, is found in the Los Angeles Basin today, but its nearest relatives appear to be the Sonoran Chub (*G. ditaenia*) and the Desert Chub (*G. eremica*), both in stream systems that drain into the Gulf of California in NW Sonora. That geographic gap might suggest pretty impressive dispersal, but the ancestor of these fish has been around for quite some time. If you go back 30 million years or so, the Gulf of California didn't even exist. Things changed dramatically 29 million years ago. When the East Pacific Rise crashed into the North American Plate, the San Andreas Transform system developed, sending microplates, continental fragments, off to the northwest. The ancestors of *Gila orcutti* did not swim to southern California; they *rode* there! Other lines of evidence, genetic and geological, support the likelihood of this zoogeographic terrain track.

The take-home lesson of these discussions is that our typically short temporal imagination can inhibit our understanding. What we see today is not all there is to see. A thoughtful biogeographer, a creative soul with an *informed imagination*, is a far better time traveler than most of us. An ecologist may wonder if competition between two species might have limited the ranges of two similar species, but a different story may lie hidden in the stones or in mitochondrial DNA. The quest for understanding is simultaneously challenging and humbling; in fact, there will be some answers we'll never know with certainty. At least we can enlarge the range and accuracy of the questions that we ask... and enjoy the mysteries that remain.

A "Deep Time" Perspective: The Tectonic Evolution of the Sky Islands

by David Coblentz, geologist at the Los Alamos National Labs

When hiking in the Madrean Sky Islands we are drawn to the mountain peaks to gain the best perspective on what makes this region a special part of the world. Here we enjoy expansive vistas of the "islands" and contemplate the many factors that contribute to the remarkable biodiversity of the Madrean Archipelago. The first factors that come to mind are the vertical mixing of desert and montane plant and animal communities, the intersection of tropical and temperate ecosystems, and the region's complex rainfall patterns. But other factors that lie beyond the realm of our perception have been at work in the Sky Islands. Visualizing the "deep time" geologic and tectonic forces that have acted on this region over hundreds of million years adds an entirely new—and much deeper—perspective on our region's unique diversity.

Rocks we walk upon in the Sky Islands were originally formed over hundreds of millions of years, from the Precambrian more than 600 million years ago (600mya) when all life was small and squishy (and mostly single celled), to nearly modern times inhabited by nearly modern plants and animals. Rock formation in this region spanned the origin of fishes, the evolution of the first land plants, the first reptiles, first dinosaurs, first mammals and birds, and then the extinction of the dinosaurs. Formation of soils from these rocks continues to this day. During this time span, several periods of crustal-scale deformation have mixed the diverse bedrock geology into heterogeneous assemblages that eroded into complex soils. Because these unique topographies and soils are important contributors to the biodiversity of the region it pays to take a closer look at the geologic and tectonic history of the Western US. In this way we can gain an appreciation of the "deep time" factors that have helped form the Sky Islands.

The geologic history of the Western US has resulted in a complex blend of bedrock geology. All three of the principal rocks types are present in the geology of the Sky Islands, including: 1) igneous rocks in the form of Precambrian and Tertiary granites, and Mesozoic to Quaternary volcanics; 2) metamorphic rocks in the form of Precambrian and Mesozoic gneisses and schists; and 3) sedimentary rocks deposited during quiescent periods in the Paleozoic, Mesozoic and Cenozoic ages in the form of limestones, sandstones, quartzites and shales. An important aspect of the tectonic history of the Sky Islands is the blending of these rock types by several stages of tectonic deformation. [Colors refer to time spans illustrated on the geologic time scale, Figure 1.]

The tectonic history of Western North America has led to a complex assembly of topographic features (Figure 2) that can be divided into a number of tectonic provinces. These provinces include quiescent plateaus (The Colorado Plateau), actively extending regions (The Basin and Range), a major continental rift system (The Rio Grande Rift), an active hot spot (Yellowstone), the remnants of a Paleozoic mountain belt of Himalayan proportions (the Rocky Mountains), and a 1200-km long pile of Cenozoic volcanic rock (the Sierra Madre Occidental). The source of this mosaic lies in the distant past—not hundreds or thousands of years, but hundreds of millions of years.

The deformational history of the Western US can be divided roughly into two stages that span over 200 million years. The first was a predominately compressional phase associated with Mesozoic to early Cenozoic subduction of the Farallon Plate and the East Pacific Rise (which separated the Pacific Plate to the west and the Farallon Plate to the East) under North America. Ultimately the Pacific and the North American plates shared a boundary. With the complete subduction of the Farallon Plate and the East Pacific Rise in the mid-Cenozoic, a transition occurred from compressional to extensional tectonics as relative motion off the coast of North America changed to transcurrent motion along the San Andreas Fault (in this case, a roughly north-south slippage).

The compressional deformation stage occurred as two distinct types that involved different parts of the Earth's crust. The first phase occurred between 150mya and 80mya in the western parts of the North American plate where the lithosphere (the upper 100 km of the Earth—derived from the Greek *lithos* meaning stone) was sufficiently weak. This deformation is called the Sevier Orogeny (from "orogenesis" or mountain building) and is called "thin-skinned" in the sense that the deformation involved only the upper-most layers (less than 10 km) of the Earth's surface. The characteristic style of this deformation phase was folding and thrusting of the underlying, older sedimentary rocks from west to east along steep westward dipping thrust faults. The Sevier thrust faulting formed a large mountain system of north-south trending topography that has subsequently collapsed due to the weakness of the lithosphere in this region. Many Sevier-related features are preserved in the faulted Basin and Range sequences in the Sky Islands, and are especially well exposed in the Canelo Hills and the mountains immediately southwest of Juarez, Mexico.

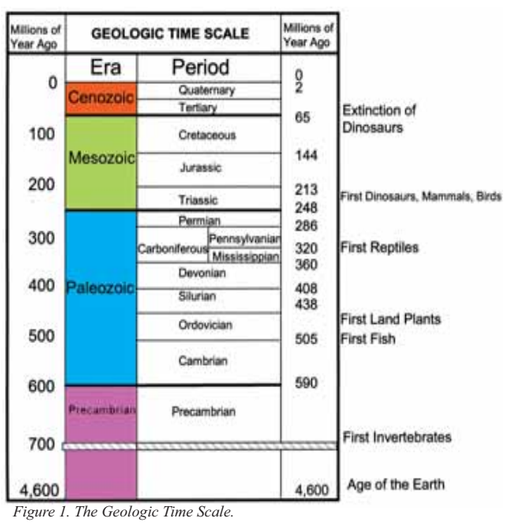


Figure 1. The Geologic Time Scale.

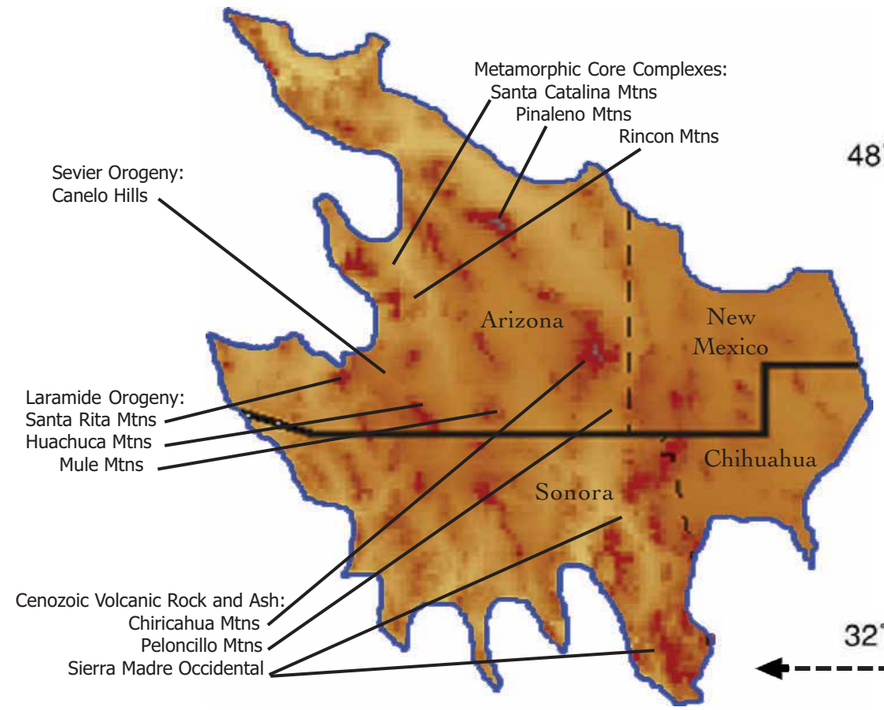


Figure 3. A selection of geologic features within the Sky Island region

As this crustal squeezing progressed further east during the Late Cretaceous and Early Cenozoic into stronger parts of the North American plate, its character changed to involve deeper parts of the crust. This second deformational phase is known as the Laramide Orogeny and is characterized by uplifted blocks of crust that include the sedimentary rocks of the first stage and the underlying older igneous and metamorphic rocks that make up the core or basement of the continental crust. The copper ores mined in and around the Sky Island region (e.g., in Morenci and Silver City) were produced in this event. Many Laramide structures are preserved in the Santa Rita, Whetstone, Dragoon, Huachuca, and Mule Mountains.

Active Cenozoic volcanoes in the region added to the diversity of our bedrock and topography, particularly around 30mya. The Chiricahuas, Peloncillos, and Sierra Madre Occidental are all piles of volcanic rock and ash that formed during this volcanic heyday. The Chiricahuas are in fact a collapsed caldera, whose eruptions spread igneous rock throughout the area, including a solidified hot ash flow called tuff. The fantastic rock spires and hoodoos of Chiricahua National Monument formed from the erosion of this welded tuff. Western volcanic activity has died off since 10mya, especially in our southern basin and range region.

While these periods of deformation and volcanism laid an impressive diversity of bedrock types across the area we now call the Sky Island region, it was later "basin-and-range block faulting" that broke, lifted, and dropped these rock layers to create the region's characteristic topography of isolated mountain ranges surrounded by low valleys. As the North American Plate overrode the East Pacific Rise about 30mya, the West's tectonics changed from subduction-related compression to strike-slip motion along the San Andreas fault system. Topography that had been elevated during the earlier compressional events began to collapse under its own weight, causing a period of crustal extension that continues in many parts of the Western US today. Rock layers compensated for the region's stretching by breaking up along faults. Some blocks "rose" while adjacent areas "dropped". Those that rose formed fault block mountain ranges while those that dropped formed the bottoms of intervening basins or valleys. These valleys have since been partially filled by rocks and soils eroding off their raised counterparts. Basin-and-range block faulting was most active between 13mya and 6mya.

This period of crustal extension caused basin-and-range block faulting from southern Oregon to northern Mexico, but in few places outside of our Sky Island region did it produce such a dynamic mix of rock and soil types. Here, adjacent mountain ranges may be composed of rocks formed hundreds of millions of years apart, thanks to the diverse raw material provided by earlier successive waves of deformation and volcanism. This extension also produced a series of unique mountains known as "metamorphic core complexes" (e.g., the Rincon, Santa Catalina, and Pinalenos mountains) in which mid-crustal metamorphic rocks have been exhumed from depths of more the ten kilometers and are now exposed at the surface. In addition, the tectonic stresses related to the transcurrent motion between the Pacific and North American Plates affect the lithosphere many hundreds of kilometers inland and are primarily responsible for the NW-SE orientation of the tectonic fabric through the Sky Islands.

Contemplating the role of deep-time geologic processes provides a way to view the Sky Islands from a new perspective. The origin of the character and composition of the mountains can be traced to plate tectonic movements and mountain building processes that affected whole continents and acted over hundreds of millions of years. The influence of these events on the bedrock composition, the topographic fabric of the mountain ranges, and the heterogeneous mixture of soils is profound and is an important contributor to the relatively high biodiversity of the region. Thus, the complex tectonic and geologic history of the region should be added to the list of factors that make the Sky Islands unique. Food for thought as we climb over the rocks on our way to the mountain tops.

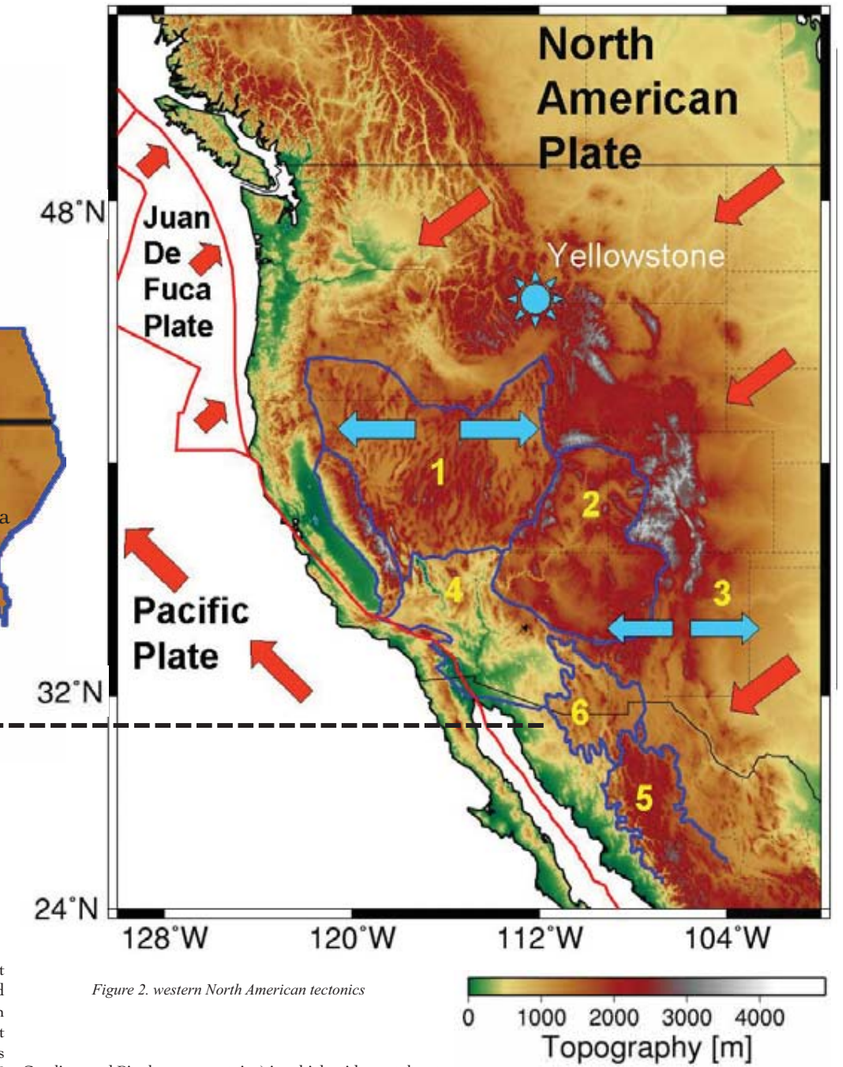


Figure 2. western North American tectonics

Road Rattlings

by Trevor Hare, SIA Conservation Biologist

I had not heard from the snake in more than two weeks. This one had never wandered far—just out to Oracle Road where she hung out in the landscaping of a dentist's office for a week or so. I had always been able to pick up her signal, until now. Four days of searching in ever-widening circles from the center of my study site had proved fruitless. New roads, housing, and commercial developments were limiting where I could search. I had checked the neighborhoods as far south as CDO High School and west to Sun City Vistoso, as well as east across Oracle and up toward the National Forest boundary. So I returned to the scene of the crime, my study site–now covered by three to six feet of new dirt, dissected by sewer and electrical ditches, and peppered with footers for sidewalks and driveways. This site was number four of my original eight study sites, and at one point was undisturbed desert with a small beautiful remnant mesquite bosque and patches of sacaton grass. I spent many an enjoyable hour tramping around this area, watching one of the resident Gila monsters motor around, saying "Hi" to my amigo the badger who had eaten the first radioed snake I had relocated to this site. Now it was a wasteland destined to be another ugly stucco housing development in Oro Valley. As I stood directly above where I thought the favorite burrow of the snake was, I picked up a very faint beeping from my telemetry receiver. It was then that I realized why I had not been able to find the snake; it was buried five feet below me!

Fast-forward 13 years; I am sitting on a creek watching a little turtle forage. In the deep mud of a clear pool the turtle is eating whatever turtles eat and doing other things only turtles know about. I am contemplating road closures in the area to protect this creek and its amazing abundance of critters. The rare Mexican garter snake calls this place home, along with native fish, the southwestern willow flycatcher, the Chiricahua leopard frog and an old favorite of fans of the Three Stooges—the western yellow-billed cuckoo (Nyuk Nyuk Nyuk!). The very last time our buddy Mike hiked down here he saw a mountain lion.

My peace is shattered by an irritating buzz from the north. I recognize the sound, and can imagine scurrying little creatures fleeing the wide knobby wheels and belching smoke of the ORVs. Then the buzz stops. Suddenly a dizzying din of destruction rises from the creek corridor. As I walk north along the creek I hope what I thought I heard was just my imagination. As I turn the bend toward the middle of the five creek crossings we want to decommission and rehabilitate, I can smell gasoline and oil smoke. My worst fears are realized. Mud-bogging in the desert! Clumps of deer grass and willow saplings are chewed up and spit aside; large new gashes on the banks bleed soil into the water; Bud Light cans litter the area; and two used diapers are floating in the now-dirty water.

Only one of my old study sites has not been obliterated by wall-to-wall stucco, though it, too, has changed. Now it sits within a neighborhood under Pusch Ridge with half-million-dollar houses on giant lots, tons of open space and the Coronado National Forest as the nearest neighbor. Lots of other things have changed also: Bighorn sheep are gone from Pusch Ridge; Oro Valley and the rest of the Tucson Basin has grown at an alarming pace; and the focus of my work has changed from venomous animals in suburbanizing areas to roads, riparian areas, and wildlife of the Sky Islands.

Not only is Tucson losing open-space faster than you can say "pygmy owl," a lot of the people who are buying into the sprawling stucco shacks are also buying into the idea that visiting their wildlands on foot is too hard or not fun enough and that criss-crossing them on an ORV is great, brought on of course by TV advertising and shiny magazines. Nothing could be further from the truth. I have seen the proliferation of ORV sales and the damage to wildlands. I have been witness to the substitution of technology for outdoorsmanship, of horsepower for brainpower, and of speed for vision.

A tired crew of roadripping volunteers enjoys an evening together in the Las Cienegas National Conservation Area

An illegal road crosses Cienega Creek.

So once again we will march out and close roads, we will rehabilitate road beds, we will plant and sow native plants and animals, and we will walk and advocate with science and data and pictures and maps of roads and roadless areas, riparian areas, Wilderness Areas, corridors, and landscape linkages. First, though, we will re-close a road that was closed and rehabilitated over two weekends in March and then was compromised in early April. Whoever broke through the closures was highly motivated, but so are we, and by the time you read this we will have strengthened the original closure and repaired some of the damage.

Since the last newsletter we have been extremely busy preparing for the Madrean Archipelago II Conference in May and with our involvement in the National Forest Service Off-Road Vehicle Policy Reform Campaign (see page four). We have also hiked through the western Mule Mountains adjacent to the San Pedro Riparian National Conservation Area, where we found areas well worth protecting with dedicated neighbors and many wildland roads being reclaimed by the desert streams they cross. We closed and rehabilitated two road segments that crossed through the Narrows area of Cienega Creek on the Las Cienegas National Conservation Area. One of these segments is apparently a major smuggling route (the only other access north to I-10 is the Sonoita Highway). The other was just a short segment in the actual Narrows that served no purpose except to cross Cienega Creek three times. Then in early April we had to cancel a Riparian Inventory weekend in the San Rafael Valley due to snow! But we will get back out there in the beginning of June, once snow dangers have passed (heh heh).

By the end of June heat will rule the desert but not the Sky Islands. The top of the Pinaleno Mountains will be the scene of a road-monitoring week and cool, cool coolness. This will follow-up on road inventory work done on the infamous rain trip in 1999. That rain would be hard to match, although we are starting the trip on *Dia de San Juan*, the real official start of the monsoons. In July we are expecting (hoping for, praying for) rain! We will go meet the rain in the Peloncillo Mountains for research projects that Sky Island Alliance is involved in. In August we will have a San Rafael Valley Riparian Inventory weekend and another visit to the Peloncillos. And in September and October we hope to be out closing BLM and National Forest roads again, plus visiting new wildlands on state lands, continuing the inventory of the San Rafael Valley, and of course a Memorial Day weekend trip to the Chiricahua Mountains where we will hike and splash, chase snakes and bears, and look at wilderness boundaries! In October we will have an exploratory weekend to a water wonderland and a San Rafael Valley Riparian Inventory weekend. See you there!

Same site after road closure and restoration

Wildlife Monitoring: Search Image for Change

by Janice Przybyl, SIA Wildlife Monitoring Program Coordinator

Change: alteration variation modification or the result thereof. How appropriate that "change" is the chosen theme for this newsletter, because change is the impetus that drives Sky Island Alliance. We try to affect positive change in the political and social arenas in order to mitigate negative changes done to the landscape and to the flora and fauna of the Sky Island region. One way to spur on change is to foster shifts in people's perception of the natural world by providing opportunities to experience and explore that world. New experiences can transform our thinking just slightly enough that we can look at the world and ourselves with better understanding.

Sky Island Alliance's Wildlife Monitoring Program

trains and mobilizes volunteers to collect data on wildlife presence between the mountain ranges of the Sky Island ecoregion. These "grassroots naturalists" conduct track surveys along pre-established transects. We are particularly concerned with the movement of four large, wide-ranging mammals: black bear, mountain lion, jaguar, and Mexican gray wolf and two smaller mammal species, bobcat and coati. Sky Island Alliance's long-term vision is to use data to advocate for protection of wildlife corridors threatened by human development of open spaces. If you are interested in volunteering, contact Janice Przybyl at janice@skyislandalliance.org or call 520-624-7080 x203.

Sky Island Alliance's Wildlife Monitoring program provides such opportunities for volunteers to view the world in a new light. During an intensive five-day training workshop, experienced wildlife trackers teach volunteers how and where to look for animal sign. By combing knowledge of wildlife ecology and behavior with tracking techniques, we help new trackers develop a "search image," which is a new way of looking at and understanding the immediate environment and the subtle changes on its surface. After the workshop, volunteers often comment on the development of their powers of observation. Their search for tracks transforms into a heightened awareness of the presence of wildlife. Just as birdwatchers become more attuned to flitterings and chitterings in trees, to flashes of light off a wing, and become more observant of color and movement patterns, so do trackers become more attentive to the messages left behind by wild critters moving across the land. To patterns of stride and straddle. To the overall shape of a track. To the clues in a track that announce: a canine left this track, or this track was left by a feline.

The large carnivores, whose tracks we search, are few and elusive (see sidebar). These mammals are rarely seen in the wild, so it is exciting to confirm their presence by finding their tracks. We wonder: when did this mountain lion walk by this oak tree? Was it days before? Hours? Minutes? Either way, she was here and that mere fact is what we desire to know and document.

During the workshop, volunteers also learn about the biological need for large mammals to move between the Sky Island mountain ranges. As volunteers collect tracking data on the presence or absence of these critters, the fact that the Sky Island landscape is becoming impermeable to that movement becomes increasingly apparent. Volunteers' perception of the landscape shifts and their relationship to the land evolves. By going out into the field every six weeks to collect data on wildlife, volunteers build a connection to the land and the wildlife they survey. It is an empowering process of exploration and discovery that encourages volunteers to become better conservation advocates. It is a process of change.

photo by Janice Przybyl

Jack Childs shows volunteers how to read a track.

PARA-Protect Arizona's Roadless Areas

Hikers enjoy one of Mount Graham's high-elevation roadless areas.

by Caroline "Frog" Tinker, SIA Roadless Rule Campaign Organizer

Today, Arizona's remaining National Forest Roadless Areas are threatened by the Bush administration's eagerness to promote special interests over resource protection. Sky Island Alliance invites you to join our newest coalition launch, PARA—Protect Arizona's Roadless Areas, to send a strong message to Governor Napolitano and President Bush that Arizona still supports the protection of our remaining roadless areas.

One way to protect these roadless areas is to uphold the National Forest Roadless Conservation Rule, a landmark policy enacted in 2001 to protect 58.5 million acres of roadless areas in our national forests, including 1,174,000 acres in Arizona. The protection afforded in 2001 ensured that our State's premium wildlife habitat, important watersheds, and exceptional recreational opportunities would remain for future generations.

Thanks to you and millions of other Americans who took time to send in comments, the National Forest Roadless Area Conservation Rule was signed into law in January 2001. This rule enjoyed widespread support in Arizona (more than 19,000 Arizonans commented in support of Roadless protection), and is the most widely supported federal rule in US history. Despite this, the Bush administration is trying yet again to strip these important protections from our Forests.

The Bush administration has temporarily excluded America's largest national forest, Alaska's Tongass Rainforest, from the rule. Now they want to make that exemption permanent, and open up our last wildlands throughout the country by allowing governors of the lower 48 states to seek exemptions for forests in their states. PARA looks to build a groundswell of support in Arizona so that Governor Napolitano has the mandate and needed support to say "Yes" to protecting roadless areas.

We must tell the Forest Service, Governor Napolitano, and the Bush administration that we're still watching, and we still care.

Sky Island Alliance invites you to join our coalition, PARA—Protect Arizona's Roadless Areas, to send a strong message to Governor Napolitano and President Bush that Arizona still supports the protection of our remaining roadless areas. Please join us in our efforts to ensure the Bush administration enforces the Roadless Area Conservation Rule as it was issued in January 2001.

Now is the time to act. Please send us an email or letter with your full name and address signaling your commitment to act. We will add your name to a growing list of supporters of roadless protection and send this list to our Governor.

Please let us know if you have questions, would like more information, or *would like to volunteer*. You may reach us at 520-624-7080 or roadless@skyislandalliance.org.

A Fine Mess for the Heart and Mind

by Ann Wendland, SIA volunteer

I've noticed a change recently: People are having a lot of trouble defining what a weed is. Academicians vie over whether weedy species should be called "nonnatives" or "invasive exotics." Pedigrees matter: Grasses imported from Russia in the 1950s are certainly weeds, but what about plants that came with the Spaniards centuries ago? Back when I was a kid in the '70s, it was simple. Nonnative or native, a weed was anything that someone forgot to mow.

Put another way, the attitude was even more sinister: Any place nobody mowed was a weed patch, good for dumping.

To the people I grew up around in Detroit's pretty new suburbs, 'open space' was an embarrassment. Mowing was next to godliness. Nearly everyone lived in subdivisions with white curbs dividing brilliant turf from pure black asphalt. Men double-mowed their lawns in diamond patterns. Women scrubbed the driveways. We told jokes about Jesus and St. Peter on the golf course.

I don't think it was much different in Tucson. Bike through those neighborhoods of '50s and '70s ranch houses on the east side: forty square miles of raked kitty litter with Bermuda grass still making runs on the drip lines. Brick collars on palm trees. I've lived in a dozen towns now, in six states, and each bears some level of witness to this culture of taming, order, and a certain idea of prettiness.

At the time, nature outside of local (mowed) picnic areas and national parks was messy, ugly, and especially undesirable close to home. Even the national parks comforted visitors with neat suburban arrays of single-family campsites, each with its driveway, grill, and tent pad outlined with two by fours.

People dumped appliances, mattresses, and cars on the woodlots and fields where I grew up. Despite the surprising discoveries this could bring—once, I found a city of mice thriving in an oven—the dumping made the status of unmowed places abundantly clear.

A sure sign of hard times, tall plants grew rampant on vacant lots and abandoned farms and down by the train tracks. The 'weed patches' seemed disorderly, noisy, exuberant, and luxurious—Queen Ann's lace and goldenrod shot up through grasses that I sometimes had to part with my arms just to get through. Mucky patches of cattails and willow choked low places, raucous with red-winged blackbirds and frogs. During the spring rains, creeks spilled out of these marshes and along the railroad ditches down to Paint Creek, an apparition of brown foamy riffles on a bed studded with broken glass and tires.

Now, Paint Creek has public approval. It has its own nature center, and the creek runs clear through a linear, unmowed park that expands at intervals to include forested preserves. The old rail bed that runs alongside the creek, once the only place in town that I was scared to walk, now bustles with joggers and families. This bizarre reversal is happening everywhere, so fast that land management agencies can't keep up (think Sabino Canyon).

Untamed nature is suddenly desirable, especially close to home. I've just moved to Colorado's Front Range, where developers cram houses together along the edges of preserved open space to cash in on the valuable view of what used to be considered weed patches. Mowing is out, and native landscaping is in. In Tucson, couples walk their wolf hybrids in the Catalina foothills. Realtors advertise "sanctuary" and "preserve" settings and foothills houses sell for a premium.

Most of the dozen counties I've lived in now have a public office and at least one private, nonprofit organization dedicated to preserving local open space and wildlife corridors.

What happened? Did environmentalists change our culture? I never even met an environmentalist until I moved to the state of Washington at age 18, or so I thought. I remember hearing about environmentalists on National Public Radio as a kid. I didn't understand the conflict, and asked my father, "Why don't they just save all the pretty places? We can use the rest." This from a child who was teased daily for being ugly. The irony was lost on me. I thought that environmentalists just cared about pristine wilderness and national treasures, and I didn't recognize the possibility of being an environmentalist right at home, in a messy, "ugly" place.

We had one in town, an environmentalist. I didn't see her that way until years later though. Her name was Evelyn Boss, and she taught biology at my high school. She inspired students to create a biology club, and within a few weeks, strange things started happening. At the very center of the high school was an outdoor smoking lounge—a square of cracked asphalt holding up a couple of orange plastic chairs. Since several hallways had huge windows onto it, few people ever ventured out there to be watched while they smoked. But one afternoon, the biology club met there with jackhammers and picks. They had the asphalt piled up and carted off within a couple of days, and then they started digging in the dirt. Pretty soon, they had a small upland and a pond formed. They planted grasses, forbs, flowering shrubs, small trees, and lanky rushes and sedges down by the pond. A weed patch, right there in the middle of the high school! Dragonflies and ducks moved in.

The miniature ecosystem persisted for more than a decade, despite the complaints of some parents—people of the lawn generations. They found it, no surprise here, weedy, messy, and embarrassing. They almost won once, but Evelyn and the biology club fought them off. In the late '90s, though, Evelyn fell deathly ill and spent more than a year away from work. On her recovery, she discovered that the school had quietly cemented in the ecosystem and turned it into a science classroom with no lab.

Maybe people like Evelyn, local hardworking environmentalists, changed our culture to the point that everyone wants to live in contact with wild nature. I don't know how such a change came about so fast—whether it came from faddishness, limited supply bumping up demand, or even a real desire for relief from ourselves and connection with other species. Whatever the cause, the new affinity for local nature, for backyard habitats, butterfly gardens, natural river parks, preserved open spaces and wildlife corridors, may be the best change I've experienced in my lifetime.

That people bicker about definitions and relative weediness and restoration and natural history on a species by species basis is a darned good sign. If we don't work to figure it out at home, we're never going to get it right anywhere else.

Our new public affection for wildness comes with some challenges. Coyotes beg at foothills intersections. Wildfires sweep into those expensive gated communities on the fringes of Western cities. Bobcats and mountain lions make grocery runs into town.

And the problem appears in reverse—not only are unexpected animals appearing in our backyards, but also unexpected humans are building in places that animals and plants previously had to themselves. Rural populations are actually rising throughout the United States. When we move in, the whole local population balance changes, with edge species and invasive species booming and longstanding natives in mortal danger.

I'm hoping against hope that the trend of interest in local nature reveals a larger desire to understand and live inside nature, to live with other species. Maybe we finally want to live somewhere messy and complex. But if that's the case, we're vastly unprepared in knowledge and in spirit. Of course, that's never stopped people before.

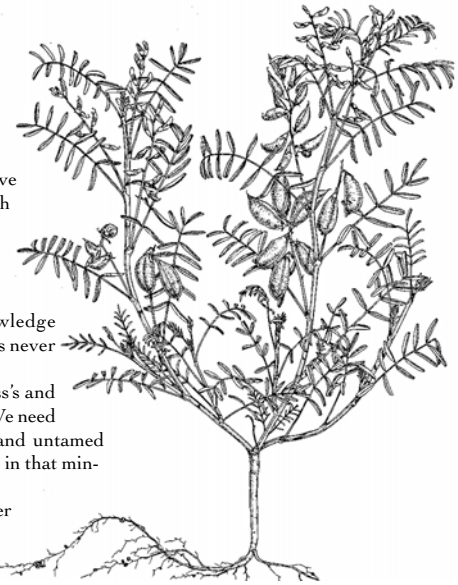
We need more Evelyn Boss's and others with her inspiration. We need the lessons about wildness and untamed life that she could teach even in that miniature ecosystem.

I was so excited to discover something different in Sky Island Alliance when I moved to Tucson. I'd seen an increasing share of pale environmentalists—we who love wildness, but gradually turn to the urban offices of agencies and nonprofits out of financial need and a desire to do good in an era of fast-paced developments and huge publicity battles.

The Sky Island Alliance staff and volunteers actually appeared to be robust, lighthearted, smart people who camp and walk around in the woods and grasslands on a weekly basis. Even better, they were up to something great out there.

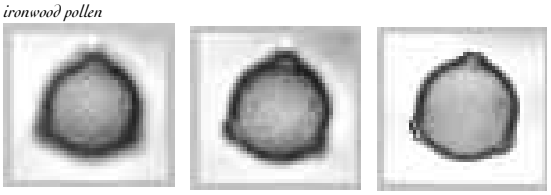
Sky Island Alliance is right on the pulse of personal connection to living with the wild—bringing people outside; kindling curiosity; and teaching scientific, systematic, and reliable observation skills. They're connecting the dots, working on open space on a regional level, training and using citizen scientists to find out which corridors get the most use by target species. The wildlife tracking program, for example, produces real data with strong credibility, as does the road inventory program. The road closure program, which shuts down and revegetates illegal roads, is just as heroic as it is fun. The overall idea of actively engaging people's minds and hearts with the ecosystem they live in is fundamental.

This idea we have of living with nature could work to the extent that "nature" loses its abstraction in our minds. Sky Island Alliance is out there working on the terms of our new alliances with individual species, figuring out ways to restore connections for them and for us. The more we know about each species, the physical processes like fire and flood, and how they all work together, the more likely we are to get it right. And then we get to live here in the middle of a messy, noisy, wild, and heavenly Earth.



an Arizona locoweed

ironwood pollen



San Pedro River

Vermillion flycatchers drop feathers
on the muddy banks; a little red

sticking to the brown. If only
our deaths could achieve something

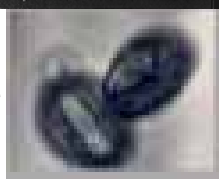
like fossils. But this would require
drowning in silt.

Add this to the world.
How long until we return to water,

sprout feathers, spin
silk from our spit? Wherever

we are going, our bodies walk
ahead of us –

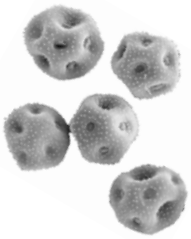
~Susanna Mishler



MEMORY OF FLIGHT AND WATER

Do you remember the smell of the river,
and the hawk searching for dominance as it swept
over the cactus?
Now the river is dry and the willows
are dust and insects.
The Great Sonoran Desert
like a bowl of earth
sends its messengers out over the air –
most often, they come back carved into pieces of
wood
and sold.

~Wendy Burke



from *Mind Poems*

beside our tent
in the dry riverbed
deer stand in silence

everything waits
for morning

I would like to say I could gauge the strength of night.
I would like to say my mind is clear.

***

the desert at night creates itself each world is new

no reason outside of mind

~Eric Magrane

microscopic pollen grains: black willow

various desert pollens, under scanning electron microscope

Ancient Cypress a Once-Mighty Sovereign

by Kathy Pitts, Special to *Restoring Connections*

One of Earth's elders struggles to survive. Somewhere in the Santa Catalina Mountains is a grand old cypress. At 93 feet tall and with a 240-inch girth, it is the largest *Cupressus arizonica var. arizonica* ever recorded.[1] We can't know how old the Catalina champ is without cutting it down, but they don't seem to live more than about 700 years. A 1980 study of cypress in southeastern Arizona showed an age range from 25 to about 450 years old.

Still, the cypress is an ancient tree, a survivor.

Conifers, including cypresses, predate the age of the dinosaurs by several *hundred* million years, members of the family of gymnosperms that developed out of the swampy fern forests of the Devonian period.

Gymnosperm describes their "naked seed," which made them less reliant on water for reproduction. Luckily for them, as the Earth's crustal plates began crashing together to form the supercontinent Pangaea with its dry interior.

The Permian was a heady time for conifers. The climate was cool. Mountains were built. Reptiles made a big appearance. Modern cypresses emerged. For, oh, 100 million years, great forests of mixed conifers stretched across the land.

Then came the angiosperms, the flowering plants that appeared early in the Cretaceous period and dominated the world's flora by the end of it. Usually insect-pollinated, angiosperms often offer fruit in exchange for carrying off seed, leading to their wide dispersal. Think blackberry. Think peach. Think squash blossom. Most cones, on the other hand, just fall from a tree.

Still, the cypresses and firs and spruce hung in there. The earth warmed; the earth cooled. There was more rain or less. Populations advanced and receded across the land through ice ages and neoglacial periods and medieval warm spells.

But attrition has been hard on the Arizona cypress. Remnant groves hide out in mid-elevation pockets of evergreens and chaparral, while widely estranged populations have developed into varieties considered by some to be separate species. One reference says of them, "Their distribution is limited by tolerances to climatic parameters, competition with more contemporary species, and in some cases disease.

"These communities appear at an evolutionary end."[2]

Ironically, Arizona cypress is now commonly cultivated for suburban landscaping and may be more widespread as a horticultural species than it remains in the wild.

Described as "useful for quick windbreaks,"[3] the cypress has small, scale-like leaves, round little cones like miniature brown soccer balls, and fibrous, shreddy bark. It usually grows 40 to 50 feet tall, with a diameter of two to three feet, but can get bigger as is the case with our champion tree.

Wind-pollinated, it reproduces from the 50 to 100 seeds held in the closed cones, which persist on the tree until opened by age or fire. Seeds remain viable until moisture initiates germination.

The Arizona cypress does have one little advantage over adjacent plant communities: it more readily germinates in the bare mineral soil left by fire and survives in dry sites that often defeat broad-leaf trees.

In fact, fire is a two-edged sword for cypress. Heat opens the cones, the resin melts and boils, then the tough woody plates char enough to leave many seeds unburned. In fact, "thickets of seedlings" are often produced after fires. Yet fire is usually kills cypresses less than four inches in diameter and often fatal to larger trees as well.

"Fire," says one source, "plays a necessary but delicately balanced role in cypress life history. Too frequent fires can destroy a grove, but elimination of fire may lead to its extinction."[4]

Back to our Big Tree. Few seem to know where it is and none whether it survived the summer fires of 2003. Heidi Schewel, horticulturalist with the Santa Catalina District, Coronado National Forest, thought the Big Tree was probably in Bear Canyon, which experienced low-intensity fire.

I'd like to think the old giant got lucky and is sprouting a thicket.

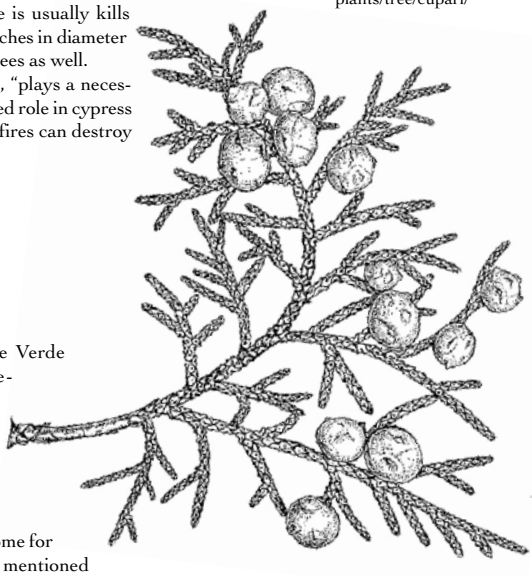
Citations:

[1] American Forests National Register of Big Trees, online at www.americanforests.org/resources/bigtrees/

[2] Brown, David, ed. *Biotic Communities: Southwestern United States and Northwestern Mexico*, University of Utah, 1994

[3] *Sunset Western Garden Book*, 1995, Sunset Publishing Corp., Menlo Park, Cal.

[4] Sullivan, Janet. 1993. *Cupressus arizonica*. In: Fire Effects Information System, U.S.D.A. Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Online at www.fs.fed.us/database/feis/plants/tree/cupari/



Time Flows By: Reflections of a Tucson Eastside Desert Rat

by Camille Kershner, SIA office assistant

It has been a little more than 10 years since I was forced to learn the intricacies involved in a four-way stop. The traffic light at the inter section of Houghton and Tanque Verde Road and the developments at Houghton and Broadway sprang into existence while I was away attending college at Northern Arizona University. These stand out in my mind as physical manifestations of "then" versus "now".

As Thomas Wolfe once said, "You can't go home again." At first glance, you arrive back in town, and things seem to be the same. After a closer look, you begin to notice the housing complexes and strip malls lining the roads where you used to see desert vegetation as a child. What a difference even 10 years of small changes can make; living with it daily, you might not even notice, but try visiting your old haunts of 20 years ago and see if your memories match what stands there today.

My best friend Jenny and I weren't technically next-door neighbors when my family moved in about 20 years ago. It was a good two-minute walk between our houses (somehow seeming even longer in the dark), but we were lucky enough that both our back yards backed onto the same corner of an undeveloped 40 acres of desert. We spent our elementary school days building "forts" consisting primarily of a mesquite tree, under which we would sweep out the leaf litter with our hands. Sometimes we would bring a roll of toilet paper inside a ziplock bag, and if we were really ambitious, we'd even dig a hole to keep it in! There was also a small wash that occasionally we would try, unsuccessfully, to dam, but usually we just played in the dry sand. I distinctly remember a family picnic along one curve of the wash, where my youngest brother, now exiting his first year at the University of Arizona, was safe in his "johnnie jump-up" swing hanging from a high mesquite branch. Meanwhile, I encountered a piece of teddy-bear cholla that started out on my leg, vaulted the two sticks my mom had as tweezers to land on her arm, and then jumped to her leg, before finally being quelled beneath a rock.

My family moved a few miles further east as I was leaving junior high, and though that house didn't have a pool like our last one, the Tanque Verde Wash was just a five-minute walk down the street. Not only was there water in this wash, it was there long enough for us to actually splash around in!

One day when I was home for winter break, my mother mentioned to me that a subdivision was being built-in "our" old back yard! I drove out to have a look, and could hardly believe that after entering through the gate that had been installed next to our old mailbox, I was driving on an actual street taking me past what would soon be clusters of houses. Between the maze of paved road and some cleared lots, I was barely able to recognize my childhood playground, let alone locate those particular spots that remain so clearly etched into my mind.

A few weeks ago, I was baby-sitting for some friends on the Northwest side, when their six-year-old son went off with his friend to play in a concrete-lined drainage ditch that runs through their neighborhood. I was horrified to hear both he and his parents refer to it as "the wash", and promised myself to show them what a wash *really* was.

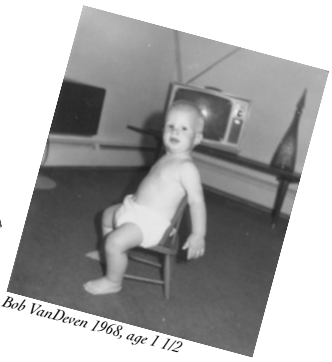
Jen and I still reminisce about the fun times we shared throughout our younger days, though she's based in Scottsdale and I now live "in town" (next to Amphi High School) after nearly 10 summers away from Arizona. I can only hope that when our children play together as we sit and chat about "old times", they have the opportunity do so in the midst of a healthy, living ecosystem, rather than a channelized skeleton.

Every day that I go to bed to the sounds of traffic, I am grateful for the chance to have grown up knowing that I prefer falling asleep to the howl of coyotes.

SIA Staff Timeline


Janice Przybyl 1959, age 3


David Hodges 1961, age 1


Bob VanDeven 1968, age 1 1/2


Trevor Hare 1969, age 7

Population of Sky Islands Region in the US*

469,859

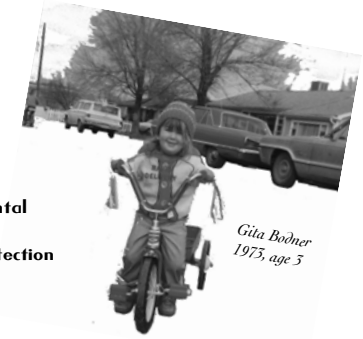
1960

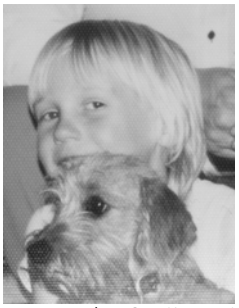
1961-Bay of Pigs invasion; Peace Corps formed

1964-Wilderness Act passed, Gila Wilderness is first to be designated

1968-Grand Canyon Dam plan defeated; Tet Offensive in Vietnam turns tide of public perception of war

1969 - National Environmental Policy Act passed, Environmental Protection Agency established


Gita Bodner 1973, age 3

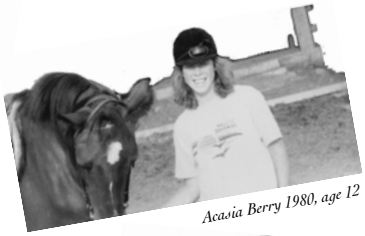

Bethany Gray 1977, age 6

1970 581,852


Dug Schoellkopf 1967, age 4

1973-Endangered Species Act passed

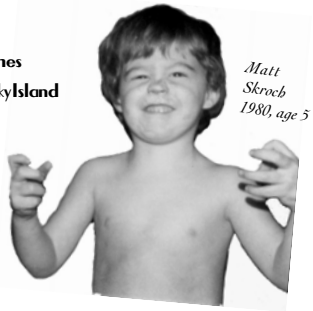
1976-National Forest Mgmt. Act and Federal Lands Policy Mgmt. Act passed


Acasia Berry 1980, age 12

1980 839,774


Caroline "Frog" Tinker 1980, age 4

1980-NM Wilderness Bill establishes National Forest Wilderness Areas in Sky Island region


Matt Skroch 1980, age 5

1984-Arizona Wilderness Act passed, establishing several Wilderness Areas in the region.

1987-AWC Wilderness proposed

1990 1,043,312

1990-AZ Desert Wilderness Act established BLM Wilderness Areas


Cory Jones (left) 1982, age 7


Camille Kersbner (left) 1986, age 7

1991-Sky Island Alliance forms in response to Islands in the Sky National Recreation Area (ISNRA) proposed by Forest Service

1992-ISNRA defeated

1994-First Madrean Archipelago Conference

2000 1,313,441

2000

* Includes Cochise, Graham, Greenlee, Pima, and Santa Cruz counties in Arizona, and Catron, Doña Ana, Hidalgo, Grant, Luna, and Sierra counties in New Mexico. US Census data.

Ecosystem Management in the Madrean Archipelago

by Leonard DeBano and Peter Ffolliott, University of Arizona School of Natural Resources

The concept of ecosystem management is not new, but its role as a central theme of natural resources management gained renewed interest and greater emphasis in the early 1990s. The USDA Forest Service and others initiated a variety of ecosystem programs throughout the western United States in response to this interest and emphasis. As part of this effort the Rocky Mountain Research Station of the USDA Forest Service was awarded an ecosystem management grant to conduct research within the Southwestern Borderlands region. The objective was to achieve responsible ecosystem management through coordinated research and management partnerships involving the public and private sectors. Much of the information gained from this project would then be extrapolated to the larger Madrean Archipelago ("Sky Islands") region, an area characterized by isolated mountains, separated by "seas" of desert shrubs and grasslands.

Management is guided by "desired future conditions," on-the-ground conditions that managers think are ideal for a particular area. Ecosystem management uses scientific approaches to decide what those desired future conditions should be, and to steer management towards achieving them. The more scientific information there is about an area, the better ecosystem management works.

The goals of this project were to (1) provide a scientific basis to establish desired future conditions for the region based on integration of the highest quality biological and physical science with desired future social and economic conditions in the context of public and private partnerships; and (2) integrate a long-term program of research efforts with on-going activities of other management agencies and not-for-profit private organizations and to combine past and future research findings into management while developing guidelines for sustaining a variable rural economy and open landscapes.

The first challenge was to assemble and review the existing body of scientific knowledge pertaining to the Madrean Archipelago. A large amount of research-based information on the biological, physical, and social dimensions had been generated in the past, but needed to be thoroughly collated in order to analyze it in an integrated manner. Bringing this information together and making it available to the project's participants and others involved two approaches: (1) organizing a conference where local and regional experts were asked to present materials relating to all aspects of the Madrean Archipelago region; and (2) entering into partnerships with knowledgeable investigators to synthesize information on topics with significant research and management planning applications.

This led to the first ever conference that focused on the "Madrean Archipelago" region. This conference, "Biodiversity and Management of the Madrean Archipelago: The Sky Islands of Southwestern United States and Northwestern Mexico," was held in Tucson, Arizona, on September 19-23, 1994. At the same time, participants began planning and implementing a long term, systematic program of basic and applied research endeavors to enhance ecosystem management in the Madrean Archipelago region. The Rocky Mountain Research Station (RMRS) initiated numerous studies on its own. More importantly, RMRS developed investigative partnerships with researchers and managers from other federal and state agencies, universities, conservation organizations, and independent investigators. The willing exchange of ideas and information among the collaborators in these efforts has been one of the major forces in the 10-year success of the project. Of particular note has been the close collaboration with the Coronado National Forest, the Natural Resources Conservation Service, the Bureau of Land Management, the Universities of Arizona, New Mexico, and Oklahoma and other organizations in the public sector. Private sector collaborators included the Malpai Borderlands Group, the Animas Foundation, The Nature Conservancy, the Desert Botanical Garden, and other not-for-profit organizations. Many of the accomplishments and contributions evolving from these partnerships will be presented at the upcoming conference on "Biodiversity and Management of the Madrean Archipelago II: Connecting Mountain Islands and Desert Seas," to be held in Tucson, Arizona, on May 11-15, 2004.

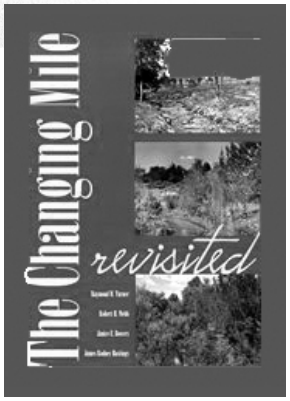
Our collective goal is effective, efficient, and responsible ecosystem management in the Madrean Archipelago region. The partnerships that have been forged among researchers, managers, ranchers, and environmentalists in tackling the challenges put forth in the early 1990s are largely responsible for the successes achieved to date in insuring diverse, healthy, and productive ecosystems. This decade of successes form a sound basis for continuing these collaborative investigations. We have every reason to believe that these partnerships and other collaborative efforts will also be sustained in the future, to the great benefit of the land and people of the region.

Book Notes

New vision: *The Changing Mile Revisited*

by Raymond Turner, Robert Webb, Janice Bowers, and James Hastings, Universi ty of Arizona Press 2003

review by Dennis Pepe, owner of Tucson's Green Fire Bookshop



The original *Changing Mile* book was published in 1965, and quickly a benchmark in ecological study. The authors matched photographs made throughout the Sonoran Desert region in the late 1800s and early 1900s with photographs of the same locations taken many decades later. *The Changing Mile Revisited* updates this classic work by adding recent photographs to the original pairs, providing another three decades of data and showing with even more clarity the extent of change across the landscape.

The Changing Mile Revisited describes itself as an ecological study of vegetation change over time in the lower mile of an arid and semiarid region. It truly is a study; this book is by no means a casual read. The first three chapters give an in-depth description of the natural forces that have shaped the deserts in and around the Sky Island region, including influences of American Indians, Spaniards, Mexicans, and finally Anglo-Americans.

The book then moves into its core, 295 photographs in 98 sets from camera stations throughout southern Arizona, Mexico's Pinacate region, and the coast of the Gulf of California. The addition of these new photographs adds three decades of data and demonstrate the prevalence of change in this seemingly changeless landscape. In readable, unbiased essays, the authors offer expert analysis of changes in the landscape and vegetation, based on the photographs in the book and nearly 200 additional triplicate sets of unpublished photographs.

Before reading the book, I though flipping through hundreds of photographs of what some would consider unspectacular scenery might grow tiresome. But having photographs taken over such a long period of time laced together with the expert analysis is almost like going on a desert hike with a plant ecologist, a hydrologist and a botanist. Their attention to detail in describing the changes we see makes each set of photographs interesting.

The final chapter on change and cause I found most interesting. The authors go into great detail in their analysis of selected plant species. The effects of various activities such as woodcutting, rodent and other animal activity and domestic livestock are analyzed, as are the effects of fire, climate change and urbanization. As you can guess, everything seems to have some impact. The authors provide a balanced perspective and acknowledge the complexity of the changes: "Unfortunately, because grazing and drought coincided toward the end of the nineteenth century, followed shortly by deliberate fire suppression at the beginning of the twentieth, it is virtually impossible to tease apart the changes that are due to natural causes-a drier and hotter climate-from those due to anthropological causes-livestock and fire suppression." They predict that certain ecosystem changes will prove to be reversible, especially in cases where population fluctuations are cyclic in nature. In other cases, "irreversible changes have occurred."

As the owner of a bookstore that specializes in books about the Southwest and nature, I am exposed to many hundreds of new titles every year and am very picky about what I add to my personal collection. The Changing Mile Revisited will be going home to my "carefully chosen few" book shelf. If you're interested in the ecology of the Sonoran Desert region this book is a crucial study tool. Not only will you have a clearer understanding of how our actions affect the land, you'll also have a much better understanding of the history of the region and the natural forces at play around us.

Thanks Y'all!

2003 Volunteers: Sky Island Alliance would like to thank the following individuals. Each of these volunteers donated time in the field. Without these folks Sky Island Alliance could not do such good work. Dan Brudno, Joe Cicero (again!), and Iris Rodden were our Co-Volunteers of the Year, donating more than 200 hours each! Thanks Dan, Joe, and Iris! And Thank You again to all our great volunteers: Chris Adams, Barry Andersen, Lori Andersen, Al Anderson, Art Arnold, Lindsay Arnold, Paul Bagley, April Baisan, Greta Balderrama, Kim Beck, Peter Bengtson, Acasia Berry, Dave Bilgray, Nick Bleser, Steve Bless, Gita Bodner, Samantha Bollinger, Curt Bradley, Dorita Brady, Tyler Brady, Archer Breon, Dan Brudno, Roberta Bruhn, Janay Brun, Samantha Brusky, Paul Burkhardt, Juan Caicedo, Joan Calcagno, Judy Calvert, George Carlisle, Kathy Carlson, Jo Ann Caruthers, Billie Casillas, Anna Mary Childs, Jack Childs, Dyna Chin, Trudy Christopher, Joe Cicero, Jen Clanahan, Matt Clark, Laurel Clarke, Mike Colbert, Mark Colby, Lisa Collis, Matt Colvin, Paul Condon, Steven Condon, Neva Connolly, Marybeth Dawson, Roy Dawson, Robert Demaagd, Tom Diaz, Lillian Diaz-Przybyl, Mary Diaz-Przybyl, Darry Dolan, John Douglas, Russell Duncan, Susan Eastman, David Eerkes, Joan Eerkes, Josh Ferris, Deena Fishbein, Sophia Fong, Julia Fonseca, Carolyn Fowler, Carol Fugagli, Mike Fugagli, Cara Gabor, Rochelle Gerratt, Tom Gibbons, Bud Gode, Wolfgang Golser, Anastasia Gorbunova, Grant Gourley, Wade Goyetche, April Green, Joanne Griffiths, Rich Griffiths, Lisa Haynes, Jeanmarie Haney, Robbie Hannawacker, Pam Hanover, Kevin Hansen, William Hansen, Barbara Hanson, Jonathan Hanson, Roseann Hanson, Cassidy Hare, Delaney Hare, Janet Hare, Zay Hartigan, Chris Hass, Lisa Haynes, Mike Headrick, Anna Hershberger, Greg Hess, Susan Hess, Gary Hinman, Matilde Holzwarth, Dana Hook, Michael Huckaby, Billie Hughes, Keith Hughes, Ron Hummel, Patricia Hux, Mike Iorio, Sky Jacobs, Matt Jaffe, Renee Janaway, Sally Johnsen, Chris Johnson, Cory Lee Jones, Jean-Paul Jorquera, Jennifer Katcher, Camille Kershner, Kenneth Kingsley, Rachel Kondor, Jane Kroesen, Bill Kurtz, Ellie Kurtz, Lisa Labita, Ed LaGrande, Kenneth Langton, Albert Lannon, Pam LeClair, Ann Lee, Lainie Levick, Jenny Lisignoli, Georgene Lockwood, Ben Lomeli, Beth Long, Lucy Magruder, Marshall Magruder, Robert Mann, Gene McCallister, Brad McRae, Kaitlin Meadows, Rinda Metz, Curvin Metzler, Amanda Moors, Sue Morse, Ken Mroczek, Aletris Neils, Jean Ossorio, Peter Ossorio, Elissa Ostergaard, Jennifer Pautler, Steve Pavlik, Penny Pederson, Marie-Claude Perigon, Serena Pickens, Carol Powell, Erin Pruett, Sally Quick, John Rawlins, Karina Readling, Judy Reed, Paul Reinhart, Joanne Roberts, Iris Rodden, Julia Rosen, Phil Rosen, Barbara Rosensimon, West Ruck, Tony Salandro, Dug Schoellkopf, Michael Scialadone, Nancy Seever, Leslie Sellgren, Harley Shaw, Alyssa Shiel, Chuck Shroll, Jon Shumaker, Xan Simonsun, Rhiwena Slack, Randy Smith, Denise Snow, Doug Snow, Judith Soward-Musick, Candan Soykan, Scott Sprague, Birdie Stabel, Virginia Stanek, Gene Steffen, Chris Stephenson, Patty Stern, Donna Stevens, Joe Stevens, Renell Stewart, Ron Stewart, Sandra Stone, Sheridan Stone, Jeri Storrs, Don Swann, Michael Terrio, Caroline "Frog"Tinker, Christina Tonelli, JD Trebec, Dale Turner, Chuck Tuzil, Bob Van Deven, Tim Van Devender, Elizabeth Venable, Sara Venturini, Robert Villa, Christine Volz, Dale Volz, Tiffany Volz, Vickie Warner, Cathy Waterman, Barbara Wellman, Bill Wellman, Ann Wendland, Patrick Willey, Alesha Williams, Kim Williams, Rick Williams, Natasha Winnik, Jason Wold, Yumiko Wold, Cynthia Wolf, and Jennifer Wolfsong.

Field Schedule Spring/Summer 2004

Please contact the Sky Island Alliance office at (520) 624-7080 or trevor@skyislandalliance.org if you are interested in any of the following events.

May 21st – 23rd. Aravaipa Canyon Wilderness Inventory Backpack. Join SIA in one of the most gorgeous areas of central Arizona. 2.5 hours from Tucson.

June 4th – 6th. Road Closure and Restoration Project on Las Cienegas National Conservation Area. Get your hands dirty and play a direct role in improving the ecological health of your public lands! 1 hour from Tucson.

June 4th – 6th. Annual Fort Huachuca Lion Track Count. This national, one of a kind event attracts premier wildlife biologists from around the country. This is a wonderful opportunity to learn more about tracking techniques, lion and bear natural histories. Space is limited and you must RSVP to Janice at janice@skyislandalliance.org.

June 11th – 13th. Riparian Inventory and Monitoring Weekend. San Rafael Valley. Join the Sky Island Alliance's Riparian Inventory/Monitoring Program in a project to assess the San Rafael Valley as a site for the conservation and management of our sensitive riparian fauna. 2 hours from Tucson.

June 24th (Thurs)– 28th (Mon). Pinaleno Mountains Roads Monitoring. Escape the heat! Celebrate freedom! Hike under the full moon! Climb to the top of the loftiest of the lofty! 2.5 hours from Tucson.

July 15th – 18th. Peloncillo Mountains Snake Research Project. If you are interested in volunteering please contact Trevor. There will be follow-up opportunities for this research project through the summer and early fall.

July 24th – 25th. Riparian Inventory and Monitoring Training Program. If you are interested in assessing riparian areas and looking for riparian animals contact Trevor for more information about this program.

August 13th – 15th. Riparian Inventory and Monitoring Weekend. San Rafael Valley. 2 hours from Tucson.

August 20th –22nd. Peloncillo Mountains Roads Inventory. The Peloncillos are the only Sky Island mountain range that stretches from Mexico to the Gila River! We will do a variety of work in the mountains and in the valley. 3 hours from Tucson.

September 3rd – 6th. Memorial Day in the Chiricahua Mountains. Join SIA as we revisit a favorite haunt! We will examine the boundaries of the existing Chiricahua Wilderness. Trogons! Ridge-nose rattlers! Coatis! 2.5 hours from Tucson.

September 24th – 26th. Road Closure Weekend. Get your hands dirty and play a direct role in improving the ecological health of your public lands! Contact Trevor for more info.

All of October – Sky Island Festival. Stay tuned!

October 8th – 10th. Needles Eye Wilderness Exploration. Join SIA in the Mescal Mountains! Three canyon segments enter the Gila River, with 1,000-foot walls known as the Needle's Eye. A deep, entangled riparian zone covers the narrow river channel. Several small slickrock canyons bisect the area. 3.5 hours from Tucson.

October 15th – 17th. Riparian Inventory and Monitoring Weekend. San Rafael Valley. 2 hours from Tucson.

Join Us
Sky Island Alliance

If you received this newsletter and it's time to renew your membership, please send in your check! If you are reading a friend's newsletter, consider joining us! We rely on members for our basic operations. Contributions are tax-deductible; we are a 501(c)3 organization.

Basic membership is only $25, but if you add a little to that, here's a sampling of what your dollars can do:

- $50 will help us survey 30 miles of roads.
- $75 will sponsor volunteer training workshops.
- $100 will close one mile of road.

Your Name _____

Address _____

City _____ State _____ Zip _____

Phone _____ E-Mail _____

Sky Island Alliance
P.O. 41165
Tucson, AZ 85717

Thank you!

Other Ways of Knowing:

Join us!

Sky Island Art show

Free public reception Thursday May 13

View art, meet presenters, socialize at cash bar

Tucson's Reid Park Doubletree Hotel 5:30-8pm

Become an SIA Program Fund Donor

Stories in recent newsletter issues have featuredprojects in our Rewilding Program: road inventory and restoration, wilderness work, wildlife monitoring, and ecosystem defense.

All the necessary road closures, tracking workshops, and wilderness advocacy gets done only with extra funding, so please consider a special donation to one of the following funds:

- Roads & Restoration,
- Wildlife Monitoring (Tracking),
- Missing Link,
- Wilderness, and
- Mexico—the Chihuahua Research Station in Janos, and the Jaguar Program in Sonora.

Please make your check out to Sky Island Alliance, with a note in the Memo line about which fund you'd like to support. We'll make sure your money goes to the programs that mean the most to you, and we'll send you reports!

Sky Island Alliance
P.O. Box 41165
Tucson, AZ 85717

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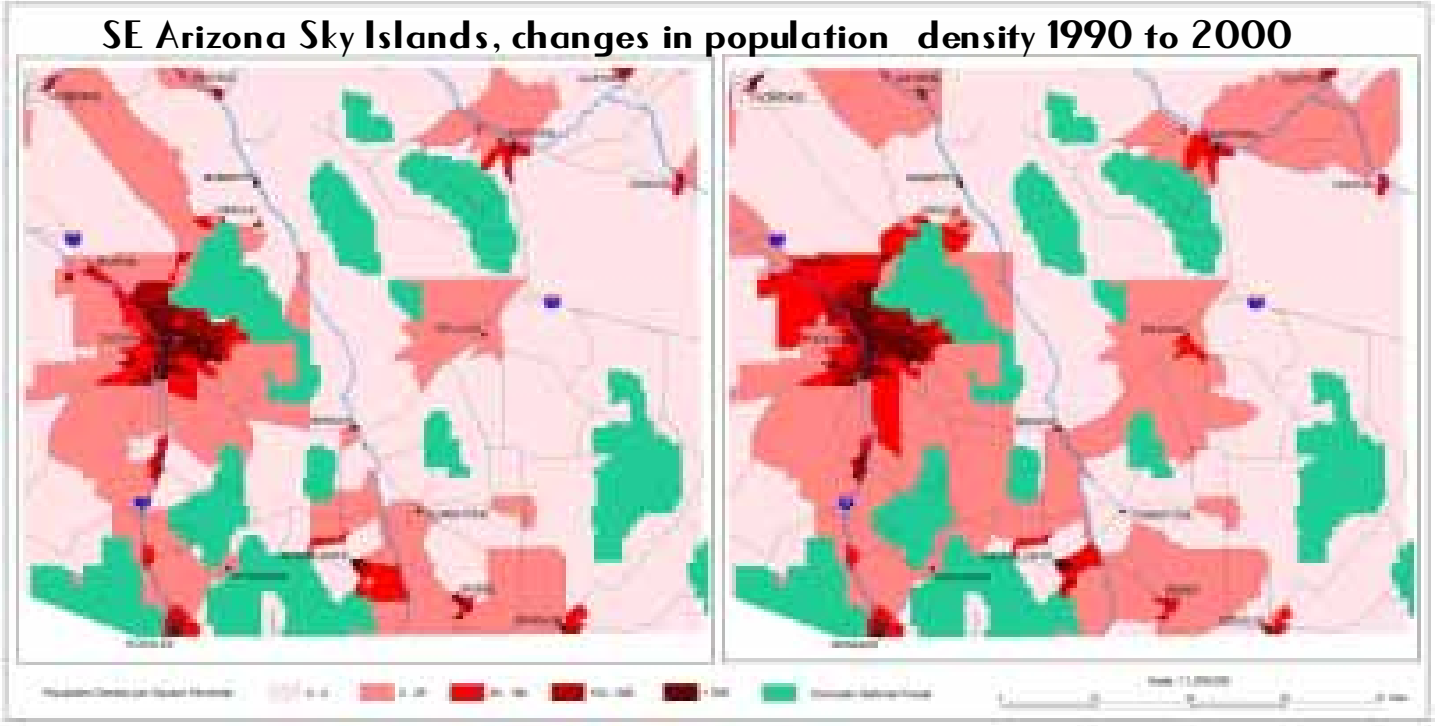
Pima County Voters: Remember the Open Space Bond Election May 18 (see page 5)



Changes in population density (people per square kilometer) across much of the Sky Island region in the United States. Data is from the 1990 and 2000 US Census, mapped by census block group. Block groups are laid out so each captures a comparable number of people across the region. Spatial resolution is therefore finest in cities, while sparsely populated rural areas have large block groups that mask some local trends.

Sky Islands Humans

Population: Resident One Million

by Bob Van Deven and Gita Bodner, editors

About four years from now a very special person is expected to arrive in Pima County. He or she is likely to be from another state and will probably be an American citizen, but our visitor might just as easily hail from another nation. Assuming the latter, odds are the person will consider him or herself to be Hispanic. It's difficult to say exactly how they will arrive in our corner of the state—by car, on foot, or perhaps in the humble, time-honored way most of us entered the world. Yet for all the anticipation preceding their visit, this person can expect little fanfare; most of us will be too busy to even notice the arrival of Pima County's one millionth resident.

Citizen one million will add not only to our numbers but also to the shifting demographic trends superimposed on the Sky Islands and the state of Arizona in general. For example, in the last decade the state's population grew by 40 percent—adding a Tucson-sized city just since the last census in 2000. The proportion of residents living in poverty fell to 11 percent but the benefits of prosperity have been unequally distributed; ten years ago the minority home ownership rate was actually higher than it is now.

As the character of our population changes, likewise the distribution of people on the land changes. In Pima County both rural areas and sections of downtown Tucson have seen a net loss of residents while the Catalina foothills and Marana have soaked up a large share of new arrivals. The population of Graham County has ballooned around Safford but remains virtually unchanged west of Duncan. As the map on this page shows, humans have been colonizing the rivers and transportation routes linking our cities, building suburban corridors along what were once thinly settled lowlands.

These trends are probably not news to most of us, nor are the corollaries of rapid growth—smog, congestion, and the burden of supplying public services to a sprawling populace. Unfortunately, little has been done to steer the growth of our communities in pragmatic and sustainable directions. This hasn't been for lack of trying—remember proposition 202? In the summer of 2000 this tough but sensible plan for controlled growth was favored by two thirds of the voters. Before the polls could open in the fall however, developers, bankers, and car dealers had waged a 4.5 million dollar propaganda crusade, outspending the friends of 202 by an enormous margin. Their tactics were successful; prop 202 was soundly defeated.

Yet for all our brawling, brooding, and wishing, a steady flow of newcomers remains an unavoidable fact of life in the sunbelt. And the implications of growth extend well beyond the urban centers of our region; they reach deep into national forests and uninhabited tracts of land, the foundations of our native biodiversity. As population increases, it's not enough to simply adjust our building practices or carpool to work, we must change the way we interact with the rural landscape or risk irreversible damage. Nowhere is this more true than in the Sky Islands.

...continued on page 13