Restoring Connections

SKY ISLAND ALLIANCE
Protecting our Mountain Islands and Desert Seas

Newsletter of the **Sky Island Alliance** **Vol. 9 Issue 3** **Autumn 2006**

The Big Picture

We can't get enough of this Big Picture. Ever been to the Tumacs? Check 'em out on one of our public hikes this Fall. Visit www.skyislandalliance.org for details.

Sky Island Alliance is a non-profit membership organization dedicated to the protection and restoration of the rich natural heritage of native species and habitats in the Sky Island region of the southwestern United States and northwestern Mexico. Sky Island Alliance works with volunteers, scientists, land owners, public officials and government agencies to establish protected areas, restore healthy landscapes and promote public appreciation of the region's unique biological diversity.

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Board of Directors

From the Director's Desk:

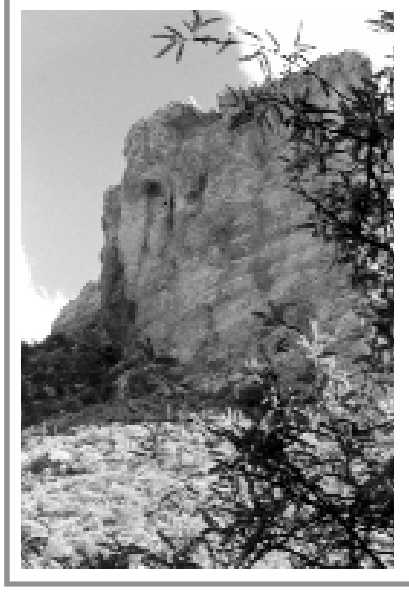
Rain is Nature's blessing here. With transformative powers, its celestial paintbrush glides over the Sky Islands with gobs of bright green hue dripping down and immersing the land in renewed life. As the washes and rivers swell, as the oaks sigh with relief, and as the critters rejoice in abundance, we celebrate too. The monsoons are a particularly ornery lot though, but similar to an old curmudgeon who really means well, nobody complains about the fits of weatherly rage thrown about landscape. They're not fair either — just ask me about how much better those darn Tucson east-siders have made out this year compared to those of us west of the Santa Cruz River. I'm not complaining though — I only hope to get even.

There are countless rituals, songs, offerings, and prayers for the monsoons. In Mayan mythology, it is the God Chac who befriends humans and brings rain for the crops and created lightening with his axe. Chac has been in a particularly good mood this season, and I really don't care to enter his doghouse by saying anything rash, but as we all know, Chac has his bad days (or years) too. He changes his mind a lot, choosing his green canvass apparently at random while leaving others — perhaps the next mountain range or adjacent draw — to find contentment in the color brown.

In an ecological sense, our Sky Islands are a diverse mosaic of infinite complexity and variation, including the concentration of resources provided by things such as rain. While not apparent today, we are enduring a prolonged drought throughout the Sky Islands. During drought, water availability becomes an especially important factor in how plants and animals fare. While the Chiricahuas become drenched in storm, the Peloncillos may crackle under foot. While water may gush out of the Galiuro's Kielberg Canyon, perhaps Buehman Canyon across the valley is left only with pools from the previous year. Regardless of the pattern and abundance of rain, resources are unevenly distributed across the landscape, and this distribution is constantly in flux.

This phenomenon is, in part, why landscape conservation planning — and action — is so important. To see the landscape as whole, without the blurry lens of jurisdictional boundaries, is to see through the eyes of nature. Animals (the case can be made for plants as well) have basic needs to survive, and one of those basic needs is the ability to locate and utilize varying resources unevenly strewn across the landscape. In the event of rain, perhaps the next canyon — or adjacent mountain range — was in more favor with Chac, thus producing a bumper crop of prickly pear fruit whereas last year's hot spot produced little. In this scenario and others, we must look beyond any static perception of wildlife's conservation needs. Perhaps exemplified by birds and large mammals such as wolves, the notion of ecological plasticity makes intuitive sense. Optimal habitat in one place — as good as it may be one year — must be coupled with available habitat elsewhere for long-term population stability. This brings me to my point. Wilderness protection in one place must be coupled with conservation efforts that connect that Wilderness to another. Protection of a wildlife linkage in one place must be coupled with habitat protection or restoration efforts elsewhere. In layman's terms, you may call it the big picture. The big picture is a pillar of Sky Island Alliance. Private lands, state lands, county lands, and federal lands — we must integrate these conceptual boundaries into ecological sense. We and our partners (nobody does it alone) work within multiple contexts to achieve this integration. Wilderness is one piece of the puzzle, but without our linkage, restoration, and policy efforts elsewhere our mission will not succeed. That's why the big picture is so important to us, and that's why we've dedicated this issue of *Restoring Connections* to the many different variables that go into successful conservation on a regional scale Our members and volunteers have accomplished so much in the last fourteen years, and we look forward to meeting tomorrow's challenges (as daunting as they are) with an intensity and vigor only expressed through such deep appreciation and love for this beautiful place. The rain won't ruin the party, but if it does, let's make sure we can get to the next ridge.

Matt Skroch
Executive Director

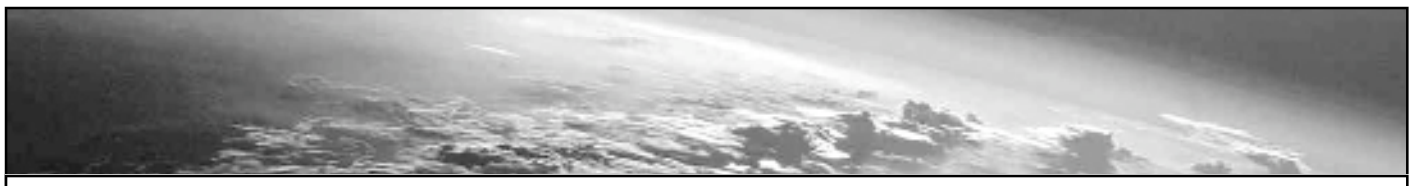


Next issue: Geology!

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 related 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. Or give your favorite small-town restaurant a boost by writing a review and letting us promote it!

Restoring Connections is published three times a year and the deadline for our next newsletter is December 15, 2006. Material submitted after that date may be saved for subsequent issues.

Please email submissions to: **julie@skyislandalliance.org**, or mail them to Sky Island Alliance, PO Box 41165, Tucson, AZ 85717. Resolution of digital images should be at least 300 dpi if possible.



A little over a month ago, I interviewed an astronaut! Believe me, there *is* a connection: his name is Mark Kelly and he's been spending a good amount of time out here in the ol' Pueblo because his fiancée is Tucson's very own Gabrielle Giffords. So a couple of us thought it might be interesting to get HIS perspective on the Big Picture from fifty miles up.

First let's deal with the urban legend: you can't see the Great Wall of China from space. I found this out because I was curious about borders — if the US does indeed build a 700-mile long wall, would it be visible? Mark told me the only borders they can see are the ones created by rivers. That was good news to me.

When I asked Mark what signs of humankind *were* visible, he told me that half of the Amazon forests had disappeared into barren pockmarks. He's seen pollution obscure Zurich, and dust clouds over the Gobi Desert. And at night, the only parts of the Earth that do not succumb to darkness are the brightly lit cities of the United States, Japan, and northern Europe.

But the most striking thing, for Mark in space and for me in our conversation, was that he could SEE the limn of the Earth — the very thin, very fragile-looking atmosphere that protects our "big, blue marble spinning in the blackness of Space" as he described it. Let me repeat that. He could SEE it — see with his own human eyes the "incredibly thin" (his words) membrane that makes our human existence and everything we celebrate around us possible. He repeated this observation a number of times; the wonder in his voice almost allowed me to see the limn myself.

The fragile limn separating Life from Death has been heavy on my mind since my conversation with Mark. Personally, globally, locally, *I know fragile.* The here-today-gone-tomorrow fragile, when developers shave vegetation off a swath of landscape; the plate-shifting geologic fragile which makes the re-arrangement of boulders in Sabino Canyon look like a couple of kids playing with blocks; the "we had no idea back then" fragile of an introduced plant or animal species getting out of control in a ba-a-a-ad way; and the disappearing-island fragile that mountaintop species might soon experience as their habitats vanish from fire, insect infestation and/or global warming.

This issue of *Restoring Connections* has a wealth of perspectives on The Big Picture, a theme which by its very nature can be daunting. Don't let it be! Let these perspectives encourage you to take positive action *NOW* — voting an informed vote, getting dirt under your fingernails, advocating for the protection of natural processes (it's the only web we've got), doing with less, writing writing writing every leader you can to insist on the switch to renewable energy (www.climatecrisis.net), thinking one step beyond your actions, praying for a just, equitable world, chanting Thomas Berry's beautiful poem all the way… Fragile? Yes. Hopeless,? No. — *Julie, julie@skyislandalliance.org*

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Sky Island Alliance Critique of Four Ballot Propositions:

In November, we head to the polls to vote for our elected candidates and just as importantly, weigh in on a slew of ballot propositions. Several of these Propositions have as much to do with land and wildlife conservation as do the leaders we send to office. For your consideration, Sky Island Alliance provides the following critique of four significant ballot propositions that you'll help decide in November.

Prop. 105: Muddying the waters on State Trust Land Reform — A draconian referendum put together by the Arizona Legislature and their developer friends to confuse voters and take away from meaningful State Land Trust reform. This referendum would only put 37,246 acres of land — mostly around the Phoenix Metro Area — into a classification that would allow for eventual conservation purchase. An additional 470,552 acres may be available for conservation purchase, but requires pre-approval by the Legislature on every single parcel. Given the Arizona Legislature's low marks for conservation and low credibility for getting anything progressive done, this proposition deserves rejection. *We say no to Prop 105.*

Prop 106: Conserving Arizona's Future State Trust Land Reform — Prop 106 is the conservation community's best chance for providing constitutional acknowledgement of open space on State Lands. Crafted over the last year by conservation and education stakeholders, this proposition will immediately protect 332,700 acres upon passage. That's 332,700 acres more than what's protected now. In addition, 361,000 more acres are placed in conservation reserve — off-limits to development and slotted for open space acquisition. The Sky Islands fair well in this proposition, with 27 of the 59 areas slotted for conservation residing in southeastern Arizona. Protected areas would include wildlife corridors in the Santa Cruz and San Pedro Valley, large slices of land in the San Bernardino and San Simon Valley, the Cienega Corridor, and the Las Cienegas National Conservation Area, among others. Would we prefer to protect more? Yes, and Prop 106 is a great start. *We say yes to Prop. 106.*

Prop 207: Private Property Rights Protection Act — Prop 207 is a deceptive, confusing bait-and-switch proposition that pretends to guard against eminent domain problems, but in reality forces taxpayers to pay land speculators for alleged value losses. Essentially, future interests in property would become legal current assets under this proposition. Municipalities would be legally forced to pay landowners not only for what their land is worth today, but what it might be worth in the future if the land is developed to its maximum. Say goodbye to down zonings, conservation plans (including the Sonoran Desert Conservation Plan), or any say that communities have on how they would like to grow. Property rights are one thing — folks should be compensated if their land is taken. This proposition is another — it will create a legal morass that will fleece the taxpayer and strip zoning committees and local ordinances of any power. All brought to you with the money of a New York State real estate mogul. *This one is easy — we say no to Prop. 207.*

Prop. 400: Referendum ordered by petition of the people of Cochise County, relating to re-zoning and approval of the Smith Ranch Master Development Plan *(Cochise County residents only)* **—** Prop. 400 is the result of a strong citizens' effort to allow voters to accept or reject the build-out of 4,900 homes on the 1,983-acre Smith Ranch, four miles west of Benson just south of Interstate 10 next to the Skyline Rd. interchange. All of the land surrounding the proposed development is zoned rural. Last April the Cochise County Board of Supervisors approved Diamond Ventures request to build a high-density, master-planned community on Smith Ranch. Proposition 400 allows the County's voters to accept or reject that decision. We support Cochise County citizens who are concerned that high-density developments in rural areas such as this negatively impact natural resources. *To keep the open rural nature of the area, which supports wildlife habitat and significantly contributes to maintaining the region as a landscape linkage, say NO to Prop. 400.* ❖

A Landscape Perspective

by David Hodges and Matt Skroch

Standing on a promontory in the rugged Sierra Madre Occidental of northern Mexico, one may peer northward across the Sierra San Luis, past the Rio San Bernardino, and gaze — on a good day — at the mighty Chiricahua Mountains of Arizona. Here along the Sonora-Chihuahua border a short 60 miles south of the U.S., you may have the chance to sit under squabbling flocks of thick-billed parrots delighting in cones of subtropical pine forests at Mesa de las Guacamayas.

In 1917 and 1918, thousands of the brilliant birds traveled northward to the Chiricahua Mountains and beyond where, back then, they were common residents in smaller densities. We can only imagine the experience of standing in Pinery Canyon amidst a sea of falcon-sized parrots simultaneously squawking away while raining down stripped pine cones from above. Noisy and brightly colored, along with an attitude that didn't include much concern for humans, the thick-billed parrot population was soon decimated by the gun. They no longer occur in the US Sky Islands.

Extinction has forever vanquished several creatures native to the Sky Islands in the last two hundred years. We're fortunate that the parrot in Mexico hasn't met this end, yet. In many ways, the idea of thick-billed parrots re-establishing their presence in the US Sky Islands provides the flame for which fuels our drive towards ecological redemption. And it's not just this magnificent parrot that gives hope to our shared efforts. Many other species that no longer occupy their historic range, and thus lack the ability to fulfill their evolutionary duties in the larger community of life, still provide much hope — they avoid the ultimate end, although survive in pockets of relict habitat, breeding facilities, or wilderness areas that roads don't reach.

Let's be clear — even with the wonderfully diverse cast of the Sky Island's special plants and animals, we are missing several key actors on the stage. Fortunately, they haven't yet left the theater. The Mexican gray wolf, black-tailed prairie dog, aplomado falcon, jaguar, river otter, pronghorn antelope . . . and just about every native fish and amphibian — they all have something in common with the thick-billed parrot. They remain. And with help, their time will come to once again reclaim their former grounds.

Their return doesn't necessitate our departure either. Population growth provides serious challenges that must be dealt with, although much of the issue is *how and where* we grow. We are currently active participants in a historic period of transformation within the region, and the responsibility lies on the current generation to make critical decisions that have significant implications for our future inhabitants. Great opportunities exist right now, as does the threat of 2500 homes on the next ranch sold. Is the current paradigm of outward growth and resource consumption sustainable? No. Neither is it acceptable.

On public lands in the United States, we contend with resource threats that include off-road vehicles, open-pit copper mines, catastrophic fires, overgrazing, powerlines and a myriad of other issues. On private lands — often those critical linkages that weave our region together — there is more uniformity in threat. Homes. We are awash with the ecological impacts of an unprecedented population explosion (currently about 35% growth per decade).

In our mind, there are three critical challenges we face for our region's ecological integrity today — the protection and expansion of protected areas on public lands, the preservation of rural characteristics outside of federally-owned land, and the safeguarding of landscape connections between the Mexican Sky Islands and those north of the border so they remain open and permeable for wildlife.

The jaguar provides a good example of the importance of linking private and public lands to effect conservation, along with the importance of unimpeded movement from populations in Mexico. The only areas

continued

by Janice Przybyl,
SIA Wildlife Monitoring Program

Jaguars. Grizzly bears. Mexican wolves. Until recently, and by recently I mean the early to mid-1900s, these three large mammals were an integral part of the big picture of the Sky Island region. In the big picture of living breathing landscape ecology, 50 to 100 years is but a mere blink of the eye, a mere quick intake of breath.

Then — maybe when we blinked — we lost them. All three, jaguars, grizzly bears, Mexican wolves… gone from the Sky Islands.

These large predators allegedly posed a threat to the livestock industry and to hunters competing for deer and elk takes, so in the name of protecting agricultural and hunting interests they were extirpated from the southwestern United States. Systematically trapped, shot, clubbed, poisoned, killed, run off, given the bum's rush.

In the Big Picture of Life, how do you measure the loss of a native species from your homeland? What else is lost? Considering the role that large predators play in maintaining intact healthy landscapes — within the interplay of predator/prey and predator/predator dynamics and the resultant impacts to vegetation and other wildlife — the losses could be endless.

Though harassed, the jaguar still roams the Sky Islands of Mexico and recently — this time I mean within 10 years — individual jaguars have been making forays into Arizona and New Mexico, slowly re-colonizing the border region. Unfortunately, the Mexican wolf was not so lucky to retain a refuge in Mexico. The U.S. Bureau of Biological Survey, the agency responsible for ridding the southwest of wolves, made forays into Mexico to completely eradicate wolves. Then in 1978, in a remarkable aboutface brought on by the Endangered Species Act, that same agency, now called the U.S. Fish and Wildlife Service, captured the last five remaining wild wolves and placed them in a captive breeding program. Lobo was no longer wild and free.

Even with a reintroduction program that first placed wolves on the ground in 1998, the wolves are not free. The Mexican wolf is a true native of the Sky Islands. Rarely did the Lobo of old range north of the Gila River, but 80% of the Blue Range Wolf Recovery Area (BRWRA) in the Apache and Gila Forests of Arizona and New Mexico lies outside the historic range of the Mexican wolf. When a wolf steps out of bounds it is captured then released back and sometimes re-released within the BRWRA. Process, politics, and special interests keep a short leash on the wolves. Lobo cannot return home.

For a more detailed analysis of the Mexican wolf, the history of its extirpation and reintroduction, including the intricacies of policy and procedure please refer back to the featured articles in the Winter 2004 *Restoring Connections.*

You can view a copy of this issue — El Lobo: Fate of the Once and Future Wolf — on our website: **www.skyislandallince.org**.

For up-to-date reports on the status of the wild wolves visit the Southwest Environmental Center's website: **www.wildmesquite.org** or the US Fish & Wildlife Service at **www.fws.gov/ifw2es/mexicanwolf**.

continued

in which jaguars have been documented over the past 10 years in the US are on protected public and private lands, the latter of which some refer to as "working wilderness." These areas are all adjacent to large blocks of wild country in Mexico, with no physical barrier to prevent movement north into the US.

If we are to recover the jaguar and other aforementioned wildlife in the U.S. Sky Islands, we expand on the three challenges outlined above.

Public land protected areas (such as Inventoried Roadless Areas, Wilderness Areas, National Conservation Areas, and Areas of Critical Environmental Concern) must be expanded, and their integrity assured. These areas are the most intact ecological systems that our land management agencies oversee and act as bulwarks against exotic species invasion that wreck havoc on natural ecosystems. In the late 19th century, Forest Reserves (precursor to National Forests) were established to protect watersheds and natural resources — we cannot lose sight of the value of the critical ecosystem services they provide. With significant increases in motorized recreation, societal resource demands, and increasing fluctuations of climate, additional protections are needed to stave off our looming tragedy of the commons. Aldo Leopold was visionary when he recognized the increasing relevance of Wilderness and other special designations during his time in the Southwest more than fifty years ago. We can't express our sentiment better than when he told us "Our remnants of wilderness will yield bigger values to the nation's character and health than they will to its pocketbook, and to destroy them will be to admit that the latter are the only values that interest us."

Secondly, we cannot underestimate the ecological threat that rural ranchland conversion to high and medium density residential units pose. Ex-urban development — without consideration of wildlife linkages in Sky Island valleys — is pinching off landscape permeability at an alarming rate. Putting ranches on the chopping block is a landowner's right, although ranchers we speak with invariably state it's not their preference but rather a relatively poor option to staying afloat. Open space is a fundamental value we cherish throughout our region, and thus public financing to protect this dwindling resource must be increased. We must look no further than the Sonoran Desert Conservation Plan as a great template for protecting wildlife habitat and rural land. Regardless of a relatively small open-space bonding capacity in rural counties, comprehensive land-use plans provide traction for manifesting our communities vision for open-space, appropriate growth, and landscape-level conservation. If counties could integrate their plans with adjacent counties, it would help concentrate urban growth in urban areas while keeping our rural areas rural. The Sonoita Valley Planning Partnership, the Malpai Borderlands Group of Cochise and Hidalgo Counties, and the Diamond A Ranch/Animas Trust in the Animas Valley are all good examples of folks working together to advance conservation and protect open space. We must note that Proposition 207, which you'll vote on very soon, would severely hamper public input in land-use planning and create a quagmire of litigation at the expense of taxpayers (see Proposition information in this issue).

Lastly, we cannot construct a wall across the wildlands of our international border. As a world-recognized Biodiversity Hotspot, the Sky Island region, by definition, serves as the critical link of the North American Continent. Its severance would have dire consequences to the natural history and unique assemblage of plants and animals of this magnificent place. No doubt we must address our flawed immigration and border policy — but to do so at the ultimate expense of an entire ecosystem would prove irresponsible, unnecessary, and short-sighted.

In spite of many challenges we remain hopeful. The conservation movement has matured, evolved, and diversified over the past several decades. There are many more folks — from varied backgrounds and perspectives — actively working together with a landscape approach to conservation, and being very successful at it. It will continue to prove itself as the most successful strategy to securing long-term conservation success.

Someday soon, we expect to be standing on a promontory in the rugged Chiricahua Mountains, peering southward past the Rio San Bernardino and the Rio Bavispe, across the Sierra San Luis to the Sierra Madre. The view will be clear and open, with parrots chattering overhead. As we look across the landscape, we will take pleasure in the knowledge that the full complement of native Sky Island species have been protected and/or restored to their former haunts, thanks to the vision of many people who have put differences aside and worked together to protect this magnificent wild landscape. Until then, there's much to do. ❖

The reintroduction project cooperators are Arizona Game and Fish Department, New Mexico Department of Game and Fish, USDA Forest Service, USDA-APHIS Wildlife Services, U.S Fish and Wildlife Service and White Mountain Apache Tribe.

From a personal perspective, I reluctantly admitted once that I might never have the chance to see a wild wolf track in the Sky Islands. However, the wolves could prove me wrong. Early in the reintroduction program, a lone male wolf journeyed from a release site north of the Gila River all the way into Mexico, then turned around and headed back. Guess there was no reason for him stay. He was truly a lone wolf.

About that same time, a female was killed on a highway outside of Flagstaff. More recently, a breeding pair set up a home range outside the BRWRA in the San Mateo Mountains. This mountain range is south of Socorro, New Mexico, nestled between the Gila National Forest and Interstate 25. However, because the San Mateo pack was not abiding by the management rules, they were captured and then relocated near Escudilla Mountain in the Blue Range of Arizona. Still referred to as the "San Mateo" pack, the breeding pair have apparently adapted to their new home. This is fortunate because relocated breeding pairs and packs often break up upon relocation.

If we can ratchet down the management and allow the wild wolves to do what comes naturally, they will disperse and travel many miles to establish new packs. I firmly believe that if the boundary rule that keeps the wolves locked up in the BRWRA was abolished, wolves could be roaming the Sky Islands within a few years. Albeit, there would be loss of wolves on the highways and more loss of wolves to illegal killings — which currently is one of the major causes of mortality — but the wolves would have a better chance to flourish. What better reason to pursue wildlife linkages and the design and creation of highway structures to facilitate safe passage of wildlife? What better reason to pursue the protection of Arizona and New Mexico's roadless areas than to safeguard wolf habitat?

This year the wild wolf population suffered some very tragic setbacks. Livestock conflicts resulted in the loss of 12 wolves. Thirty wolves have been removed from the wild since January 2001, a number equal to the current estimated wild population. Currently the removal rate — dispensing with "problem" wolves — is higher than the mortality rate.

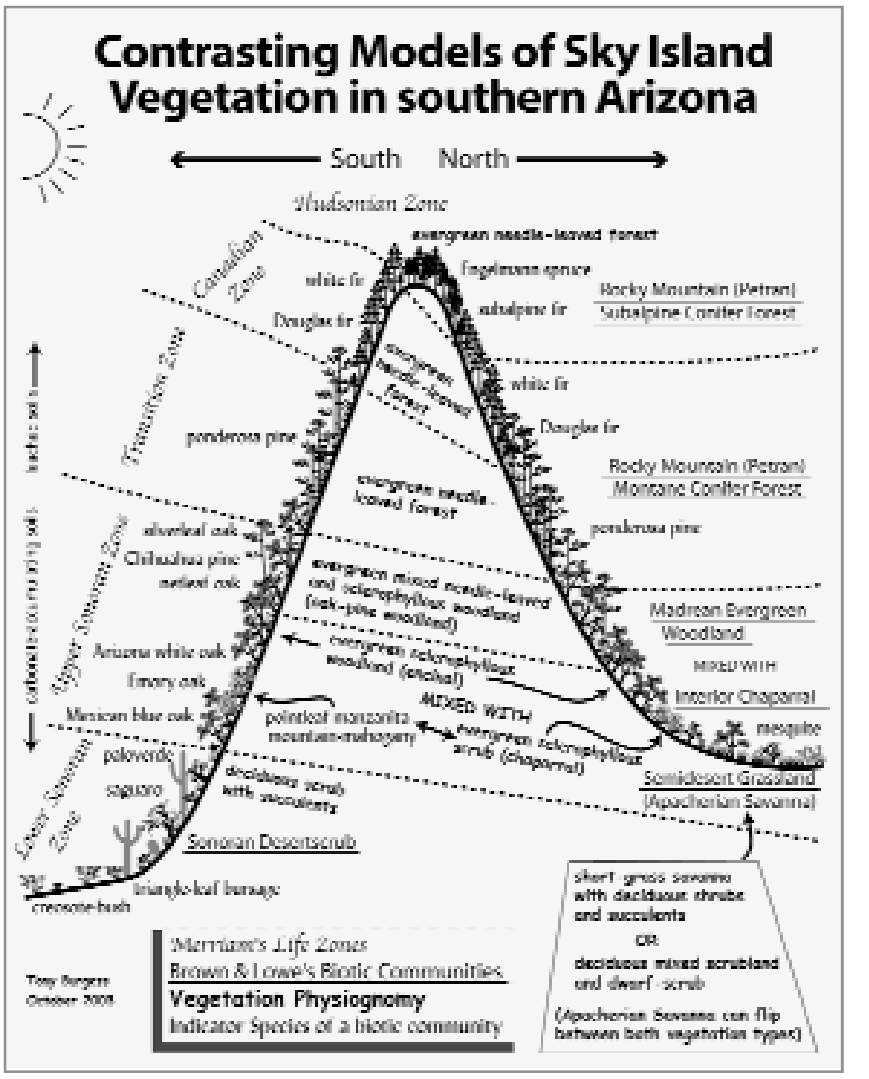
At a recent Mexican Wolf Management Workshop held in Pinetop, Arizona, Richard Fredrickson from Arizona State University addressed the dire situation of low wolf numbers He recommended that the population be allowed to grow quickly assisted by the introduction of more wolves from the captive population — the sooner the better.

Robert Wayne of the University of California believes that the interplay of a species with its natal habitat evolves skills adapted specifically to that environment and results in creating a distinct genetic entity. The Mexican wolf is the most genetically distinct wolf of all the North American wolf subspecies and, according to Wayne, because of near eradication, the Mexican wolf lost more genetic diversity than any other small population of wolves in the world. All more reason to bring Lobo home.

For Lobo to remain truly a Mexican wolf the recovery area must be expanded to include its real home — the Sky Islands. In coming months, Sky Island Alliance, along with other organizations, will mount a campaign to guarantee the Mexican wolf maintains its status as a distinct population and that the boundary rule is eliminated — working toward the day Lobo regains its rightful place in the Big Picture and once again leaves tracks in the Sky Islands. ❖

Exotic Futures on Sky Islands

by Tony Burgess, Environmental Studies, Texas Christian University



Non-native species — "exotics" — have appeared and increased on Southwestern Sky Islands. Should we be concerned? The spread of exotic species is one aspect of systemic, planet-wide phenomena referred to as "global change." Crosby (1986) described this "biological imperialism" as an inevitable consequence of European industrialization and colonization, which led to correlated, accelerating changes in ecological communities everywhere.

I offer a personal perspective. It is based on my experience working with Ray Turner's team studying exotic plants at the Desert Laboratory of the University of Arizona. My Sky Island time was concentrated in the Santa Catalina Mountains north of Tucson and the Guadalupe Mountains on the Texas/New Mexico border. I confess that my ideas about distinguishing natural and human processes became thoroughly confused during my work as designer and biome manager of Biosphere 2, which some considered an ecological blasphemy. And I confess that I am responsible for introducing an invasive exotic grass, *Dichanthium annulatum*, that escaped from Biosphere 2, but has not yet spread extensively (Felger et al. 2005).

Whenever I see changes in a place I have known, I get disturbed. I suppose I would feel more comfortable if the 'nature' I connect with were stable or at least changing predictably as summer going to winter. When one studies the transformation of indigenous ecological communities by globalization, a tangled web of connected factors is revealed: increasing global trade, more extensive commodity extraction from landscapes, growing human population, rampant consumerism, increasing demand for financial yield from land investments, changes in atmospheric chemistry that may accelerate climate change, etc. In this context, it would be unreasonable to expect that the Sky Island ecosystems will not change. They will, and those who care for such places will be concerned. As with the climate change debate, there are attempts to distinguish 'natural' dynamics from human-caused changes. When exotic species are involved the answer is easy: we caused it. This conclusion leads to an implicit, straightforward task: we should get rid of exotic species in a xenophobic campaign of 'cleansing' so that we all may benefit from 'pristine,' natural places. Yet my experience has made me a bit cautious about simplistic, zealous approaches to ecological management. Certainly with heroic effort, we might be able to purge some aliens from our natural places. Is this the best use of our finite time and focus? When should we try eradication, and when should we facilitate integration into the American 'melting pot'?

The introduction of sweet resin-bush (*Euryops multifidus*) provides a useful case history (Pierson & McAuliffe 1995, McAuliffe 2000, Munda & McReynolds 2004). This small shrub was planted at several Arizona sites in 1938 for erosion control and possibly for sheep forage. Federal land management priorities changed, and little subsequent notice was taken until the late 1980s when Ray Turner, matching old photographs of grazing exclosures, discovered an extensive outbreak from an original planting on the northern slope of the Pinaleño Mountains. Joseph MacAuliffe and Elizabeth Pierson described an area of Frye Mesa where resin-bush had almost completely replaced native vegetation. Their work raised awareness among government agencies, and management to halt the outbreak followed. Had the resin-bush continued to spread, the lower elevations of many Sky Islands would have suffered substantial biodiversity decline.

Most of the resin-bush history conforms to the typical pattern for exotic plant outbreaks: an intentional or accidental introduction, a lapse of attention for several decades, and a subsequent accelerating outbreak. Unlike other outbreaks, the resin-bush invasion was detected in time to stop it. Most invasive exotic species were not noticed or did not create concern until they were beyond control. McAuliffe and Pierson deserve our gratitude for their timely alarm.

Our work on exotic plants at the Desert Laboratory (Burgess, Bowers, & Turner 1991) corroborated Crosby's assertion that European imperialism involved the spread of a whole biota that had coevolved with the rise of agriculture and urbanization, starting in the Middle East and consolidating in Europe. (Jared Diamond's *Guns Germs and Steel* magnificently summarizes this process.) As crops and cropping systems developed, weeds became adapted, and some of the weeds even became crops themselves. Concurrently, escalating pastoralism concentrated herds of sheep, goats, cattle, horses, swine, and camels; and range plants were pressured to adapt. Some species evolved to disperse with livestock, to colonize bare, disturbed soil rapidly, and to tolerate heavy grazing. These species are as man-made as Styrofoam, and they have served to mitigate our devastating effects on landscapes, because their adaptations allow at least some vegetative cover to exist even when land is heavily pastured.

In the arid context of Sky Islands, most of the introduced plants that have caused the greatest changes during the Twentieth Century have been associated with livestock production. Some species, such as buffelgrass (*Pennisetum ciliare*) and Lehmann lovegrass (*Eragrostis lehmanniana*), were intentionally introduced by federal agencies motivated by the assumption that any grassland was better than no grassland. As the frontier officially closed, the successful conversion of Midwestern tallgrass prairie into corn and soybean fields was a model to be emulated: to push the frontier of commodity agriculture beyond its arid limits, so that Anglo-American farmsteads continued from sea to shining sea.

Our work at the Desert Laboratory showed that most exotic species were relatively rare and confined to disturbed sites such as roadsides and arroyo channels. Similarly, exotic mullein (*Verbascum thapsus*) and white sweetclover (*Melilotus albus*) are usually found along roadsides and grazed pastures in the higher Sky Islands. A few exotic plants had spread so extensively over the Desert Lab reserve that, had we not known they were introduced, they would have seemed native. Examples are buffelgrass and filaree (*Erodium cicutarium*). The history of these extensive invaders conformed to the resin-bush story: there was a lag of several decades between the introduction of a species and its explosive outbreak. Fifty years is a general estimate. Thus, the plants that had invaded extensively by the 1980s were all introduced before about 1940. All were associated with Mediterranean pastoralism with the exception of buffelgrass, Lehmann lovegrass, and Natal grass (*Melinis repens*), which are the northern representatives of the "Africanization" of Neotropical thornscrub and dry forest (Parsons 1970). In the climate of the northeastern Sonoran Desert invasive species from Africa meet those from the Mediterranean. This invasion confluence affects the lower elevations of nearby Sky Islands; however I am not sure that there is a predominant geographic source of invasive species in the higher elevation conifer forests, at least not yet.

Livestock-adapted species altered the vegetation structure extensively, changing fuel loads and fire regimes. Wildfires are redefining the boundaries among

continued

desertscrub, savanna, chaparral, and woodland vegetation throughout the Sky Islands. The pastoral phase of frontier settlement had many other ecological consequences, including extermination of wolves, destruction of riparian vegetation, and new episodes of arroyo erosion. Thus the railroad-abetted movement of commodity livestock production into the Southwest triggered cascading ecological effects.

But ranching is no longer the dominant source of financial prosperity. The explosive growth of urban Sunbelt techno-oases is bringing new suites of exotic species into the Sky Island region. The demand for drought-tolerant, ornamental plants to expand the palette for xeriscaping has already led to new introductions from other continents. Examples are *Cassia nemophila* from Australia and various *Aloe* species from Africa. We can assume that there will be much more development of pleasuring destinations for heat-stressed, urban-weary people. Ornamental landscaping for high-elevation resorts and the associated construction activity will certainly increase the chances of introducing more exotic species. For example, if an exotic grass proves adaptable for revegetating ski slopes or high-elevation lawns, it will be spread by human activity, either intentionally or accidentally.

People like to make a difference, and we are fundamentally an agricultural people. If you could change the ecological community in a way that would make it more 'useful,' wouldn't that be good? Thus we have introduced exotics for sport: rainbow trout that threaten Gila trout, Aberts squirrels from the north that may compete with the native Mt. Graham red squirrel, and Barbary sheep that may compete with bighorn sheep. As real estate prices rise, the pressure increases to maximize financial return from land investment. This simple need, in concert with increasing sophistication in genetic engineering and biomimicry, almost certainly will give more impetus to 'improve' Sky Island ecosystems and blur distinctions between the technical and natural. Exotic roadside weeds have evolved adaptations to human disturbance, and they may provide components of biodiversity that increase resilience of ecological functions to human disturbance. Is an exotic grassland 'better' than no grassland? If the spruce on Mt. Graham are dying, should we introduce a more drought-tolerant strain from somewhere else? If black bears with "human-safe" behavior could be designed, should they be introduced in order to "restore" a lower-risk, more "natural" amenity to Sky Islands with residential development? It is difficult for most of us to refrain from taking some kind of action.

Globalization will accelerate species introductions into Sky Islands; so, considering the probable lags between introduction and outbreak, we can predict at least 50 years of continuing outbreaks ahead. These will include roadside weeds, ornamental plants, game animals, livestock (including pets), as well as other unintended dispersions from travel in search of wealth and pleasure.

Biotic globalization of the Sky Islands will be filtered by their topography. Unlike expansive plains, mountains have diverse ecological niches due to interactions among substrate, topography, vertical climate gradients, massif size, etc. Native species populations are likely to be patchy and small. This makes each high-elevation population more vulnerable to extinction. However the contrasting microclimates and habitat conditions within these topographic mosaics create a setting in which no single invasive species could overwhelm the whole landscape — excepting us, of course.

Perhaps demand for high-quality water will lead to greater valuation of Sky Islands for generating rainfall and conditioning water. I remember experiments to herbicide chaparral in order to increase rainfall runoff. And I heard an engineer propose that we "shrink-wrap the mountains" to divert all the rainfall downstream toward Phoenix. As good water gets scarcer, proposals to re-engineer the Sky Island vegetation for better watershed functions will seem more reasonable.

The diversification of any ecological community involves incorporating exotic invasions into the checks and balances of local food webs. Biological control of exotic species attempts to accelerate this process, and sometimes it seems to work well. Given enough time, integration of invasive species into local ecosystem processes is inevitable, but it may cause extinction of native species. Thus our real concern seems to be how we shall feel about the changes in Sky Islands as local and exotic species negotiate. Will the resulting ecosystems be cultural monuments or tragedies?

In this churning context of climate change, human fecundity, urbanization, commodification of natural capital, etc., why do exotic species invasions seem important? I think they are especially poignant because exotic invasions are metaphors for our own colonization. We are exotic invaders. And in our efforts to cope with exotic invasions, I think we somehow attempt to deal with our own challenges of becoming native to these places. If we 'defend' native nature, perhaps we atone for our own invasion, and perhaps we earn the right to think of ourselves as almost native, too.

The probable future of Sky Island biodiversity calls for a commitment not only to live well in our places — practicing restraint, forbearance, and mercy; but also to encourage at least a few people to fall madly, joyfully in love with a Sky Island or one of its creatures, so that we have continuing network of observers and advocates. We should support these bionerdy people and reward the knowledge that they can create. Support should include archives of their natural histories whether they are romantic, descriptive, or analytic. Computer databases will be useful, but to encourage integrative participation, there should be well-curated collections, natural history curricula, and naturalist art galleries, too. Ardent Sky Island naturalists may need emotional support, as well. We should help these lovers bear the losses they will inevitably witness, as we would console bereaved family members after a funeral. With the guidance of these naturalists we can continue to discover how each Sky Island can be celebrated. We can foster foresight to learn how to refrain from financial exploitation, and instead create positive feedback between social and natural capital. If we are to inhabit Sky Islands as coevolutionists we shall evolve a new system of landscape values — some amalgam of utilitarian subsistence (we need the water), pleasuring ground (we need celebration and meaningful jobs), and sacred reserve (we need spiritual growth and healing). The New Agrarianism is a possible example (Freyfogle 2001). For this greater purpose, we do not need xenophobic raging, but instead inquiries into how each exotic species creates its niche, and how it might be integrated into local food webs and eco-infrastructure. Such basic natural history will inform our own task of becoming less exotic and more native to the Sky Islands.

The wild for me is just that — self-organizing without human control. Weeds may be "wilder" than masked bobwhite quail raised in cages. Which is wilder, a cougar in a zoo or a feral housecat? Thinking as an ecological designer, I might try a compromise predator in Sky Island exurbs: semi-domesticated bobcats that would prey on housecats, but be too small to threaten people. In long-inhabited landscapes the line between natural and cultural is very hazy, but long human inhabitation could still foster biodiversity and the potential to evolve. What is important, I think, is that wildness and diversification are celebrated. ❖

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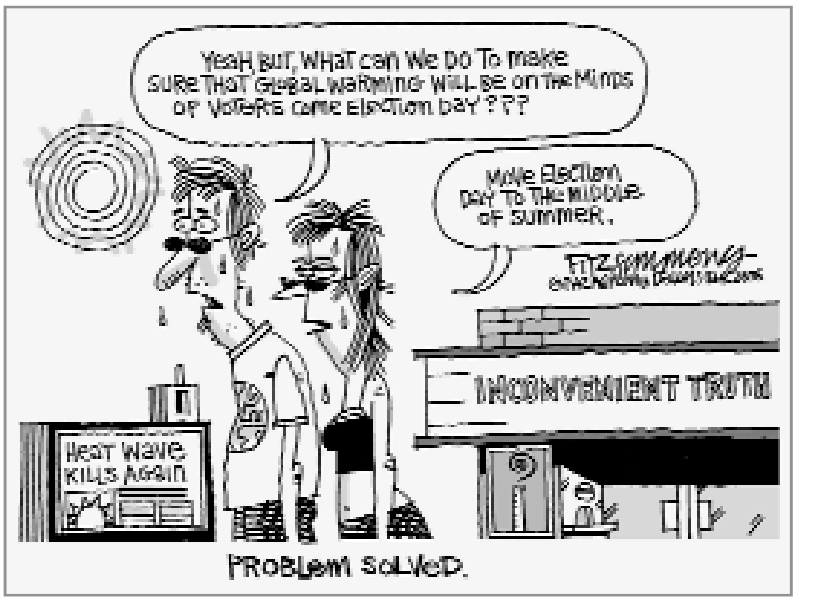
Islands in a sea of change

By Melanie Lenart, Postdoctoral Research Associate with the University of Arizona's Climate Assessment for the Southwest (CLIMAS)



By David Fitzsimmons, reprinted with permission of The Arizona Daily Star.

Weather changes with the winds, while climate changes over decades. At these time scales, mountains don't move. Like sitting ducks, their ecosystems rest among the most vulnerable to the ongoing climate shift of global warming.

In the Sky Islands, global warming can come on the wings of bugs. It comes with a temperature rise that can play musical chairs with species habitat. Through it all, wildfire will likely play a major role in how rising temperatures manifest in the Southwest.

Over the past century, global temperature has increased by about 1 degree Fahrenheit on average, according to analyses by the Intergovernmental Panel on Climate Change (IPCC). Much of this warming has taken hold since the mid-1970s, the start of what some scientists call a climate shift—one largely due to increasing greenhouse gas levels from the burning of coal, oil, gas and forests. They are projected to rise at least 2 degrees and perhaps 10 degrees or more in coming decades.

Temperatures have risen faster in the Southwest than in the rest of the country or the world as a whole. Western Regional Climate Center data show temperatures increased by about 1 degree Fahrenheit a decade in Arizona and by about 0.6 degrees Fahrenheit a decade in New Mexico since the mid-1970s climate shift. Note that Arizona's average temperature increased during each recent decade by the amount the globe warmed overall in a century. Although population growth has impacted some climate stations, the upward trend occurred throughout the state, at rural as well as urban sites.

What's more, the pace of the warming seems unlikely to slow anytime soon. Several recent modeling efforts suggest the Southwest's annual temperature could continue to climb by 0.5 degree to 1.5 degrees Fahrenheit a decade throughout this century.

The rise in temperature from the ongoing warming will have some annual ups and downs, as any climatic factor fluctuates with natural variability. For instance, a major volcanic eruption could temporarily cool things down for a year or so, while a strong El Niño event could heat things up. But IPCC scientists have high confidence in projections that global temperatures will continue warming for at least decades to come, based on existing greenhouse gas levels and the changes they launch.

Even small changes in temperature can make big differences for some high-elevation ecosystems, especially when they occur in winter. On many mountainsides across the West, wintertime temperatures often hover within a few degrees of freezing, as revealed in an analysis by Roger Bales of the University of California-Merced (*Water Resources Research*, 2006). So we can expect a continuation in the West-wide trend toward earlier snowmelt found by Iris Stewart of Scripps Institution of Oceanography and colleagues (*Journal of Climate*, 2005).

Higher-elevation sites are likely to warm faster than their lower-elevation counterparts, according to a global-scale analysis of model projections led by Raymond Bradley of the University of Massachusetts and colleagues (*Geophysical Research Letters*, August 2004). But the researchers caution that a general lack of high-elevation climate stations makes it difficult to detect this difference so far.

At Arizona's highest-elevation climate station—the McNary station above 7,000 feet in elevation—the number of frost days has been dropping by an average of half a day a year since about 1940, according to an analysis by Ann Lynch, a research entomologist with the U.S. Forest Service. At a 2004 conference focusing on the sky islands, Lynch connected the warming to devastating insect attacks. Bark beetles ravaged about 1.9 million acres of Arizona forests in 2003. Later research by David Breshears of the University of Arizona and colleagues supported the case that high temperatures shared the blame with drought for the scale of the damage.

Freezing temperatures tend to keep insects at bay, while longer warm periods can allow them to go through more than one reproduction cycle. So short winters or warm winters of the future could again turn forests into insect fodder.

The variety of insects feasting on Mount Graham's forests in 2003 included an exotic maritime species adapted to a warmer climate. The bug-killed trees added fuel to a fire in 2004 fire that swept through about half of the spruce-fir forest—the only existing habitat for the endangered Mount Graham red squirrel.

Biologists might want to start brainstorming about ways to keep the red squirrel from joining the list of extinct animals, perhaps by dispersing some members of the species further north. If it's not fire, another impact related to rising temperatures is likely to push the spruce-fir beyond its tolerance level and off the mountaintop. It currently occupies only about 1,500 acres at the peak, the mountain's coolest area.

Mountain species are adapted to cooler, wetter climates that come with the high-elevation territory. The cutthroat trout, for instance, needs cool streams to survive. Temperatures in the mountains run cooler than those in the valleys below, a fact that helps explain our attraction to these island oases in a sea of desert. Globally, temperatures drop by about 3.5 degrees Fahrenheit on average for every 1,000-foot increase in elevation.

Lower evaporation rates come with the lower temperatures, allowing moisture to accumulate and support forests, especially in areas where wintertime temperatures allow snow to build up. Mountains also help generate rain and snow by funneling winds and clouds up into the higher atmosphere where they can cool down and precipitate. The combination of lower temperatures and more precipitation allows mountains to support species that can't survive in the warmer, drier desert climate.

Precipitation—or the lack of it—often wields even more influence than temperature in how particular species fare and how large wildfires get. Unfortunately, projecting changes in precipitation remains an elusive venture, especially at the regional scale. While temperature models generally agree on an upward trend, models of precipitation run the gamut from more to less precipitation for the Southwest.

Higher evaporation rates and earlier snowmelt make it likely the landscape will face more severe drying if precipitation decreases, or even if it increases only slightly or inconsistently. Because of this and concerns related to long-term patterns in sea surface temperatures, many researchers worry about a potential increase in long-term western drought as the globe heats up.

At the same time, there's reason to believe the Southwest will receive more precipitation overall as the climate warms, when considering the processes involved. Warm air holds more moisture, and tends to release it in more often in heavy rainfall events. Seasonal rainfall patterns in the Southwest depend upon the jet stream's path, the power of tropical storms and the monsoon's arrival and strength. All of these have the potential to favor us with more precipitation as the climate warms. (This line of thinking is summarized below, but more details and some of the caveats can be found in the *Southwest Climate Outlook* articles available at the website given at the end.) In short, we should prepare for more floods as well as more drought.

From year to year, the jet stream's high-level winds control how much moisture arrives, especially during winter and spring. And El Niño wields a crucial influence on the jet stream's path. El Niño events may become more frequent and long-lasting in a warmer climate, as they arguably have in recent decades. In the Southwest, the odds of enjoying a wet winter and spring go up when El Niño warms tropical Pacific Ocean temperatures near the coast of South America.

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Rising ocean temperatures in the Pacific and Gulf of California could also increase the Southwest's share of tropical storms, swept into the area with the remnants of hurricanes in the fall and with the monsoon in summer.

The Southwest does not fall in a hurricane zone, but tropical cyclone remnants detectably boost regional rainfall tallies, especially in September, as an analysis by University of Arizona researcher Elizabeth Ritchie has shown. Many climatologists expect warming sea surface temperatures to boost hurricane strength, including in the Pacific region that affects the Southwest. But it remains unclear whether this will translate to more rainfall for our region.

Meanwhile, the summer monsoon draws its moisture in part from the Gulf of California. Once the gulf's sea surface temperatures reach about 84 degrees Fahrenheit, daily rainfall amounts in the Southwest increase, especially in Arizona, as researcher David Mitchell documented based on intense monitoring over several seasons (*Geophysical Research Letters*, 2001). A temperature rise on land also spurs the shift in winds that defines the monsoon. Basically, baking mountainsides pull in monsoonal winds and rains with their heat, whether metaphorically blazing in the midday sun or literally burning during fire season.

Oddly, wildfires can rage just as ferociously during seasons following high rainfall, as in 2005, as they can during really dry years, such as 2002. The 2005 fire season broke the record for area burned in Arizona set in 2002, when one of the driest years on record burned nearly half a million acres of mostly forest in the White Mountains. The difference involves whether fires burn in lower-elevation grasslands or higher-elevation forests.

Wet winters followed by dry springs stoke grassland fires. The grasses that flourish within a matter of days of a wet spell soon shrivel up into what firefighters call fine fuel. These grasses can even carry fire into the Sonoran Desert where our classic saguaros live. The 2005 fires spread through more than 700,000 acres, including about 50,000 acres of Arizona desert. Although grasses carry the fire, woody species near saguaros generally deal the fatal blow, something to remember when considering management practices to protect this southwestern cactus species.

Variability in rainfall can boost wildfire hazard in forests as well as grasslands. Several analyses have revealed that a wet winter or spring a year or two before a dry year can boost the amount of area burned in some Sky Island forests. It only takes about 40 dry days to transform the branches and logs firefighters call "thousand-hour fuels" into tinder.

An eventual season of dryness is virtually inevitable in the Southwest, as natural variability in rainfall helps define our semi-arid system. And May and June, peak fire season here, are typically dry. The difference between a wet spring and a dry spring rarely exceeds a few inches of rainfall for both Arizona and New Mexico.

Variability between seasons could actually increase with global warming, as moisture from the previous season can influence conditions in the coming season. A moist El Niño winter is often followed by a weak summer monsoon, in part because the jet stream so favorable in winter and spring can serve as a barrier in summer. Conversely, a dry La Niña winter/spring can help pull in the tropical winds that transport the monsoon to the southwestern United States from its birthplace in Mexico's Sierra Madres.

Global warming is likely to widen the swings between relatively abundant rainfall and times of drought on the landscape, regardless of whether the Southwest gets more or less rainfall overall. Unless spring rainfall rates increase remarkably and consistently, a scenario that is not on the table of climate projections, we should expect more fires during warm, dry springs.

The earlier start of spring snowmelt that comes with warming temperatures is also likely to lengthen future fire seasons, with dry, flammable conditions arriving sooner in the year. The southwestern fire season's end typically depends on the monsoon's arrival, but a sputtering monsoon can boost area-burned tallies in the short-term because of its abundant mountaintop lightning strikes.

For these reasons and others, anything that can be done to make ecosystems more resilient to fire can help as global warming continues to ramp up for decades to come. ❖

More details and some of the caveats involved with the climate concepts summarized here are available in the feature article archive of CLIMAS' Southwest Climate Outlook, *found at* www.ispe.arizona.edu/climas/forecasts/ swarticles.html.

Of Life and Rain

by Sergio Avila, SIA Wildlife Biologist

This summer, at least in Tucson, the rainy season was good. Those of us who have lived in the desert for a long time realize that every time it rains the sadness expressed by old, yellow-colored leaves, dry washes and thirsty animals, changes into expressions of happiness and survival, and the result is a continuation of Nature's power: LIFE. Rain has started a chain reaction in the desert, and the effects are visible if we pay attention to the big signs: the pools, arroyos and rivers flowing; small and large cacti with yellow, orange, red, pink or white flowers; insects flying around these flowers, trying to get some nectar; birds, bats and toads try to get these insects and store some energy to breed; ants and horned lizards, the occasional desert tortoise, deer and javelina babies, and the big cats' quiet trips, are all signs of good times. Everything is connected through the presence of water, and rain is water at its best!

July was a rather pleasant month; with some cool mornings, stormy nights and all sorts of plants growing up here and there. Washes, arroyos and rivers are flowing, at least temporarily; underground aquifers are re-charging; and almost everywhere I look within and outside the city, is green with different tones and shapes, but always green. But when I look at it through somebody else's perspective, I find a sad (and sometimes selfish) approach: destruction and tragedy can be a result of rain too. Continually, people complain about the amount of water everywhere, the closed roads and flooding washes, the trash that it carries, the risks of driving in it; and TV Newscasts make it seem a "big tragedy of deadly consequences". Houses flood and are destroyed mainly because of poor development planning; cars are taken away, possibly because people make the wrong decision of driving in the washes, and there is trash because somewhere up the stream, somebody didn't take care of their garbage can and doesn't care about what happens down the stream. I think most of the outcry is the human side of a weather phenomenon, seen through the eyes of some yellow-tinted newscasts.

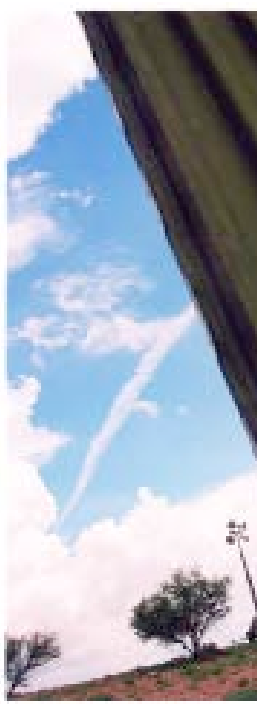
Except in the case of huge climate events like hurricanes or snowstorms, the presence of water is a very positive event for the continuation of life. The results are evident: our Sky Islands and surrounding deserts are a big block of happy ecosystems! But remember: golf-course "lakes," swimming pools, fountains at new developments, misters at restaurants and movie theaters, and human-made dams are not part of the water cycle, do not play a role in Nature, and do not contribute to the natural conditions in our region. In my opinion, those are part of the selfish and ignorant way that humans manipulate water for our own enjoyment.

In this web of life that connects us all, I belong to a tree. The tree I belong to has a wide trunk, strong branches and every year many new little leaves grow from neighbor branches: the branches I grew up with, when we were all small leaves. My family tree has profound roots in Mexico, and even though we don't know where those deep roots and thick branches come from, we know that they are part of the history of indigenous groups like the Chichimeca and the Nahuatl. It makes me happy to think that rain watered those roots and we got to this point, where I'm a little part of that tree and even with some inter-crossing with seeds from Chile, Spain and France, I still look like those Aztec ancestors.

This rainy season I will see the closest branch in my tree, the one I grew up next to and shared space, food, water, sunlight and other needs, have its fruits. The miracle of life, the great power that Nature gives most of us, worked its way one more time, and my family tree is growing a new little flower. This beautiful flower is expected with interminable happiness and hope; the hope for water to help it grow, get strong and sway through the dry times. The hope that rain will connect us all, and that we all connect through water; the hope that this flower has enough rain to grow up, be a juicy fruit and continue enjoying life as the most precious gift that we are awarded.

I just can't get enough with Nature. She surprises me over and over and over again, and I thank rain for connecting each little part of Nature to me. I look forward to the upcoming Spring. ❖

"This flood damaged some of the things we attach value to. But it's Nature. It's natural. The natural purpose of (Sabino Canyon) is to drain water from the Santa Catalina Mountains — and that's exactly what it's doing."
— Heidi Schewel, US Forest Service



clockwise, from top left:

Bootprint. This man's bootprint is one of ten footprints, agents spotted a half mile south of where the group was apprehended.
August 2006, Douglas, AZ

Lunch break. Agent J. makes time to eat his lunch while driving.
April 2006, Santa Ritas, AZ

Fabrication. The Douglas Border Patrol station begins building another section of the border fence using landing mat materials from the Vietnam era.
January 2006, Douglas, AZ

Intersection. This steel mat is the end of the landing mat border fence and the beginning of the chain link section of the border fence in Nogales. Lights in the background add illumination to border activities at night.
August 2006, Nogales, AZ

Recovery. The border patrol's search and rescue team, BORSTAR, prepares B. to be flown by helicopter to a hospital for further assistance. B. developed complications due to exposure, after walking for four days with her daughter from Mexico.
February 2006, Arivaca, AZ

Break. A section of border fence that has been cut and entered illegally by vehicle traffic numerous times. Through this site of recurring repairs towers the Fresnal Mountain in Sonora, Mexico.
August 2006, Douglas, AZ

Aperture. A view into the United States from Mexico.
December 2005, Naco, Sonora

Refuse. Remnants of people who crossed the border.
January 2006, Nogales, AZ

Alien. Water jugs—one of the most prominent pieces of garbage found in border areas. *August 2006, Nogales, AZ*

Security. A poster in a training classroom at the Nogales Border Patrol station.
January 2006, Nogales, AZ

Cycle. A bicycle hangs on the border fence. Many people ride bikes on their journeys to Phoenix via Mexico. Many paths near this section of fence, are also frequented by drug smugglers.

On Migration

Photos & essay created by Emily B. Hertz. She currently lives in Tucson and picks up trash in southeastern Arizona.

Needle and string. Virgin Mary beach towel. Cans of tuna. Bus ticket stubs. Voter registration cards. Pesos. Baby bottle. Fleece-lined corduroy jacket. Pornography comics. Multi-colored oxford shirt. Cloth rosary. 10-speed bike. Red training bra. Fleece onesie.

I remove evidence of human migration and trespasses on U.S. soil. This is my third year as a conservation intern.

I came to Arizona because I love the land. The jagged red rocks, cobalt blue skies, and 350 days of sun. I came to Arizona to understand more about the land, the rocks, the plants, the people, and the relationships between them all in the Sonoran desert. I came to Arizona because I was interested in the people crossing the border. Why? Who? How? Where are they now? Did they make it? Are they happier? I still ask myself these questions.

I had my own concepts about the border situation before I moved here. In line with the contemporary obsession to vilify and glorify, I too, had cast the heroes and villains, unaware that I would end up working alongside the entire cast. Border patrol agents. Ranchers. Environmental advocates. Military personnel. Human rights activists. Law-enforcement agents. Hunters. Mothers. Fathers. Sons. Daughters.

People.

Most media doesn't have the time to delve into complexity. Most people aren't privy to the stories I hear everyday. Being followed home after work. Giving birth in the desert. Finding abandoned children. Finding abandoned parents. Being threatened at gunpoint. Giving a ride to kid and his bike en route to Phoenix from Mexico. Finding human bones. Cutting fences. Breaking open water pipes used for cattle. Feet, without soles—worn away from walking. Roads spider-webbing the landscape. Washes full of trash up to mid-calf. Many times I have come home from working in the desert, having made choices or having heard or seen things that really challenged and questioned my life philosophy. At times I have gotten headaches, nauseated, or vomited. I have vented to friends or cried. And afterwards I usually write. But I've wanted to understand the issues I've been confronting more in depth — to come to a place of understanding about the history that's being created, from all perspectives.

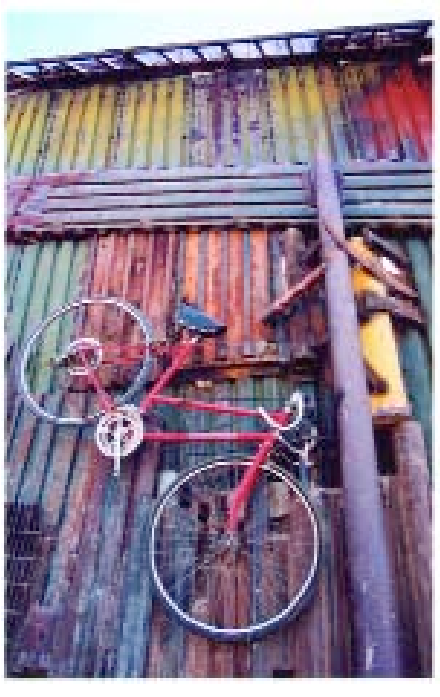
Since January, I have been writing, recording conversations, and taking photographs of the Border Patrol. Border fence. Rescues. Tracking. Infrastructure. Firearms. An agent's day-to-day activities. This agency is the first segm of five. I plan to also photograph a loc person who works with a variety of hu organizations, a person who works fo environmental advocacy organization immigrant.

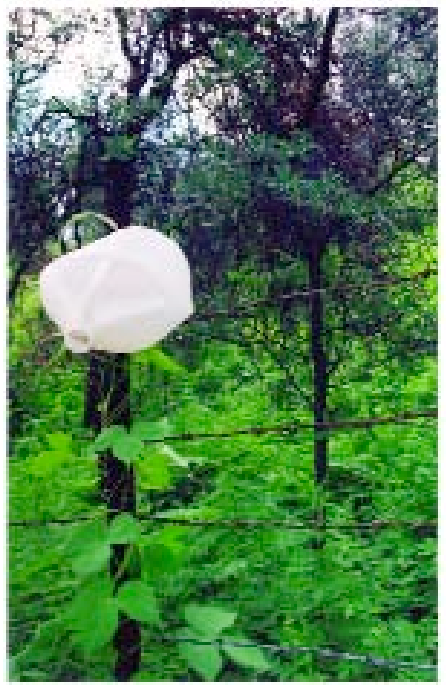
My journey is about seeing people entirety. It is about juxtaposing the ste the ordinary. It is about taking a mom beyond the image and listen to the sto it is about seeing ourselves in each oth

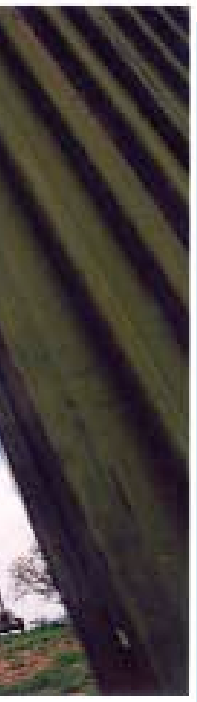
Today I opened a small black bible months ago in the desert. Green, pink marker highlights, adorn bible passag love, courage, hope, and fear are lightl Spanish, on rice paper for someone na

"I love you with my heart, with my b mind and with my soul. I love you so can't bear it. Remember me and don When you sit alone watching the sky remember where you are from, you a those stars that are together and noth separate them, although years will pa love."

Did she leave this bible behind? W going? Who penciled in the passages a the bible? Where is she now? Where i Did she make it to her destination? D caught? Did she see me?







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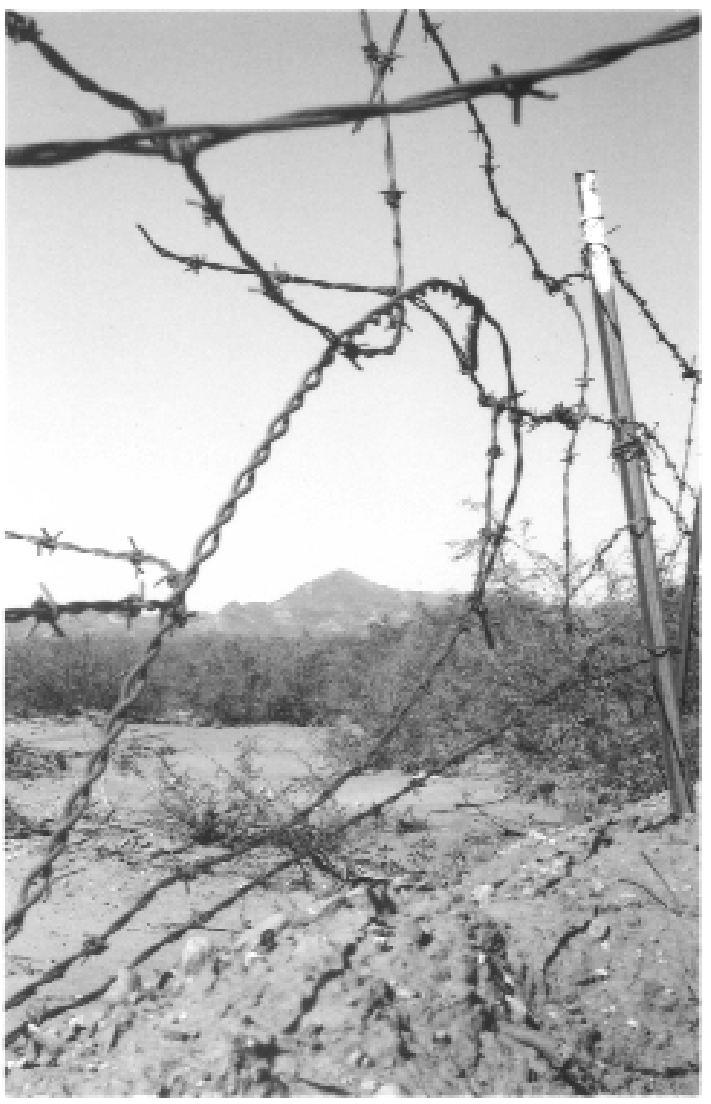
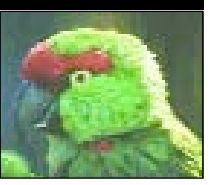


Cool as the jaguar, less baggage than the wolf: Bringing back Arizona's native parrot



By Eva Lee Sargent, Ph.D., Southwest Director, Defenders of Wildlife

Flocks of bright green, red headed parrots squawked in the Chiricahuas not too long ago, and it's time to bring them back. Thick-billed parrots (*Rhynchopsitta pachyrhyncha*) were extirpated from Arizona by the 1940s, probably by overhunting. Unlike the extinct Carolina parakeet (the only other parrot found in the continental US), it isn't too late to give the thick-billed parrot another chance. The species, which is endangered, still survives in the Sierra Madre Occidental in Mexico.

These parrots are unusual and delightful. Unlike most parrots, they occupy high altitude temperate forests, often roosting in the snow zone in winter, and sometimes eating snow as a water source. They have an extremely specialized diet of pine seeds, supplemented at times with acorns and conifer buds. Some populations migrate long distances annually, and almost all thick-billed parrots migrate at least sporadically to find their preferred foods. On long flights they fly in formation like geese, and their loud calls in flight sound like people laughing. The thought is irresistible — a flock of big, beautiful, green, red and yellow parrots, laughing while flying over the snowy Chiricahuas — and these birds are a part of our heritage. Like Mexican wolves, jaguars and ridge-nosed rattlesnakes, thick-billed parrots belong in the Sky Islands.

An experimental reintroduction program for thick-billed parrots took place in the Chiricahuas from 1986 through 1993. The project used a mix of confiscated birds (i.e. birds that were confiscated by the Fish and Wildlife Service after being smuggled into this country) and captive-bred birds. Although no permanent population was established, and the released parrots suffered predation by hawks and years of lean cone crops, there were successes — the birds formed flocks, found food, migrated, and reproduced in the wild. Most importantly, the project demonstrated that wild-caught, translocated thick-billed parrots have good potential to re-establish the species in Arizona, and it laid the groundwork for another effort in the future.

The future of thick-billed parrots in Arizona depends upon their fate in Mexico. Because the parrots need intact pine forests they are in real trouble. Large scale logging in the Sierra Madre Occidental is rapidly converting old-growth forests into miles and miles of uniform, immature pines. These may provide some food but are not usable as nests, and suitable breeding sites are fewer each year. Fortunately, a long-term research, monitoring and conservation program, lead by a team from ITESM (Instituto Tecnologico de Estudios Superiores de Monterrey) in Monterrey, Coahuila, has been underway since 1995. The thick-billed team monitors population numbers, chick survival and forest conditions in nesting areas, performs experimental translocations between sites, and works within communities to protect and enhance habitat. They are also working to unravel the great thick-bill mystery. Despite years of searching, interviewing, and radio-tracking attempts, no one knows where the thick-billed parrots, which are studied at their summer nesting sites, go during the winter. This information is vital, because these unknown wintering areas also need protection.

There appear to be fewer than 2000 thick-billed parrots left in the wild. It is critical that efforts to re-establish extirpated populations in both Arizona and Mexico be accelerated. Re-establishing the parrot in Arizona is not a feel-good luxury, it is an extension of range into suitable habitat that is not threatened by logging, and it may be vital to the species' survival. In order to guarantee the long-term survival of thick-billed parrots, it will be essential to restore them to multiple places in numbers large enough to protect against natural or manmade disasters and with enough connectivity to other populations to provide for dispersal (and therefore gene flow) between populations. The first step is for populations and habitats in Mexico to be secure enough to provide birds for translocation to other sites, so that a chain of populations can be established from Durango to Arizona. The thick-billed parrot's charisma and plight have brought it some allies, including wildlife agencies in both Mexico and the US, and a broad mix of nonprofit organizations including the World Parrot Trust, Pronatura, Defenders of Wildlife, and of course Sky Island Alliance. All of these groups are working together to foster the resources, expertise and will needed to save the thick-billed parrot. We need more thick-billed parrots in more places, and to accomplish that, they are going to need friends on both sides of the border, cheering them on and making sure they return to their rightful homes.

South African scientist brings hope to Arizona's rivers

By Melissa Lamberton

In a conference room in Guatemala City, Dr. Jackie King stopped her presentation and put a new picture up on the screen. African boys smiled out of a summer landscape.

"Here's your target species," King said. "They are little boys of about ten years old. What do they want? They want to play a game called Poohsticks."

I knew the game; no one else did. I played it as a child in the muddy flash floods of my Arizona home, in love with the cheerful world of A.A. Milne's famous book. Sticks specially chosen for some easy-to-identify feature are dropped into the water at a certain point, and then chased—in a riot of shrieks, laughter, and splashing—to another point, where the winner's stick is lauded for its navigational skill.

What would these boys want from a river? Certainly not the same things that a fish or a crocodile would require, which is what the scientists, journalists and policymakers in the room had been discussing until now. Little boys would want sand underfoot, not sharp stones on bruised feet. They'd want quick clear running water. They'd want a river that would never run dry.

King is a pioneer in the field of environmental flows. She has advised the World Bank and the World Commission on Dams, and lectured in countries all over the world. In August, she traveled in Central America before visiting Arizona for the last of a series of multinational water conferences. In a summer landscape and a drying world, she has become a voice for rivers.

The United States could learn something from South Africa's children—and its government. With Nelson Mandela's post-apartheid administration, South Africans had the unique opportunity to completely rewrite their country's water law. Government officials published their proposed "Principles" and asked for feedback from the people. Their response: we want our children to have water. Conserving environmental resources wasn't a pastime for the elite. It was a way of life.

King was one of the scientists who showed that a river's health depends primarily on its flow: the pulse of floods and natural droughts that regulates the life cycles of insects, cues fish to spawn, and shapes the diversity of life within the ecosystem. In the desert, spring flows after snowmelt triggers cottonwoods to disperse their seeds onto rich, new soil. Summer floods scour the riverbanks, calling toads out from hiding. This ebb and flow of life depends on the timing of water, just as much as the amount.

Dr. Jackie King. *Photo courtesy the author.*

The concept that nature has as much right to water as people became the foundation of South Africa's national Water Act. This law guarantees water for the basic needs of South Africans—drinking, cooking and sanitation—as well as for the ecosystem itself. All uses outside of this "Reserve," including industry and agriculture, require permits.

Unlike South Africa, America has no opportunity to start over with a blank slate. Scientists and concerned citizens are attempting to work within our system of overlapping and competing water rights to preserve our future drinking supply. Within the last century, intensive groundwater pumping has sucked the life from the rivers of the West, which once braided the landscape in green. King's work has the potential to help us bring back these linear oases, but our complex legal system is a daunting obstacle.

During her visit to Tucson, King commented on how easily we dismiss the importance of the ephemeral streams that flow in our cities only a few times a year. "No doubt you have lost as well as gained," she told politicians and scientists at a roundtable at the University of Arizona. "You just can't remember what you lost now because it happened so long ago."

We have not lost all our rivers. Last year, a section of the San Pedro went dry for the first time on record. Over four million migrating songbirds depend on trees whose roots no longer reach the aquifer below. One of the last remaining perennial rivers in the West, the San Pedro is endangered by the water demands of Sierra Vista and nearby Fort Huachuca.

Nationally recognized as an important birding area, the riparian habitat of the upper San Pedro is second in mammal diversity only to the rainforests of Costa Rica. Unlike the Colorado, the timing of this river's flows has not been altered by dams, but by a less obvious modification. Groundwater pumping in the San Pedro basin has exceeded the aquifer's ability to replenish itself—a deficit that is growing. Most likely, we won't notice the services the river provides—economic as well as aesthetic—until visitors look down on an empty arroyo.

Water law in Arizona treats surface water and groundwater as separate, although science now shows them to be intimately related. A lowering water table puts our few remaining rivers at risk of becoming like the Santa Cruz in Tucson, which only fills with water during floods. Water is still allocated by a "first in time, first in right" policy, created in the Gold Rush days by miners illegally trespassing onto federal lands. When water is scarce, the first claimant can receive his or her full allocation of water, and the last must take what's left.

Dr. King giving a field lesson at a river in Guatemala. *Photo courtesy the author.*

The science of environmental flows has emerged only in the last two decades. King's work was perfectly positioned to find a place in South Africa's new government. But here in Arizona, new laws claiming that the environment has a right to water must compete with old laws that give the previous users a higher priority. Like a blood donor who does not have a right to her own blood, rivers relinquish themselves to the demands of industry and agriculture.

South Africa's experiment in water law is a social contract between not only the government and the people, but the people and the world in which they live. Written into its language is the fundamental understanding that ecological health serves the common good. With this understanding comes a promise. In South Africa, rivers will not be silent and aquifers will not run dry.

How will the idealistic language of the law translate into real life? The greatest hurdle is the one we all face: there is simply not enough water. But the government intends to make good on its promise, even if that means standing up to the demands of its own citizens. "The old government said, 'If people need water, we must supply it,'" King told a University of Arizona audience. "The new government says, 'We live in a dry country. Get used to it.'"

Around the world, developing countries are writing sustainable water laws with the understanding that nature's rights are inextricably tied with the rights of future generations. Yet our own Constitution has no overarching vision to regulate allocations of water. What would it take for the United States to follow South Africa's lead in making policies that call for freshwater reserves, recognizing that the timing of river flows cannot be altered with impunity? In 1746, Benjamin Franklin wrote that when the well's dry, we know the worth of water. Today, wells all over the west have gone dry, only to be dug deeper. It is the environment—and our children—who pay the higher cost.

Reversing the destruction of our future drinking supply requires an intimate understanding of each watershed's workings—the natural rhythms of river, rain and aquifer and how each interacts with the other. But it also requires a clarity of vision that our water policies currently lack. We need to allow rain to flow in the rivers again. We need to understand that water given back to the chub and flycatcher is water preserved for our children's use as well.

If we cannot remember what we lost, at least let us begin to recognize what we still have. When the first

continued

Our Last Desert River

by Dr. Robin Silver

(This article was originally published this Summer as an op-ed in the Arizona Republic.)

The *Arizona Republic* deserves generous praise for timeliness and courage in presenting Shaun McKinnon's series on the state of Arizona's struggling rivers. "Why save a desert river?" we are now asked. The fact that this question is even asked speaks volumes about the general state of our Nation and current leaders' conservation ethic. We answer with the San Pedro as our case in point.

Arizona's San Pedro River is the last surviving free flowing, un-dammed desert river in the Southwest. Seasonal flooding still rejuvenates its streamside vegetation. Cattle are not permitted to devour its young trees. The San Pedro's cottonwood/willow forest is the best surviving example of the rarest forest type in North America.

"Beautiful," "peaceful," "restful," "replenishing," "invigorating" and "inspirational" come to mind when describing this remnant treasure. Congress officially recognized the upper San Pedro's value and uniqueness on November 18, 1988 by creating the San Pedro Riparian National Conservation Area. In 1993, Life Magazine recognized the area as one of "America's Last Great Places."

President Theodore Roosevelt believed that "there can be no greater issue than that of conservation in this country." That "…wild beasts and birds are by right not the property merely of the people alive today, but the property of the unborn generations, whose belongings we have no right to squander."

Our current political leadership is reticent to protect natural treasures such as the San Pedro. They undermine or even outright ignore mandated protection.

The San Pedro is under siege on multiple fronts:

⚹ San Pedro stream flow during the driest times of the year seeps directly from the groundwater aquifer into the River. Groundwater pumping supporting excessive, unmitigated groundwater-dependent local growth increasingly intercepts groundwater ordinarily providing San Pedro stream flow. Fort Huachuca's local spending fuels most of this growth.

⚹ The San Pedro has not received its share of congressionally legislated and quantified water for most of the time since Congress' 1988 recognition.

⚹ The water supply from the Sierra Vista area's sole source aquifer is already over-allocated. An adequate supply of groundwater does not exist there to satisfy current reserved water rights nor any future claims.

⚹ Arizona Department of Water Resources (ADWR) denies the existence of San Pedro Federal water rights by pretending that San Pedro source groundwater and its stream flow are not connected. The Bush Administration has not challenged this fiction in spite of the fact that it has been debunked in Federal court on multiple occasions.

⚹ ADWR and local developers falsely represent the adequacy of the areas water supply. Thousands of new homeowners unwittingly purchase homes without secure future water supply. In the not to distant future, spigots coming on line after November 18, 1988 will inevitably be turned off. This is the date of congressionally legislated San Pedro water rights. Arizona consumer fraud statutes are designed to prevent such a scenario by prohibiting the act or use of deceit, dishonesty or deception in connection with the sale of real estate. Arizona's Attorney General is not enforcing the law.

⚹ Arizona Department of Environmental Quality refuses to enforce requirements for mitigation by groundwater-dependent developments. The Bush Administration defends instead of challenges these violations.

⚹ Fort Huachuca recently warned the City of Sierra Vista that the Base's future is in jeopardy if the City does not do more to solve the local water problem. Despite this warning, the city approved a new development that will increase its groundwater dependent population dramatically without significant new long-term mitigation.

⚹ Sierra Vista's attorney says, "There is only a finite amount of water in the aquifer that the Fort and City share…any award of groundwater to the Fort means less groundwater remains in the aquifer for the City." Sierra Vista counts on continued inaction by Federal and State officials.

President Roosevelt believed that "spring would not be spring without song birds…" Millions of songbirds migrate through the Southwest every year to and from their wintering grounds in Central America and Mexico and their summer breeding grounds in Canada and the northern United States. For tens of thousands of years, they have depended on river corridors for shelter, food, and water during their transit. In the past, the rivers Rio Grande, Gila, Salt, San Pedro, Santa Cruz, and Colorado formed these corridors. Today, only the San Pedro survives. More birds than ever now depend on the San Pedro on their migration.

President Roosevelt believed that "conservation is a great moral issue." He recognized that Noah obeyed God's command to bring all creatures on his Ark to assure their survival and to sustain the wonderful biological diversity that graces our World.

Nearly 45% of the 900 total species of birds in North America utilize the San Pedro at some point in their lives. The San Pedro has the highest bird diversity of any place of its size in the country. It supports the highest variety of mammal species in the United States and the second richest on Earth. Only the montane cloud forests of Costa Rica hold more. In addition, 47 species of reptiles and amphibians are also found there. Federal, State and local officials are literally throwing Noah's charges overboard by not protecting the San Pedro.

Saving the San Pedro is really about our own individual and collective core values. It is not important whether we save the last desert river for its beauty, inspiration, importance to songbirds, unique biological diversity, for future generations, morality, or merely because my four-year-old thinks it is "way cool." Pick your own reason. It is important only that it survives.

Federal, State and local officials will not save the San Pedro. Only determined citizen action will save Arizona's and the Southwest's last surviving free flowing, un-dammed desert river. Please join us as we continue to do everything possible to save the San Pedro. ❖

Dr. Robin Silver is Co-founder and Board Chair of the Center for Biological Diversity. The Center is a non-profit conservation organization with more than 25,000 members dedicated to the protection of imperiled species and habitat. Dr. Silver is an Arizona native, a local Emergency Room physician, and a professional photographer. He is also Vice-president of Maricopa Audubon Society.

San Pedro River at Charleston.
The U.S. Geological Survey (USGS) streamflow-gaging station (09471000) at this site has been active since the early part of the 20th century. This photograph, taken on July 11, 2005, by USGS hydrologic technician Josh Ayers, shows no-flow conditions at this site. This is the first occurrence of no-flow conditions in the data record from this station.

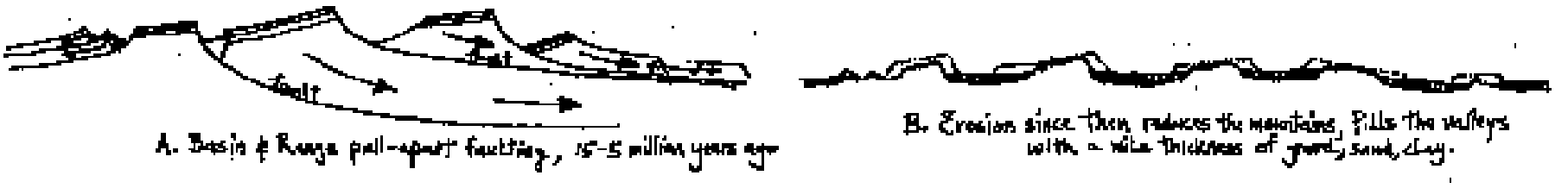
For additional information for ongoing USGS activities along the San Pedro River, link to **az.water.usgs.gov/projects/AZ17801.htm**

Hope to Arizona's rivers *continued*

settlers came to the West looking for gold, they found veins of water instead. Rivers like the San Pedro were the only real currency of the land. We have mined that resource for more than a century, impoverishing the land. Like South Africa, we need to move forward. This will become my generation's march—not for suffrage or civil rights, but for rivers that never run dry.

A week after King's visit to Arizona, I walked down to an arroyo near my home. The last of the summer floods had written their hasty signature over the landscape. Dark pools fell into muddy cascades, murmuring reassurances to the stones.

I found a flat stretch of water with sand underfoot. I hunted for a stick. ❖



A Geologist's Basin and Range

By Bob Scarborough, consultant

Welcome to Basin and Range country, the only such recognized province on planet Earth. Geologists who come to Tucson from afar usually ask, after a view of the land out of the airplane window, 'What ever happened here?' It takes awhile to tell the whole story, but we usually get the point across.

Basin and Range is defined as that portion of western North America whose physiography is dominated by a series of long skinny mountain ranges separated by broad, wide, flat valleys, all in parallel, more or less. The spacing between adjacent range crests is some 25-35 miles. An early geologist of the region, G.K. Gilbert noted almost 100 years ago that if viewed from far above, Basin and Range resembles a mass of giant caterpillars marching northward towards Wyoming, where, I will add, they're stopped by the cold. The biggest streams of the region like the Salt, Verde and Gila Rivers do very strange things, as examination of a regional map will indicate. All these streams course down a single valley for many miles, then abruptly turn and cut a deep gorge through a mountain range, to exit on the other side where it picks up the next valley, and then proceed on. This strange kind of downhill behavior on the finer scale produces an end result that Nature seems to have planned for on mega-scale — the streams all manage to converge near the head of the Gulf of California (Sea of Cortez), thus somehow fulfilling their aqueous destiny for the grand water cycle. The meanest tallest mountains of the region, it seems, are mere trifles when compared to thin bundles of running water. Just exactly how all this was accomplished has yet to be understood. Still, other streams like the Santa Cruz and San Pedro behave more like streams ought to — they maintain their course straight down a single Basin and Range valley over most of their length.

Some valleys remain isolated from the regional through-flowing stream system, but are very easily spotted, as they each have a dried-out salty lakebed at their low spots — examples being Willcox and Lordsburg 'playas' cut through by I-10 headed east out of Tucson, or the Salton Sea in southern California near Palm Springs. These lakes were full-up, and all the streams with lots of water, back in the many Ice Ages that have graced the land over the past two million years or so. Along the road from Willcox to Chiricahua National Monument, you pass through a sizable sand dune field astride Willcox playa, blown into shape by powerful winds during the stormy times of the Ice Ages.

Basin and Range clearly covers a fair portion of the montane West. We can track this skinny range-valley-range appearance over a large region, southwards to the other side of Mexico City; northwards easily to southern Oregon and just touching Wyoming; west to the mighty Sierra Nevada of California; and eastward to El Paso, Texas. I count parts of eight western states and six or more states of the Republic of Mexico. Classic Basin and Range country totally dominates the scenery along Highway 50 east out of Reno, Nevada, all the way to Salt Lake City, Utah, where you view the very large Great Salt Lake, partially dry but partially flooded. At the latitude of Tucson, Basin and Range mountains and valleys progress from El Paso westward through Tucson and all the way to the base of the big southern California granite mountains west of El Centro. Within Arizona, as one travels northward, Basin and Range yields first to highland mesas and deep canyon country we call the 'transition zone' (like the Verde Valley environment), then, once over the amazing south-facing cliff called the Mogollon Rim (seen well just north of Payson), the land quickly changes fundamental character and becomes the southern edge of the Colorado Plateau, a vast eroding series of tablelands that really extend into central Wyoming.

Any outdoors-type well knows the grandeur of the region's lofty mountains, termed 'Sky Islands'. In places they stand out bold 5-7 thousand feet above the floors of nearby valleys. Mt Lemmon, Mt. Wrightson, Kitt Peak-Baboquivari Mountain, and Mt. Graham are certainly local favorites. Besides being treasure troves of bald geology, ripe for the plucking, they are part of the big ecologic picture that rewards our region with the highest plant diversity in North America, built up layer by layer in ascending bands from the sea level hyper-deserts along the lower Colorado River, to the Canadian spruce-fir bands atop the tallest peaks. I especially like to hike up into the alpine tundras above treeline on Mt. Baldy north of Silver City, or on the San Francisco Peaks at Flagstaff (though perched on an adjacent geo-province called the Colorado Plateau).

Geologists now understand SOME of the geologic origin of this large region, but don't fret, some big mysteries remain. We recognize a two-step process. **FIRST,** the Basin and Range country was host to a very major volcanic event whose product was fantastic quantities of internal earth heat and masses of rhyolite. Examples of the large rhyolite volcanoes are found at Chiricahua National monument, in the Superstitions, Kofas, Galiuros, Organ Pipe and Tumamacori Mountains. These volcanoes were blowing as far north as the large Absaroka field at Yellowstone National Park (not exactly the parent of modern Yellowstone).

All this heat delivered to the surface is a sure sign BIG things were happening underneath. We sense a huge flat tear within the crust, foundering of mush rocks downward, replacement by very hot magma material. The biggest rhyolite massif known *in the world* is the entire Sierra Madre Occidental of western Mexico (Copper Canyon country), an elongate series of huge volcanoes blowing and smoking its way into existence at this time. The *largest single volcano* of this episode is the beast called the Timber Mountain caldera north of Las Vegas, Nevada, upon one arm of which the Nation is now preparing to bury all its high-level nuclear waste. For anyone who has visited Gila Cliff Dwellings north of Silver City, you've stood on the eastern flank of another big one, called the Bursum caldera. A caldera is a volcano that forms a circular central collapse valley some time in its eruptive history. Overall, this volcanic event occurred some 40 to 15 million years ago. The modern world inhabited by people has not witnessed a big rhyolite blowout like these — the biggest in historic time was Tambora, Indonesia, in 1815, about 1% of the ferocity of the BIG ones. Yellowstone just might be big.

The heat-softened continental crust then underwent **Step two,** a stretching due to pull-apart forces acting in the molten earth under the crust, and the land merely broke apart into many disjunct blocks, most of which were long and skinny. The first of the two-part diagram shows this. The best simple analogy is to take a hard chocolate-coated candy with creamy caramel nugget center. Don't eat it, crush it thoroughly between your fingers, slowly. Then stretch it apart a bit. The gooey part is the softer hotter rocks of the lower crust that pulls apart smoothly. The hard brittle chocolate coating snaps into pieces, and each piece slides along sideways with the gooey mass, while retaining its original character. The brittle chunks kind of represent the mountain blocks, and the bare caramel is the valleys. The family dog, by this time, is well prepared to consume the experiment so let him. The elevation of most valley floors wound up some 10,000 feet lower than the mountaintops, then became where one-mile thick piles of sediments were washed and accumulated. The slight importance of these bathtubs full of sediment, is that they are also filled with groundwater, our ONLY source of water. (CAP waters only come when the Colorado is flowing.)

Basin and Range faulting action occurred mostly between 15 and 5 million years ago. Minimal faulting has occurred in our region since then. Northern Basin and Range (#2 on the map) is just breaking open and forming now. The last big shaker in our region was in early May, 1887, 2:30 P.M., centered south of Douglas, killing 51 Mexican citizens when an adobe-walled church fell in on them. Headlines in the *Tucson Citizen* next day read, "Volcano Erupts in the Catalinas", as they mistook a series of forest fires set off in the high country by rolling boulders, for a volcanic eruption. Basin and Range faulting is still alive, just barely.

Remember the mystery of the streams that cut gorges through the mountains, to get to the other side? We figure these are *antecedent streams*, whose paths were established to the ocean before Basin and Range faulting happened, and the stream power just kept cutting deeper notches as the valleys sank and the mountains rose.

There's one more big feature associated with Basin and Range sky islands, as drawn in the figure. After the ranges and basin valleys were made, streams by the hundreds cut side canyons into the mountain flanks. Over ten million years the

continued

Basin and Range *continued*

streams cut out a flat beveled shoulder of hard rock all around the mountain range, then buried it under a thin veneer of gravels. These shallow-buried bedrock benches are called pediments, and are a major problem for any person wishing to dig a water well near a mountain front — bedrock has little to no groundwater.

Basin and Range country has been here for the last 0.01% of geologic time on this planet. Past oceans have drowned the land, sharks have swum through it, starfish crawled upon it. Entire mountain chains the size of the Himalayas have turned to dust, their remains sit as so much mud off some coastline. Cataclysms of questionable origin have reduced life on Earth to feeble status, from which it has admirably recovered, some five times. Sand dunes five times the size of Arizona have blanketed, and ash from a million volcanoes, all before this latest fun episode of Basin and Range. Sunset glories have tainted the land to shades of fire red. Dinosaurs have walked down along some sediment layer buried beneath Grant Road, paying no heed at all to the traffic lights some 65 million years hence. The land has come a very long way. But where heads Mankind? ❖

Bob Scarborough gives a more indepth discussion of this topic in A Natural History of the Sonoran Desert *(ASDM/University of California Press, 2000).*

Lasting Impressions

by Diana Freshwater, Executive Director, Arizona Open Land Trust

Sometime in the early 1980s, when I'd been in Tucson a few years, my grandfather and I set off on a day's outing towards Peppersauce Canyon. We would be driving some of the dirt roads that crisscrossed the northwest side of the Santa Catalinas. Though the gas tank of his old Buick was over half full, we stopped for more gas, and even my short acquaintance with these automotive ramblings with him told me that this stop for gas meant an all-day trip. We got some sandwiches, too.

My grandfather first came to Arizona in 1912 to begin his life as a teacher in a country school on the Blue River in Greenlee County. He was eighteen. Several years later, after he came to live in Tucson, he learned of another country schoolteacher, who had started out by teaching in small remote Arizona schools when she was about the same age as he had been. Her name was Eulalia ("Sister") Bourne. She would go on to teach in several country schools and publish *The Little Cowpuncher,* a mimeographed newspaper written and illustrated by her students. But he had never met her, and that day of our little roadtrip, he was determined to remedy that, even though he was not quite sure where her ranch was. His acquaintance with the area was long, though, and I think he reasoned that sooner or later we would stumble across her ranch if we just followed our noses

Cerro Colorado. *Photo courtesy the author.*

long enough. And we did. Just before dusk we pulled up to her ranch house, and she was home. She was quite surprised to have visitors, and, after introducing ourselves, we waited near the corrals while she returned to her house to put a bandana over her hair and the apparently trademark pass of red lipstick over her mouth. When she returned, we met the few cows she still had about the place and heard about the troubles of some others on another part of her ranch.

Then the two old teachers began reminiscing about a way of life that had already disappeared: broad tough landscapes that afforded little ease to those who lived in them (except for the traveler, who could count on hospitality at whatever spot of civilization he or she came to at the end of the day); and the robust responsibilities of country schoolteachers in the tight communities that made their living in that tough landscape. But mostly I remember getting a deep sense of just how much these two, both in their nineties, were still awed by the simple beauty of this Arizona landscape. As we stood out by the corral in the setting sun, the joy of it still resonated in them.

As all of us have become acutely aware of over the last several years, southern Arizona is undergoing unprecedented growth. We've all heard this change reduced to numbers. Governor Napolitano, for instance, often recalls that when she came to Arizona in 1983 there were 2.5 million people here. This year there are more than 6 million people in Arizona. It is estimated that by 2025 there will be 15 to 20 million people in Arizona.

It's impossible to ignore the obvious signs of such growth on the landscape. Near town, there are new roads, new sewer and water lines, red-tiled roofs, big box stores like Wal-Mart, and planned communities. Further out, there are vast stretches of open rural ranchland being converted to seemingly endless numbers of 5-acre to 40-acre ranchettes. This latter pattern of unregulated development has a huge impact. In addition to marring viewsheds, fragmenting wildlife habitat, lowering our groundwater table, and impacting our air quality, it is a significant drain on the system — especially in Pima County. These "ranchettes" typically are not served by sewer or water, so each homeowner drills a well and installs a septic tank. It turns out that this pattern of land use accounts for a huge allocation of a community's fiscal resources. Because these homes are in remote places, public services — such as emergency services — are expensive to provide. As appreciable as is the fiscal impact, the loss of the vast open landscapes is even more significant. As wildlife habitat is splintered, southern Arizona's unmatched diversity of plant and animal life is vanishing.

The large unbroken landscapes, formerly given over to ranching or farming, which now support these much denser uses, were sold by owners who answered to tremendous pressure to sell their properties for previously unthinkable amounts. These pressures include prolonged drought, increasing production costs and rising property taxes. In fact, in Pima County, there are only a handful of landowners left with holdings greater than 1,000 acres. The question we ask ourselves at the Arizona Open Land Trust is what can we do to relieve some of these mounting pressures and help to keep landowners on the land. Our goal is to protect open landscapes and the uses that will keep our landscapes free from unregulated development, while encouraging development in areas that are already supporting population and have infrastructure in place.

Within the context of the Sonoran Desert Conservation Plan, which is guiding future growth in Pima County, the Trust worked with The Nature Conservancy to identify high biodiversity priorities. Although the Plan initially was a response to endangered species, it was soon recognized as a plan that would also aim to protect quality of life. The Plan is remarkable for its foresight and for the fact that it is being implemented effectively. And the large landscapes, often in ranching, that are being protected because of the Plan are a significant component of the conservation framework. In fact, the largest single acquisition of private land in Pima County protected a working landscape that is 13 miles wide — roughly the distance between Mission and Houghton Roads. The benefits realized in terms of groundwater supply, air quality, preservation of wildlife habitat and scenic views are invaluable. More recently the Trust has developed the Family Lands Protection Fund to assist landowners throughout southern Arizona to protect their land in perpetuity. The Fund is established to provide information and services to those facing decisions about the future of the family lands.

The citizens of Pima County have shown their support for protecting southern Arizona's open spaces by passing open space bonds over the years, including the 2004 open space bond. What is happening right now in Pima County may be a model for other southern Arizona communities to consider. I think this willingness on the part of our citizenry to support conservation with such reasoned vigor is, in part, because the past is still visible to us in our daily lives. We still enjoy our western heritage — the vast open landscapes enriched by mountain ranges, clear running streams, and an unmatched diversity of plant and animal life. And we don't have to go far to be right in it. That day so long ago, when I stood in the twilight with my grandfather and Sister Bourne as they cast their minds back to their early teaching days, was the first time I recognized the strength of this heritage — and the impression of it has never left me. ❖

Picturing the Heart and Soul

by Michael Berman, photographer

I photographed the desert along the SW Arizona and Sonora border for seven years. I called it the Gran Desierto after the giant sand dunes on the north end of the Sea of Cortez. It is a big landscape with names like the Pinacate, the Cabeza Prieta, Organ Pipe, and the Barry M. Goldwater Range.

When you name something — a plant, an animal or a place — people think you know it. When you take a photograph people think you know even more. Seven years out there photographing was just about enough time for me to get a real sense of how little I know about the land. I carry a camera because it helps me stick… stay in a place and look at things closely.

A camera is about the most useless piece of equipment you can bring into the desert. You can't eat it, you can't drink it, and it gets heavier with every mile you walk, but when you start to think about jettisoning some weight, the damn things cost too much to fling into the dirt.

Sometimes the equipment comes in handy. I once draped a raincoat over the top of a tripod so I could stick my head under the makeshift tent and get some sleep on a rainy night. Long before dawn my legs were soaked. I got up, stuffed my wet sleeping bag in my pack, and started up the rubble on the north side of the Cabeza Prieta mountains.

It stopped raining as soon as I started walking. The sky turned from deep gray clouds to black with stars, enough stars so I could see my hands in a soft blue light. I wended my way up. Pushing into seams and small canyons until a wall would push me out and over the smooth granite into another seam and another small canyon.

After a couple of hours the sky caught the first light and warmed to a soft red glow and I climbed. I reached the top after sunrise and made a photograph looking north into A-1 Basin. When I think about photographing the desert I think mostly about walking at night and about what cannot be photographed.

I work with a 4"x5" view camera. A big camera that looks like an accordion on a tripod. By the time I get my lenses and camera gear into a pack it weighs over thirty pounds. Add some water and food and a sleeping bag, and you might ask why I decided to use a view camera.

The answer is simple. If I were to tell folks there is something out there in the desert I just don't quite understand, and if I said I was going off alone to spend thirty or forty days walking around, looking at things, and talking to my self, and if as soon as I came home, I were to say I need to go back out, my friends and family might plan some sort of intervention. But if I carry a big view camera, exhibit the photographs in a gallery, and do a couple of books, it starts to look a lot like work.

This is the gift of photography. You can go and look at things you find important and share what you see.

Close your eyes for a moment and think of the word wilderness. What images come to your mind? High mountains… glaciers and snow, walls of a great canyon, or the reaches of trees in a primal forest? More than likely you will conjure up images found in the landscape photographs of Ansel Adams.

It is worth remembering that a hundred years ago wilderness still conjured a vision of a wasteland or places that needed to be subdued for mans dominion. Ansel Adams helped create the contemporary vernacular for wilderness. One of the greatest powers of art is to create a symbol, and Ansel gave us a symbol for wilderness as a magnificent landscape worth fighting for and saving.

In the Gran Desierto I made a photograph of a spent missile lying on the desert floor. Without the missile I would have passed the place by. When I show the photograph I tell people it is a picture of an old growth ecosystem. I point out where my footprints press into the soil and how the variations in shades of gray revealed a complex matrix of living systems deep within the soil.

When I started my Gran Desierto project I photographed the beautiful sweeps of the desert. Over time I realized this was not the thing I found important.

The desert was so damn inhospitable ... a place without water and only a few miserable roads ... but if you got out and wandered around you found something that is missing from much of the west. It still had soil, and because of this thick amazing soil, each valley had a totally different matrix of plants. In the mountains you found unique gardens tucked in ridges of lava, in the middle black and red cinder cones, and between smooth contours of granite.

This landscape taught me something. We have to learn how to see the complexity of our landscapes and appreciate what is there.

When Ansel made those beautiful photographs of the land and stirred us into thinking they were worth saving there was one small problem. Sometimes the land

continued

ABOVE **Looking westward** TOP **A classic portrait of the Gilas**

The Globe is Local

by Mike Quigley, SIA Tumamacori Wilderness Campaign Coordinator

"Think Globally, Act Locally" was a phrase popular on bumper stickers a few years ago. Tip O'Neill says "All politics is local."

Acting locally is great—it's by our own personal choices that we make change. And, as Ghandi said, "you must be the change you wish to see in the world." But the issues facing us these days are bigger than Tucson, bigger than the Sky Island region—they're global. And in more than the geographic sense. Building a wall along the U.S.-Mexico border, for example, is more than a southwest issue, it's more than an immigration issue, it's part of global ecological, economic, and social issues.

We're facing big, global problems with local consequences. An economy that is dependent on oil, most of it from unstable parts of the world that require the inputs of American military force and foreign aid money to keep the pump pumping. A political system that rewards incumbency rather than effectiveness and is beholden to campaign financing money. A media that for the most part is more like MTV's "Real World" rather than Edward R. Murrow's "See It Now". A "free market" economic system that subsidizes the true cost of doing business by pushing things like environmental clean-up, pension plan responsibility, and living wages off on government programs—at the same time that free-market-robber-barrons are squawking about more tax cuts to further limit the effectiveness of government oversite and regulation. And let's not forget an American West that is sprawling across acre after acre of delicate landscape. Oh, and there's Global Warming. I'm with Al—it's real, it's here, we're the cause, we oughta fix it.

So why don't we fix it? Why don't we fix any of that? Let's back up: how do we fix that? By acting locally? Yeah, there's a good start. Buying locally-grown produce, consolidating errands run in your car, composting, rainwater harvesting from your roof, these are great things to do. And yes, over time, as more people demand more options, the market may change. Wal-Mart is offering organic cotton goods, I hear. But, there are a few things that make these worthy personal actions less effective globally or in the short term.

First, the market may not respond to demand—are computers getting easier to use? Do we have freedom of choice when shopping for cable TV service? Are cellphone plans any easier to understand and why do we need to sign a two-year contract to get cell phone service? Or, the market may respond in other unpleasant ways—outsourcing pollution to other countries, sweatshop labor in the Northern Mariana Islands for labeled "Made in the USA" goods, government subsidies and protectionism for well-connected industries.

Second, the global value of good personal choices may be far outweighed by much larger-scale bad choices by others, industries, and governments. You plant native plants in your yard and use rainwater harvesting, grey-water and treated-effluent to irrigate them. That's good. Then another 10,000 new tract homes go up and the swimming pools go in and the golf course or, unbelievably, the town "lake" is built. For regional water conservation, your good personal choice is a drop in the bucket.

Third, the costs of some good personal choices can be rather expensive compared with the traditional mass-market alternatives: good organic produce is more expensive, hybrid cars are more expensive, solar panels for your house are more expensive, nice houses in nice downtown neighborhoods can be more expensive. Why? In some cases, some things are just more expensive; but in many cases, things are more expensive because they have not received the subsidies, incentives, and breaks given to the more established, mass-market-accepted, damaging alternatives.

So what is a locally- and globally-minded good citizen to do? Another bumper sticker from my youth seems right: "Question Authority". I mean literally. Remember that all politics is still local—especially in an election year. Go to meet-the-candidates events and don't be content to hear railings against the incumbent or how-great-I've-been speeches from incumbents. Whatever. That's yesterday. What are they going to do for tomorrow? Ask for a five-, ten-, 100-year plan that doesn't once mention "re-election" or "administration" or use the word "inevitable" when referring to human choices and actions. Ask about global warming. Ask about foreign policy. Ask about health care reform. Ask about sustainable economic prosperity. Ask about conservation and environmental protection. Ask about the policies that allow companies to poison our air, water, land, viewsheds, children, bodies, food supply, and public discourse just to realise a higher profit, a higher shareholder value. Hey! Newsflash! The planet is the investment and we're all equal shareholders in that!

What's all this have to do with Wilderness (my acting locally and globally issue)? We're working hard to get a local 80,000-acres of American public land protected from habitat fragmentation, ATV noise and pollution, general degradation. That requires an Act of Congress. An objective poll found 87 percent of local residents in favor, we have support from hiking clubs to real estate brokers, Congressman Grijalva is in favor—we GOT the local support. We have to convince the Arizona Congressional delegation. We have to convince the House and Senate Resource committees, we have to convince the U.S. Congress and the President of the United States. We'll do that. We'll get our local area protected. And when we do, I don't want to see that effort undone by larger issues that go unaddressed; I don't want to go hiking in our new Wilderness area and see the landscape we protected damaged from effects of global warming, dumb-growth, pollution, or failed immigration and trade policies.

If we are to effect real, big picture change, we need to think locally, act locally, think globally, act globally. Buy local organic produce if you can find it, put some solar panels on your roof if you can afford it, walk more and drive less if you're able. But also, hold our corporate and government leaders accountable. If you own stocks or mutual funds, look at your portfolio and see who you are investing in and supporting, exercise your shareholder rights to call for better corporate behavior, divest or boycott companies who don't want to be part of the solution. And this election cycle, tell the candidates and the elected representatives to stop spending your tax money subsidizing destructive practices, tell them to spend money on research-and-development for clean, sustainable power; for tax policy that rapidly transitions our larger society to better practices; for holistic and sustainable trade treaties and practices; for cracking down on polluters instead of letting them pass their mess to us; for preserving our wild public lands instead of carving them up into concessionaire playgrounds; for whatever big, seemingly-unsolvable issue you care about. Two more to think about: the Chinese proverb "a journey of a thousand miles starts with a single step" and "there's no profit on a dead planet." ❖

Picturing the Heart and Soul *continued*

that is ecologically important just doesn't lend itself to a "save this place" photograph. The challenge of our times is to attend closely enough to see the significance of all landscapes.

I have lived in the Sky Islands for 20 years. I am just beginning to get a sense of it. When people ask me about my home I say I live in the center of the universe and describe the Sierra Madres in the South, and the Mogollon rim to the North, and in the middle a bunch of little ranges that peter out into wide stretches of desert grassland.

When Julie St. John asked me to write something for Sky Island Alliance two photographs came to mind. I had had a call from National Geographic with a request for a black and white photograph of the Gila. They wanted the big beautiful Ansel Adams photograph. I told them the Gila is not that kind of place. I have not made one and haven't seen one.

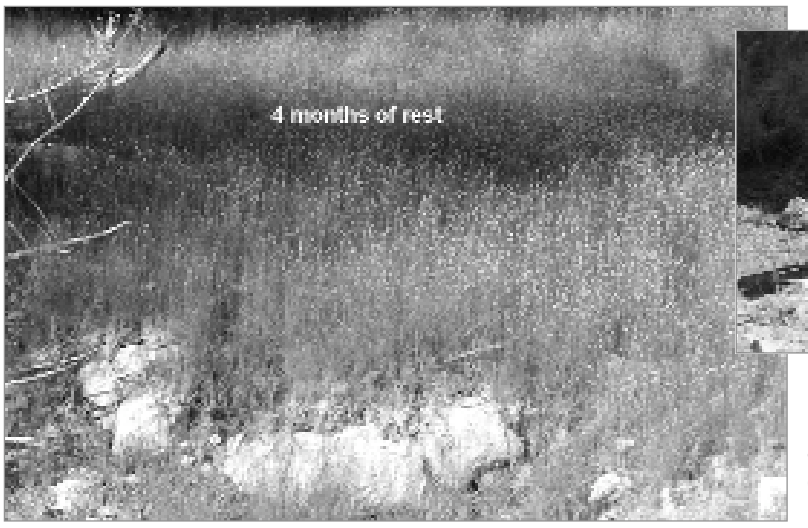
I was driving home from Arizona and as I hit the playas on I-10 just over the New Mexico border, I was thinking about this phone call. A snow storm was breaking up, and I thought if the clouds lift off the west side of the Mogollon Mountains at sunset I could make one of those classic pictures of the Gila. I veered to the north, ran up the side of the mountain and I made a beautiful picture, and I am quite proud of it.

I made one other photograph that evening. I turned the camera to the west and photographed some scrubby mesquite and pinons that rolled into grass and the distant hills beyond Mule Creek. The picture of the mountain with a clearing snow storm could have been made anywhere and people would have said it was beautiful, but those scrubby little hills… they are the heart and soul of this place… the last vestiges that stitch these ecosystems together. This is a landscape we need to learn how to see. These are the lands that are important. ❖

Heart of Gold Gulch

by Donna Stevens, Upper Gila Watershed Alliance with an update by Van Clothier, Stream Dynamics*

**(Reprinted from the Summer 2006* Carapace*, the newsletter for the Upper Gila Watershed Alliance)*



LEFT: **One-rock dam (or weir) installed in April after four months.** RIGHT: **SIA & NMWA volunteers work on the Gold Gulch Restoration, April 2006.**

I'm always heartened by the number of people spending their weekends working harder than they did at their jobs. Getting dirty and sweaty was the order of the day(s) on April 8 and 9, when UGWA was joined by volunteers from Sky Island Alliance and New Mexico Wilderness Alliance in a work project in Gold Gulch. This riparian restoration project included the construction of rock structures in Gold Gulch, the extension of the fence protecting the wetlands, and the planting of native riparian species.

The Gila National Forest Plan identifies Gold Gulch as one of three "key habitat areas" in the South Burros. It's an important wildlife watering area in the arid Big Burro Mountains, especially this year.

On the east side of Gold Gulch Road, about four road miles from Hwy. 90, there is a spring-fed marshy area on a hillside. The Forest Service fenced this area from livestock in late summer 2003. Below the marshy hillside is a short reach of Gold Gulch that supports riparian vegetation, mostly Deergrass and Seepwillows. This stream reach, approximately 200 feet long, was also fenced in summer 2003, to protect it from livestock and off-road vehicles, and to begin the process of habitat restoration.

Gold Gulch is heavily impacted by livestock grazing and by vehicles in the riparian corridor. Much of the watercourse is denuded of vegetation, with little or no regeneration occurring. Although Forest Road 860 parallels the wash for over three miles, many vehicles drive the watercourse instead of the road.

Within the exclosure, the Gold Gulch riparian area is healing slowly, despite the drought. The existence of the hillside springs and the absence of cattle and vehicles are facilitating this process.

During UGWA's work weekend, the twenty two volunteers of *Tres Alianzas* (this is what we had begun calling ourselves to avoid becoming exhausted merely from voicing all the long group names) built two rock baffles, two "one-rock dams," and one rock cross vane inside the fenced reach of Gold Gulch. (Baffles and cross vanes are structures used to deflect streamflow away from the bank to be protected and are easily overtopped by flood events. One-rock dams are used to raise channel bed elevation and to control or modify slope gradient.) These unobtrusive structures look natural and will not be noticed by casual observers, especially after the first flood deposited sediment on them. A significant part of the project consisted of adding a 300-foot diagonal segment to the existing L-shaped exclosure to include more of the wetlands area. Fencing materials were provided by the Forest Service.

To accelerate the recovery of the riparian area inside the exclosure, volunteers planted approximately fifty poles of native riparian vegetation. Cuttings were taken from downstream Seepwillows, Goodding's Willows, Fremont Cottonwoods, and New Mexico Olives.

Volunteers were taught and supervised by Van Clothier, owner of Stream Dynamics, a local watershed restoration business. Clothier has worked on a wide variety of drylands streams, arroyos and landscape-scale watershed restoration projects. His clients include the Malpai Borderlands Group and the San Francisco River Association. Van Clothier volunteered his time for this project.

Clothier was joined by many folks, ranging in age from 5 to 65, who wanted to pay their planetary rent. Trevor Hare from Sky Island Alliance and Michael Scialdone of New Mexico Wilderness Alliance recruited volunteers from their memberships and supported the project by lending their time and expertise. Out-of-town volunteers camped out at Gold Gulch, and were entertained by UGWA's own Kyle Johnson and other musicians.

Habitat restoration in this short reach of Gold Gulch will benefit areas both upstream and downstream, by providing a seed bank, increasing water retention and raising the water table. Stream banks will be stabilized. Native riparian trees, shrubs, perennials and annuals will start to recolonize. A return visit to the site, long before the rains began, revealed that most of the plantings were still alive. In turn, the fauna that depend on this vegetation will return.

The Upper Gila Watershed Alliance envisions this stream restoration as a pilot project that we will continue to monitor and protect. We hope to undertake more ambitious watershed projects in the future.

UGWA extends a big thank you to everyone who volunteered their time and muscle power to helping to heal our watershed, one small place at a time.

If you're lacking a gym membership, consider joining UGWA for our next work weekend. Great work, great workout and great fun are all guaranteed — gloves provided.

Flood Update

Southwest New Mexico was in a very severe drought this spring. By the beginning of July, my house had only received 0.75 of an inch of rain in the past ten months. I was worried that the house was going to burn down in a forest fire and so we bought fire insurance. The rains started on the fourth of July. My home arroyo has flowed 8 times since then. Not too far away, Gold Gulch was also getting its share of runoff events.

Several relatively large floods have passed through the springs where we did our restoration work. On July 24, I discovered that a 60' length of 3" diameter black poly pipe had caught on the new fence during the flood, separating the break-away at the water gap. Debris lines and scour marks revealed that flood waters had raged high over the rock work we had completed, tearing some of it out, burying some with sediment. However, enough of the structures remained in place to protect the newly vegetating bank of the hillside springs, and a new meander was created, directing shear stress away from this bank and creating new floodplain as it eroded the opposite bank instead. This erosion actually increased the width and flood prone area of the creek (a good thing in a wildland situation because the more flood prone area you have, the more area a flood has to spread out, slow down, and soak into the ground.) This flood must have occurred on July 4th or July 7th. The Burros, after ten months of severe drought, have finally received a proper monsoon.

I repaired the water gap. No cows had gotten into the exclosure. As you can see from the photos, the sedges in the new part of the exclosure are bouncing back. The willows we planted on the right bank are doing well. In addition, the place downstream of the exclosure where we filled in a cow wallow and planted 16 willows and seepwillows is doing great. Eleven of these plants survived and are growing up nicely.

You wouldn't believe how much rain we have been getting. I returned to the site on August 8 to discover another severe flood had been through Gold Gulch, extending the meander and depositing more sediment on the inside of the bend, further increasing the flood prone area of the creek.

By installing baffles to initiate meanders, and rock riffles to control the grade, we had hoped to one day harness the power of a large flood to restore the natural meander pattern of the creek. It is amazing to see the changes produced by this season's monsoon floods, and although several of the structures were removed, it's certainly better than it was!

Perhaps *Tres Alianzas* (Sky Island Alliance, New Mexico Wilderness Alliance and Upper Gila Watershed Alliance) would be interested in doing a maintenance work party this fall or next spring to effect a bit of maintenance on the rock work, to plant additional native riparian vegetation, and to bear witness to the power of floodwaters to self-heal a degraded watercourse.

Thanks to all who worked on this project. ❖

Order your 2007 Sky Island Alliance calendar today!

We have been collecting photographs of the beautiful Sky Island Region for our 2007 calendar from Sky Island Alliance members and friends. Order your calendar today and enjoy the magnificent landscapes of the Sky Islands all year! Now is the perfect time to buy holiday gifts for colleagues, neighbors, family and friends while supporting Sky Island Alliance. Don't forget upcoming birthdays!

Members of the **Legacy Club** will receive one of these beautiful calendars FREE! You can get one too by joining the Legacy Club before the end of the year.

Please place your calendar order by November 17, 2006. Calendars will be mailed to you the first week in December with plenty of time for holiday gift giving. For more information, please contact Nicole at **nicole@skyislandalliance.org** or 520.624.7080 x209**.**

Please mail order form to:
Sky Island Alliance, Attn: Nicole, P.O. Box 41165, Tucson, AZ 85717.

Name: _____

Address: _____

City: _____ State: _____ Zip Code: _____

Phone: _____ Email: _____

Quantity: _____ ($15 each, includes shipping costs) Total amount enclosed $_____

If paying by credit/debit card:

Card Number: _____ Exp. Date: _____

Security Code (last 3-4 digits usually on back of card): _____ Billing Zip: _____

Signature _____ Date: _____

Join the Legacy Club!

Comprised of our monthly and quarterly donors, this program is an easy way to donate to SIA and helps us tremendously! By donating just $10 a month, you can turn your yearly $35 membership contribution into $120. Or, by donating $50 every quarter, your yearly contribution would total $200! There are many different donation options through this program. If you are interested, please call Acasia at 520.624.7080 x207 or click on the *Donate Now* button at **www.skyislandalliance.org**.

SKY ISLAND ALLIANCE
Protecting our mountain islands and their flora.

It's easy to contribute!

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 $35, 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.

Send in this form to **Sky Island Alliance PO Box 41165, Tucson, AZ 85717** or donate online at **www.skyislandalliance.org** — it's quick, easy and safe!

Name: _____

Address: _____

City, State & Zip: _____

Phone & Email: _____

❑ $35 ❑ $50 ❑ $75 ❑ $100 ❑ Other $_____ *(any amount helps and is appreciated!)*

❑ My check is enclosed

❑ Please bill $_____ to my: ❑ MasterCard ❑ Visa ❑ American Express

Card No.: _____ Exp. Date: _____

Security Code: _____ (usually the last 3-4 digits on the back of the card by the signature panel)

Card billing zip code if different: _____

Volunteer Appreciation Party & Benefit Concert for Sky Island Alliance!

Please join us October 26, 2006 with local musicians:

Tryst ✭ Kevin Pakulis ✭ Al Perry

Doors open at 6 pm ~ The Historic Y

300 E. University Blvd. (SE corner of Univ. & 5th Ave.)

Tickets are $10.00 / $5.00 for SIA members / Children under 12 free

2006 SIA volunteers FREE!

Spread the word — Tell your friends to come Eat, Drink, & Dance!

For more information, or to buy tickets in advance, please contact Nicole at 520.624.7080 x209 or nicole@skyislandalliance.org

Field Schedule: Fall into Winter 2006

27-29 October. Scary Road Restoration. Come out and get your hands dirty installing vertical mulch and erecting barricades, and play a direct role in improving the ecological health of your public lands! 1.5 hours from Tucson.

17-19 November. Thanks for Roadless Areas! Road Restoration. Come out and get your hands dirty installing vertical mulch and erecting barricades, and play a direct role in improving the ecological health of your public lands! 1.5 hours from Tucson.

1-3 December. Big Fat Road Restoration. Come out and get your hands dirty installing vertical mulch and erecting barricades, and play a direct role in improving the ecological health of your public lands! 1.5 hours from Tucson..

15-17 December. Merry Road Restoration. Come out and get your hands dirty installing vertical mulch and erecting barricades, and play a direct role in improving the ecological health of your public lands! 1.5 hours from Tucson.

12-14 January. Santa Teresa Mountains Roads Inventory. Join the Sky Island Alliance in one of the most gorgeous islands in Arizona.! Great Wilderness! 3 hours from Tucson..

26-28 January. Peloncillo Mountains Riparian Inventory. Visit the beautiful and remote Peloncillos in a project to assess restoration potential of historic ciénegas and degraded streams. 3.5 hours from Tucson..

For more information contact Trevor at **trevor@skyislandalliance.org** or at 520.624.7080 x204

Wishlist: A late model truck or SUV, good running and good on gas! Steel posts for road closures!… Contact Trevor!

Arizona Ecumenical Council's Earth Care Commission presents:

Good Earth! Good God!

An award-winning conference that addresses the spiritual side of wild nature PLUS an evening with Rachel Carson!

"An Evening with Rachel Carson" Storytelling Event

Friday, November 3, 2006, 7pm at the Community Christian Church
1701 S. College Ave., Tempe (just 3 blocks south of ASU)
For more information, call 480.967.5266 or email caringforcreation@earthlink.net

Caring for Creation Conference*

Saturday, November 4, 2006, 8:45am–3:45pm at Central United Methodist Church
1875 N Central Ave., Phoenix (next to Phoenix Art Museum/Palm Lane)
For more information, call Doug Bland at 480.967.5266, the AEC at 602.468.3818 or aec@aecunity.net, or visit **www.aecunity.com/yourti108648.html**

**At 2:30pm, the Arizona Wilderness Coalition and Sky Island Alliance will be presenting an exciting workshop on historic American attitudes toward "wilderness" and our current campaign to protect the Tumacacori Highlands in southern Arizona. We'll also be offering several guided wilderness backcountry trips later in the fall for anyone who wishes to experience the Highlands and other wild areas of Arizona up close!*

SKY ISLAND ALLIANCE
Protecting our Mountain Islands and Desert Seas

The North American Continent

By Thomas Berry, the revered geologian of our time…

In these opening years of the 21st century as we gather here in this great central valley of the North American continent, we reflect, in a moment of quiet, on our dwelling place here on this continent.

When we came to this continent, it was a glorious land of woodlands and prairie grasses, of a vast open sky, a land of buffalo and elk, a land of abundance shaped through the centuries with their summer storms and winter chill.

Today we come to this valley
from the coastal plains
along the Atlantic shores,
from the northeastern woodlands,
from the Appalachian hill country,
from the Great Lakes to the north
the Gulf regions to the south,
from the grasslands, the mountains
and the deserts to the west,
the redwood forests
along the Pacific shores,
from the reainforests
in the shadow of Mount Rainier,
from the far North
where the boreal woodlands
sweep down from Alaska
across central Canada
to the storm-beaten cliffs
of the North Atlantic.

We come here today, to this valley, as on a pilgrimage, from all these regions and from regions beyond. We come to reflect on how, centuries ago, we might have joined the community of life here, we might have established an intimacy with this continent in all its manifestations. We might have seen this land as a divinely blessed land to be revered and dwelt in as a light and gracious presence. We might have felt the divine in every breeze that blew across the landscape, seen in every flowering plant, wondered at in every butterfly dancing across a meadow in daylight, in every firefly in the evening.

But if in the past we have not been sensitive to the deeper meaning of this continent, we come here today as pilgrims, not simply to this place along the grasslands, but to the entire continent.

Pilgrims, penitent, we bring with us the promise of dedicating ourselves to relieving the oppression we have imposed in the past and beginning a new era in our presence here today.

We begin to understand that the way to the world of the sacred is through the place of our dwelling.

We are finally awakening
to the beauty of this land.
We are finally accepting
the discipline of this land.
We are finally listening
to the teaching of this land.
We are finally absorbed
in the delight of this land.

We have come from the far regions of this continent, each of us with our distinctive experience of the regions whence we come. We reflect on the 200 million years since this continent broke off from the other continents and began its distinctive development.

While we learn the sacred quality of this continent in its spatial extent, we also experience those historical moments of grace whereby all the various features of this continent took on their present modes of expression.

The story of this continent is now our own story, for, while we came here in the later stages of its history, we are now integral with what takes place here. Throughout the future the story of this continent and our own story will be a single story.

Today we begin to relieve an ancient wrong. We wish especially to restore to this continent its ancient joy. For while much of what we have done is beyond healing, there is a resilience throughout the land that only awaits its opportunity to flourish once again with something of its ancient splendor.

So far as we are able, we wish to evoke these powers to their full expression so that the primordial liturgy of divine praise that once arose from this continent might again burst forth in a new brilliance of expression.

We are concerned for the children,
the children of every living being
on this continent, the children
of the trees and grasses,
the children of the wolf,
the bear and the cougar,
the children of the bluebird
and the thrush and the great raptors
that soar through the heavens,

the children of the salmon
that begin and end their lives
in the upper reaches
of the great Western rivers,
the children, too, of human parents
for all the children are born
into a single sacred community.

It is increasingly clear that none of the children, nor any living being on this continent or throughout the entire planet has any integral future except in alliance with every other being that finds its home here.

Tonight we come here as pilgrims to this continent to beg a blessing from its mountains and valleys and from all their inhabitants. We beg a blessing that will heal us of our responsibility for what we have done, a blessing, that will give us the guidance and the healing that we need.

For we can never bring a healing to this contientnt until we are first blessed and first healed by this continent.

To make ourselves worthy
of this blessing
is the task to which
we dedicate ourselves
in these opening years
of the 21st century
that all the children of Earth
might walk serenely into the future
as a single sacred community.