

Restoring Connections



Quarterly Newsletter of the Sky Island Alliance Vol. 8 Issue 3 Fall 2005



photo by Noel Snyder

Thick-billed parrots nesting in aspens within Chihuahua's Sierra de la Madera



SKY ISLAND ALLIANCE

Protecting our Mountain Islands and Desert Seas

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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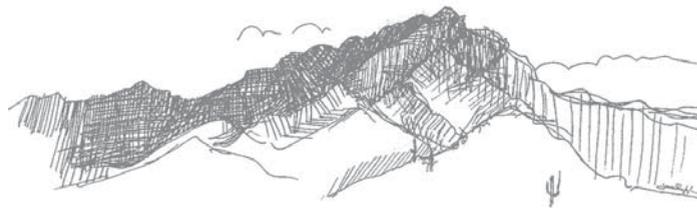
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Welcome, Nicole! Farewell, Gita!

Nicole Urban-Lopez was born and raised in Tucson, Arizona, and as a native, she shares a special relationship with our surrounding landscapes. Nicole is a recent graduate from the University of Arizona, where she earned a B.A. in political science and focused on environmental policy. She recently returned from Washington, DC, where she spent the summer working with environmental legislation as an intern for Congressman Raúl Grijalva.

Nicole enjoys spending time outdoors, reading and being involved in the local music scene. Her favorite area of the Sky Islands is the Chiricahua Mountains, and she has spent many weekends there hiking, cooking and enjoying the scenery. Nicole joins Sky Island Alliance as the Membership and Outreach Coordinator and looks forward to meeting our wonderful members and volunteers!

...and a farewell to Gita as our newsletter editor-in-chief. Following her biology research roots, Gita has taken a job with The Nature Conservancy at the Las Cienegas National Conservation Area, and she has extra tan lines and bug bites to prove it. She's helping boost monitoring and adaptive management practices—fancy terms for knowing enough about the effects of our actions (or inactions) to change them before they cause real damage. Gita is delighted to be working alongside Janice and Trevor and the rest of the Sky Island Alliance crew on this jewel of the Sky Islands, and she is equally pleased to connect with a whole new branch of the Las Cienegas family. She'll miss the creative side of crafting a newsletter out of such naturally fabulous raw material, but will reluctantly hand over the deadline whip to some other hardy soul.

Many Thanks to Our Contributors!

Huge kudos go to Dennis Caldwell for designing our gorgeous new logo, and for putting up with all our divergent opinions in the process! Thanks also to Dana Backer, the mere mention of whose name makes invasive species' roots quake; Angela Barclay, our great hope for solving the remaining mysteries of what we should and shouldn't plant after fires; Carolyn Campbell, the mere mention of whose name makes politicians' and unscrupulous developers' roots quake; Erika Geiger, grassland research guru, whose name will hopefully never again be misspelled by careless editors; Chris Hass, PhD, tracking expert extraordinaire who was recently voted "Most Likely to See Coati Scratches Where Nobody Else Has Bothered to Look;" James Leckie, who is as keen on Saguaro National Park's fauna as he is on its flames; Ellis Margolis, intellectual Johnny Aspen Seed who uses any excuse he can get to explore the mountain West; Guy McPherson, a rare breed of scientist who can see clear to advocate for protecting the natural world while he works to understand it; Jeneiene Schaeffer, loyal friend of Saguaro National Park; Ceal Smith, most astute observer of wild creatures and all their marvels, be they fig wasps or children; Noel Snyder, who flies off to study and protect birds more often than anyone else we know; Mills Tandy, whose unassuming manners and large, fuzzy dog belie one of the region's brightest botanists; and, of course, the Sky Island Alliance staff.

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Seeking SIA newsletter submissions

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

We want to keep this newsletter filled with inspirational, informative material, and we'd like your help! Do you write poetry? Draw, sketch, paint, or photograph? Like to address regional conservation issues? Review books or websites? Anything that relates to the Sky Islands region is fair game! You can respond to items in our recent newsletter, comment on your experiences as a volunteer or conference-goer, etc. Also, let us know if you'd like to be a regular contributor, e.g. with a column each issue. The deadline for our next newsletter is January 15, 2006. Material submitted after that date may be saved for subsequent issues. Please email submissions to newsletter@skyislandalliance.org, or mail them to Sky Island Alliance, PO Box 41165, Tucson, AZ 85717. Resolution of digital images should be at least 300 dpi if possible. [Give your favorite small-town restaurant a boost by writing a review and letting us promote it!](#)

Ecological Souffle

By Matt Skroch, Executive Director

As I extended my arm toward the orange coals and flame of our campfire, I fully recognized that as my perfectly white marshmallow dangled off the end of my stick, it would burst into flames at any moment. I just couldn't wait for that perfectly toasted, lightly browned variety of campfire marshmallows that some more patient folk subscribe to. I wanted to see it burn and sizzle before devouring the black mess of charred sugar.

Staring with great respect at my burning sphere of goo, I felt a sense of excitement and wonder in the flame, so close to my eyes. Knowing I would soon put it out with a quick puff, I sat entranced by the sugar flame for several seconds. I reckon you may know what I'm talking about. If you don't... well, try it sometime.

Later that evening, as we've done so many times on Sky Island Alliance field trips, we all stared into the small circle of our campfire, refusing to take our eyes away—even while engaged in conversation with fellow volunteers. There's just *something* about a campfire that captures your eyes and won't let go. As a pastime of our human race, the campfire is about the only thing that will compete with the ubiquitous television for our unbending attention these days. That's saying a lot.

Fire has been an integral part of our lives for millennia. Just as it ignites our marshmallows over an open flame, it also heats our houses, cooks our food, and propels our vehicles and aircraft around the world (hopefully less so with new hybrid technology). Fire isn't always controlled, and when it comes to wildland fires, more often than not we are at its mercy. It's frustrating for humans to not have control over nature's ways—and our wildfires. We've struggled to gain the upper hand since our evolution, with limited success in spite of our costly efforts.

Big, frequent fires have occurred throughout history, with the main difference not being the acreage burned, but the relative intensities of today's fires. Our conditions of prolonged drought and high fuel loads (lots of brush, understory and deadwood)

have combined to create explosive conditions in recent years. Wildland fires generally burn hotter now, providing unique challenges to public safety and ecosystem integrity.

These high-intensity fires provide stark, blackened landscapes that inherently convey disaster to most of those who see these images on television, in the newspaper or directly in the field. Disaster is not always the case, however, and we must resist the emotional response invoked from seeing the effects of these big burns. Instead, more concern may be placed on *where* the high-intensity fires occurred on the landscape and what may be done on our part to reduce the risk of long-term ecological damage.

Active restoration of burned areas can give nature a kick-start toward regrowth. This issue of *Restoring Connections* provides some great insight into dealing with the after effects of fire on landscapes. People spend millions of dollars every year seeding, planting and stabilizing soils after fires. These are necessary tasks in certain situations, yet it's clear that using prescribed burns (and other management techniques *before* critical conditions arrive) is more efficient both in ecological and economic terms. Fire is a tool in many ways. We need to use it more often—in the form of prescribed burns—to prevent

the complex, costly and varied successes of dealing with fire during and after its arrival to a landscape that previously had been unmanaged, or

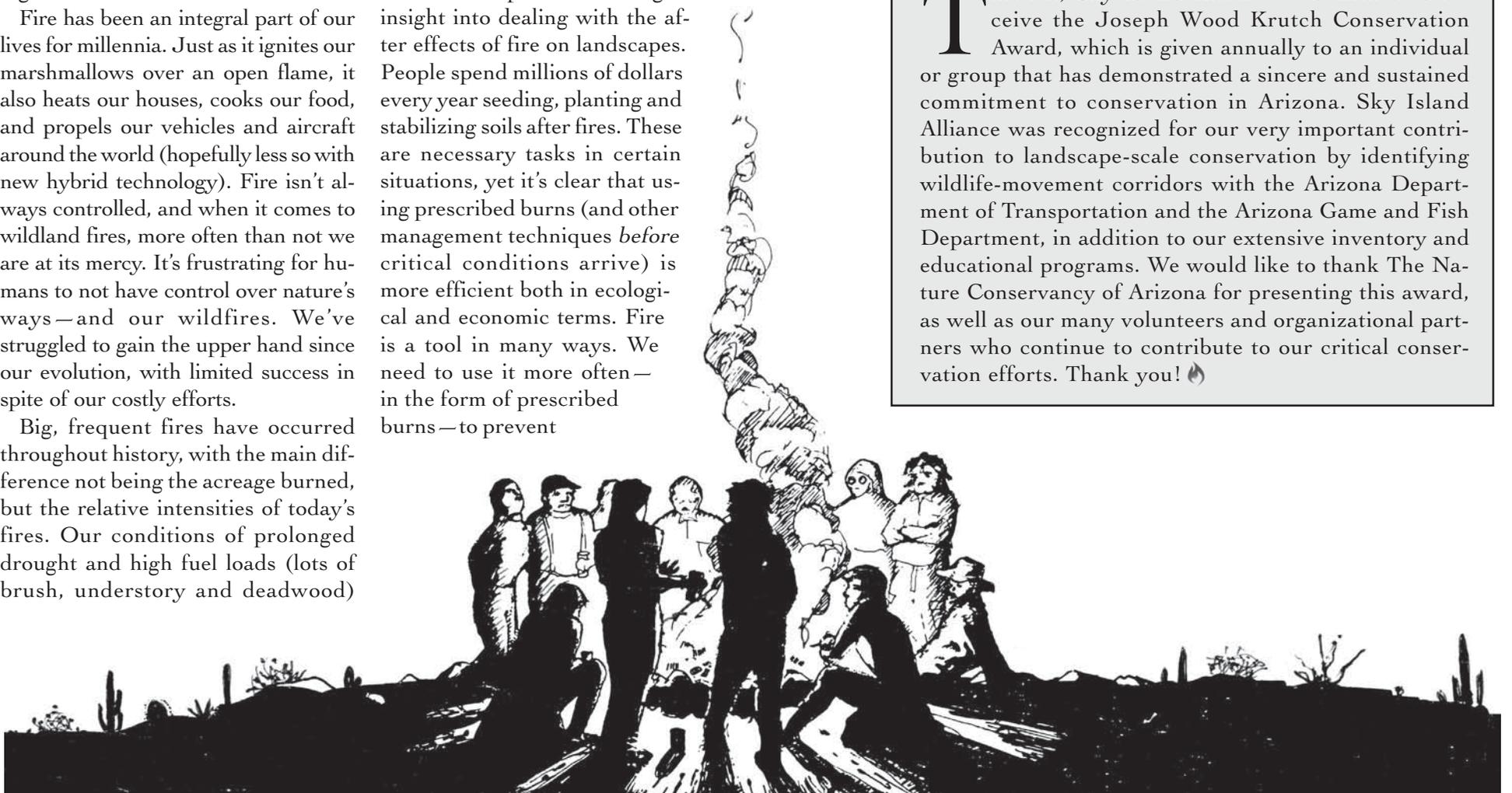
managed improperly, for fire. In addition, let's remember that just because the marshmallow is black, it's not all bad. 🔥

High-intensity fires provide stark, blackened landscapes that inherently convey disaster to most of those who see these images on television, in the newspaper or directly in the field. Yet disaster is not always the case.



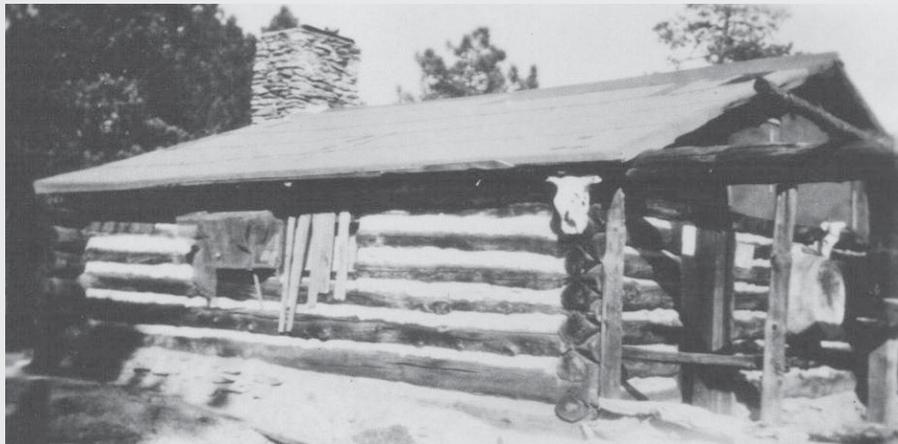
Sky Island Alliance Receives the Joseph Wood Krutch Conservation Award

This fall, Sky Island Alliance was thrilled to receive the Joseph Wood Krutch Conservation Award, which is given annually to an individual or group that has demonstrated a sincere and sustained commitment to conservation in Arizona. Sky Island Alliance was recognized for our very important contribution to landscape-scale conservation by identifying wildlife-movement corridors with the Arizona Department of Transportation and the Arizona Game and Fish Department, in addition to our extensive inventory and educational programs. We would like to thank The Nature Conservancy of Arizona for presenting this award, as well as our many volunteers and organizational partners who continue to contribute to our critical conservation efforts. Thank you! 🔥



A Celebration for Manning Cabin's Firefighting History

By Jeneiene Schaffer, Friends of Saguaro National Park



It sits alone most of the time, visited now and then by hikers that sweat the rugged nine-mile hike into the Rincon Mountains to an elevation of 8,000 feet. Nestled in the Saguaro National Park Wilderness, the Manning Cabin was built in 1905 by Levi Manning (who was the mayor of Tucson from 1905 to 1907). Originally intended as a mountain getaway for Manning's family, the National Park Service turned it into a backcountry ranger station for firefighters in 1933—a role it still plays today.

Tucson Citizen environmental reporter Larry Copenhaver remembers his "electrifying" experiences on the fire trail crew. During the summers of 1962 to 1964, he and seven other crew members stayed in the bunkhouse near Manning Cabin. "We didn't have a chainsaw back then. We had to carry a six-foot, two-man saw that was essentially a potential lightening rod. Now, when you consider that these fires were caused by lightening in the first place, it made us very worried."

While working on a hot spot at the top of Mica Mountain, their worries literally flashed before their eyes. "A bolt of lightening zipped across the saw that I was carrying. I dropped the thing, and we all ran away fast—terrified we might get hit for real."

The lack of aerial suppression is another reflection from Copenhaver as to what it was like to put out fires in the Rincon Mountains more than 40 years ago. Copenhaver says, "There are no vehicle access roads within 10 miles of the cabin, so you couldn't haul water in." How did they put out the fires? "We threw dirt on them."

In the years since, time has taken a toll on the cabin. Restorations need to be made, and the National Park Service wishes to remove any

of the 20th or 21st century improvements that have been introduced.

To kick off this revival of a part of Tucson's history and to help with preservation efforts, the Friends of Saguaro National Park, along with the Western National Parks Association and the Arizona Historical Society, hosted a Manning Cabin 100th anniversary celebration at Tanque Verde Guest Ranch on October 23. Events included exhibits on the cabin, firefighting and fire history in the Rincons, Wilderness, mule-packing demonstrations, pioneer and fire-fighting dress up for the kids, and the Hispanic history in the Rincon Valley. More than 500 people attended this fun event. The Arizona Historical Society is continuing presentations throughout November.

Finally, Saguaro National Park is asking folks—from firefighters to hikers—to share their experiences at Manning Cabin. It hopes to create an "oral history" that will remain for generations to come.

For more information, contact Meg Weesner, chief of science and resources management, at (520) 733-5170, or Jeneiene Schaffer, Friends of Saguaro National Park, at (520) 622-1080. 🔥

Seasonality

By Mike Quigley, Wilderness Campaign Coordinator

Seasonality. Back east, where I'm from, seasonality is dramatic: It's green with new growth, or it's red and gold with autumn leaves, or it's white with snow. Here in southern Arizona, seasonality is more subtle. And I'm thankful for that.

This year, the monsoon season started late, but it brought a lot of rain to a lot of areas. The Tumacacori Highlands were transformed from their winter browns to their summer greens, and the change was stunningly beautiful. I've been hiking there often during the past year as part of our effort to have this magnificent place designated as a Wilderness area. It's always beautiful—wild, wide-open, dramatic. But this summer, it went green. My colleague has a photo of the place from a good monsoon season past. The trees dripping green, the grasses lushly green, the hilltops and slopes fuzzy with green. I used to kid him about it, asking what Photoshop trick he had applied to transform that rugged, straw-golden land from a southern Arizona vista into a scene from the English countryside. He kept telling me: "Wait for the monsoon."

Sure enough, that's all that it took—a lot of rain and some Arizona sunshine. That magical combination in a natural, wild place like the Tumacacori Highlands gives way to meadows of knee-high blue and sideoats gramma grasses, waist-high sacaton, wildflowers, and standing pools of water that nurture leopard frogs, butterflies and dragonflies by the score. And, in many of the remote canyons, shade and running water. Imagine!

I often think there is seasonality to other things too, like cultural trends or relationships. And there is certainly seasonality to politics. Congress recesses for the month of August (historically an unbearably hot and humid time in Washington, DC). Elections are in the fall; primaries in the spring. Like tending a garden—when to plant, when to water, when to add some compost—timing can matter a great deal when trying to move our political system to do the right thing.

Politically, now is the season for contacting our Senators to tell them that we want their support for the Tumacacori Highlands Wilderness proposal. We've been gathering broad public support; we've been discussing the proposal with elected officials; and Congressman Raúl Grijalva is prepared to introduce legislation in the House of Representatives. Now is the time to strongly encourage Senators John McCain and Jon Kyl to make

the Tumacacori Highlands Wilderness a reality in law like it is already a reality on the ground. We've talked with key staff people for both Senators, and, at this point, the Senators themselves need to hear from all of us that this is the right thing to do.

Please write or call Senator McCain and Senator Kyl and tell them that you support Wilderness for the Tumacacori Highlands. Ask them to join with Representative Grijalva by sponsoring identical legislation in the Senate.

If you're an Arizonan, please also encourage your Representative to support Wilderness (and if your congressman is Grijalva, a note of thanks and encouragement would be welcome, I'm sure). If you're living outside of Arizona, please let our delegation know that you appreciate the wild parts of Arizona and let your own Representatives and Senators know that they should support this Arizona issue when the time comes.

It's a new season. It's time for our elected officials to get green. Let's tend that garden. Let's make that happen. Write letters, send emails, make phone calls. And next year, maybe we'll enjoy the green season in our new Wilderness area. 🔥

Our friends at the Campaign for America's Wilderness have set up a great website where you can edit and send an email to the Senators:
action.leaveitwild.org/action/index.asp?step=2&item=27516

If you prefer mail, phone or fax, the contact information is:

The Honorable John McCain
US Senate
241 Russell Senate Building
Washington, DC 20510
Phone: (202) 224-2235
Fax: (202) 228-2862
and
The Honorable Jon Kyl
US Senate
730 Hart Senate Building
Washington, DC 20510
Phone: (202) 224-4521
Fax: (202) 224-2207

Outside Arizona, you can find contact information via www.house.gov or www.senate.gov.

Contemplating a Future of Lost Opportunities

By David Hodges, Policy Director

In 1995, the US District Court of Arizona imposed what would turn out to be an 18-month injunction prohibiting any timber sales from taking place on any national forest lands in Arizona and New Mexico. Over a two-year period leading up to this event, I had the opportunity to examine, on the ground, every proposed timber sale in Arizona and many in New Mexico (note: only two of these were in the greater Sky Islands region—most were in central and northern Arizona). What I found left me disillusioned and disturbed with how our public lands were being managed for fuels, fire and timber.

I looked at sales that were described as “thinning” projects and touted as a means to reduce wildfire risks and enhance forest health. What I found in many cases was the largest, most fire-resistant trees were marked for removal, while thickets of small, fire-susceptible trees were left behind.

I looked at timber sales that had a diameter cap on the size of tree that would be cut (these were touted as “old growth enhancement projects”), and in some instances found hundreds of trees marked for cutting that were significantly greater than the diameter cap.

I learned that a “seed cut” (the stated purpose was forest regeneration) was nothing more than a clear cut with an occasional tree left on the landscape as a seed bank for future forests. These remnant trees would then be cut in five years.

I learned that mistletoe was mistakenly treated as a scourge on the forest that must be eradicated via the removal of trees—many, many, many large trees—that had to be cut down to “save the forest.”

These inconsistencies between environmental planning, documentation and the on-the-ground reality had a tremendous influence on the court’s decision to grant an injunction halting logging in Arizona and New Mexico.

I offer this brief history as context to where we’ve been, where we’re going and where we may end up.

Since the lifting of this injunction, our forests (already compromised by more than a century of timber production) have faced a combination of insects and drought, further complicating any restoration strategies. We’ve also seen major fires in many of our Sky Island ranges since 1994, and they have increased in frequency as the drought stretches on.

The good news is that these recent fires also provide opportunities that did not previously exist. On Mt. Lemmon in the Catalinas, the Bullock and Aspen Fires burned a year apart and greatly decreased fuels on much of this mountain range. From a strategic perspective, this condition allows for a natural fire restoration plan that can be tied into these two large burned areas, which would act as buffers/firebreaks.

The Forest Service should move quickly to introduce fire back into Pusch Ridge, the only major area



of the Santa Catalinas not to have burned in the past three years. Combined with a program that maintains cleared areas around structures in the upper elevation forests while doing the same at the wildlands-urban interface below, this could allow the mountain to return to a fairly natural fire regime.

Unfortunately, the window for achieving this is closing at an alarming rate, as many of the opportunities presented by these recent fires will be gone in a few years.

In my mind, when folks are getting riled up at the latest fires, about insects, about drought and about forest health, the question has always been whether this change anything? I suspect we will be having these same conversations 20 years from now, and this is unfortunate. I believe that in many cases we know what we need to do, but we lack money and leadership from our elected officials.

This is a national policy and funding issue that will be decided (or not decided), for better or worse, in DC. This does not leave me optimistic in the short term as meaningful restoration will cost lots

of money. Due to the war in Iraq, Katrina, tax cuts, etc., there will not even be close to adequate funding for the foreseeable future (the use of fire as a tool becomes more important as it will always be much cheaper than thinning acre-by-acre).

This means we remain at the mercy of blowhard politicians who continue to use these events to castigate conservationists, pontificate about how we need to cut more trees and build roads to save our forests, promise to work to solve the problem and then disappear until the next big fire season. Then, when the cameras are rolling, they will appear and repeat the same mantra again and again.

For these people, playing politics with tragedy and natural disasters comes as second nature. Though often self-proclaimed experts on fire, they are ill informed as to the science of forest processes, and they do more harm than good in conveying to the larger public what the issues actually are.

No wonder I fear that nothing will be different in 20 years, that we will be having the same conversation and debate on forest health and fire, and that our elected officials will still be spouting nonsense and distorting issues for political gain.

Lest I leave you with the impression that all is bad, I am hopeful in several areas. Locally, the Coronado National Forest has made tremendous strides in incorporating scientific principals into forest and land management. The agency I knew 20 years ago (or even 10), no longer exists.

I do believe that we can and will make meaningful progress here in the Sky Islands. But this will require public pressure on elected officials to ensure adequate funding for the land management agencies, as well as support for good forest management by those agencies. 🔥

In keeping with the spirit of “Rambling Rants,” I have one more bone to pick here. During the past decade, there has been an ongoing debate regarding how much and where to thin forests to protect the wildlands-urban interface. Those who always look for excuses to build more roads and cut more trees have pushed the notion that embers travel for miles in advance of a large fire. To them, this is reason to not just clean up close to structures but to cut deep into the surrounding forest.

After the Aspen Fire had burned most of Summerhaven in 2003, there was much talk of how the fire came out of wilderness and that thinning deep into the forest could have avoided this tragedy. Even President Bush, during his photo-op on Mt. Lemmon (to push his “Healthy Forest Initiative”) talked of the need to build more roads and to have a more aggressive policy targeting the forests around communities. *It was even suggested at several post-fire meetings that the Pusch Ridge Wilderness be decertified!*

Unfortunately for the propagandists, this story turned out to not be true. The most important story of the Aspen Fire was missed completely by the media and ignored by decision makers in DC. This is a story about how Summerhaven was not destroyed by a crown fire raging out of the wilderness but was taken out by a low-level ground fire that burned from cabin to cabin.

Amazingly, after years of being warned of the need to clean up around their homes and having barely escaped the Bullock Fire the previous year, most folks had not done the thinning and raking needed to protect their cabins. Had this bare minimum of preventive maintenance been conducted, most of those homes would still stand. To read “An Examination of the Summerhaven, Arizona, Home Destruction Related to the Local Wildland Fire Behavior During the June 2003 Aspen Fire” and view the report’s many illuminating photos, visit: www.firelab.org/media/Summerhaven.pdf.

Until next time,
—David



Road Rattlings

By Trevor Hare, Conservation Biologist

I can taste it—the raspberries, the gooseberries, the Portuguese *chourico*, the pond water, the green chilies, mesquite smoke, the lemonade berries, the victory and the defeat, the bitter and sweet and tart, the juniper berries, the mushrooms and the bellotas. I can close my eyes, and I can taste it.

The sights and sounds, the smell and the taste of my home stay with me and provide the way for me. My pictures, my field notes, my data forms don't and can't tell it; only the poor-will and the green grass can tell me and can lead the way for me. Sometimes I get lost, but only in town. Sometimes I get in trouble, but only in town. Sometimes I yell and stress and again, only in town. Only wild critters and exposed rock, only the encinal and the gallery forest know which way.

And the way leads us here and there. Back in May, 10 of us visited the Las Cienegas National Conservation Area to close a small road and an illegal campsite that is now growing over and looks great. Also in May, 15 of us visited the Dos Cabeza Mountains where we explored a small canyon full of power and pictographs, slick rock and spring water. And over the Memorial Day weekend, 25 of us traveled up the Blue River for a tamarisk-mapping project. We found too much of the ugly little invader but not so much that eradication and/or control is not possible. So that is our next step.

In June, we visited the Peloncillo Mountains for a riparian inventory weekend, and we slept on the dance floor shaded by oaks while leopard frogs

danced in our dreams. Also in June, a few hardy souls continued the Blue River tamarisk work by backpacking the unroaded lower Blue. The water flowed cool and clear, and we slept on sand bars and lounged in the shade of cottonwoods and sycamores. In July, we revisited the amazing Apache Box—we were planning on swimming, only to find that there was no water but of course canyon tree frogs and garter snakes.

In August, 10 more folks came out to Las Cienegas National Conservation Area to close a warren of illegal roads and ATV play areas to help protect an erosion control project in Mattie Canyon. It was here that we discovered the work of a brave soul who blasted two beautiful western diamondback rattlesnakes with a shotgun, leaving them in the road as a warning to all other snakes. In September, our Third Annual Labor Day Gathering and Wilderness Celebration in the Chiricahuas revealed lushness beyond compare—and raspberries, ladybugs and twin-spot rattlesnakes! The following weekend, the Huachuca Mountains invited us—with rain and grass and sunshine—to walk in its lovely riparian corridors.

Hopefully, the winter schedule will reveal all of the wondrous stuff we saw and experienced this summer. Soon, we will revisit the Huachuca Mountains to finish the inventory of the area in anticipation of restoration activities and follow-up monitoring. In December, we will visit the Peloncillo Mountains to do some more road inventories and give ourselves an early winter solstice gift. Then in 2006, look forward to returning to the Santa Ritas after a five-year hiatus.

I hope that those who couldn't join us this past season soon will, and I want to thank all who did make it out! 🔥

The colors are blowing my mind! The sounds and smells are freaking intense! Even the taste is different and wild!

The black tail and the yellow breasts, the green, the painted and the varied, rose throats, cardinal (all over) and white ears. The gray and ferruginous, berylline and sulphur, indigo and rufous, the slate and rusty, the gold and red and blue and orange, and the tan, the brown, the earth. The rattle, the woosh, the who who, the beep and boop, the rustle, the scream and the nyuck, the plop and the slip, the roar and the growl. Wow!

The Huachucas smell like snakes (as does Paradise), the Dos Cabezas smell old and of rocks, the Peloncillos and Pajaritos smell of frogs and jaguars, and the Chiricahuas smell like raspberries and bears. The smell of history and sage and of the future, chilies and *carne asada*, of cigar smoke and whiskey, the smell of coffee in the morning and the campfire, of death and of life, of decadence and exuberance, these all permeate the air and aura around these Sky Islands.

The Seasonal Ecology of Fire

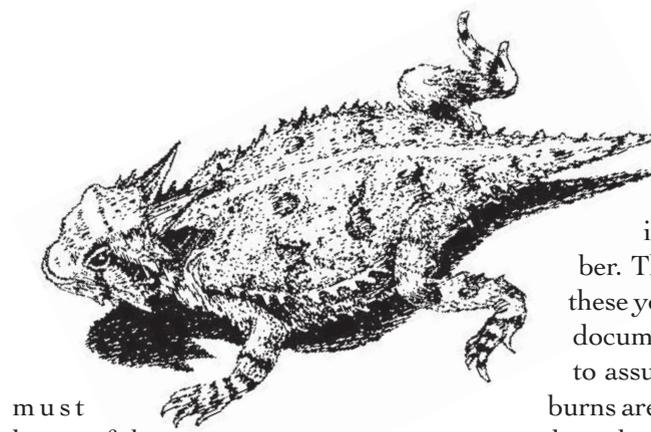
By James Leckie, Saguaro National Park Lead Fire Monitor

As managers become increasingly savvy in the application of fire, new questions emerge regarding the manner in which we care for our resources. No longer is it enough to say: "Let's put fire on the ground." Today, we are asking ourselves where and how often do we ignite our lands, factoring in the availability of the resources we use to ignite them. We are also asking when do we ignite them based on the "good of the resource."

These questions are not easily answered without clear, quantifiable objectives and lots of data. Researchers have spent lifetimes trying to answer them. And more lifetimes are needed to clarify the answers we are finding as well as the myriad new questions our data raises.

At Saguaro National Park, our main form of post-fire treatment is monitoring. We have had an active prescribed burn program for nearly 20 years, and we have vegetative data dating back almost as far. This data indicates that the seasonality of the burn plays a major

role in how the forests respond after fire. Initial studies at Saguaro National Park show that fall burns increase the probability of overstory and pole tree mortality. Conversely, seedling recruitment is bolstered by fall burns. Grasses recover more vigorously from summer burns while fall burns promote forb growth. Ferns seem to be encouraged by fire regardless of the season.* As this data trickles in year after year, we are beginning to see these trends in the forest with greater depth and clarity—trends we create as a direct result of our management actions. But we



must

be careful,

because there are many inhabitants of the forest and we have only begun to tap into their gestalt.

Animals have evolved with the same fire regime as the plants. Case in point: Many species of reptiles in the Rincon Mountains have young in the fall, potentially to coincide with the post-monsoon availability of resources. Historically, most of the naturally occurring fires in southeastern Arizona began in July to coincide with the advent of the monsoon. These young reptiles historically "escaped" their first fire season by not being born until after it. Mountain short-horned lizards

predominately give birth in late August and September. The effects of fall burns on these young lizards have not been documented, but it is reasonable to assume that these late season burns are more detrimental to their numbers than summer burns when the young are not present. This is just one example of a need for further research.

The forests are home to many species—each interdependent on its neighbor's role. We have a great responsibility to them to restore and maintain that home. Ultimately, we must answer to them.

As we continue down this path, we will be better equipped to predict responses and therefore attain management objectives. 🔥

*Results are based on three fall and two summer mosaic pattern burns of moderate intensity, five years after fire.

Coatis and Fire

By Dr. Christine Hass, PhD, Wildlife Biologist & SIA Tracking Trainer

I had been observing coatis in the Huachuca Mountains of southeastern Arizona for four years when a brush fire consumed a portion of one troop's home range. The fire burned mostly grass and mesquite, but it also burned through a riparian forest of sycamore, cottonwood, walnut, ash and chokecherry. It was this riparian forest that the coatis had used, yet after the fire, they ceased coming to the area for at least the remaining year that I was able to monitor that particular troop.

Most of my study was done at Fort Huachuca Military Reservation, but it also included the nearby Coronado National Forest and the Nature Conservancy's Ramsey Canyon Preserve. At the time, the military was actively thinning brush and trees near roads and picnic areas, as well as limbing trees to reduce the possibility of crown fires. Coatis either avoided these thinned areas, or they moved rapidly through newly opened areas where I had previously observed them slowly foraging. Likewise, Ramsey Canyon had also done a lot of thinning of the oak understory. A troop that had frequented the preserve for more than five years all but disappeared when the thinning started, not reappearing until the oaks resprouted and were a couple of feet tall.

Coatis are fruit and bug eaters, and they do much of their foraging on the

ground. It's not hard to understand why they might avoid newly burned areas—a fire burning along the ground will incinerate much of the insect and other invertebrate life. Trees killed or heavily damaged by fires produce little or no food for the coatis. Studies in the Midwest have shown that it may take years for ground-dwelling beetle populations to recover following a forest fire. I am unaware of any studies on the effects of fire on beetles and other insects in the Sky Islands, but I imagine the results are similar.

The reaction of coatis to burned and thinned areas also points out the importance of cover—not just overhead cover from the forest canopy but also horizontal cover. Coatis like thick, brushy areas; indeed, much of their behavior is adapted to that kind of habitat. Thick cover may also be coatis' attempt to avoid detection by a large

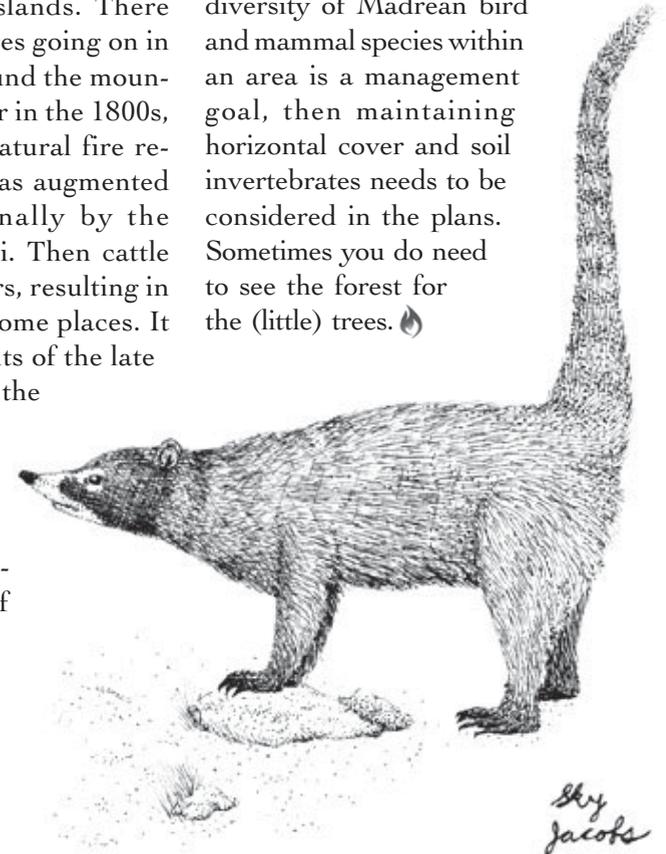
variety of predators, including mountain lions, golden eagles, bobcats, black bears, jaguars and humans.

Coatis were first reported in the US in the late 1800s. While I have my doubts that it was the species' first appearance in this country, this time period does appear to mark an increase in the number of sightings throughout the Sky Islands. There were also drastic changes going on in the habitats in and around the mountains at the time. Earlier in the 1800s, not only was a more natural fire regime in place, but it was augmented by fires set intentionally by the Apaches and Sobaipuri. Then cattle arrived in large numbers, resulting in severe overgrazing in some places. It wasn't until the droughts of the late 1800s killed off most of the cattle that the forest began to regenerate.

Fire suppression changed the appearance of the forest, resulting in higher densities of juniper, oak and mesquite—all coati foods. It's possible that the distribution and numbers of coatis we see today are the result

of fire suppression beginning around the turn of the last century. Forest thinning and controlled burns will likely impact coati distribution, at least in the short term. The long-term effects remain to be seen.

I am not advocating that forest management plans be based solely on coatis. However, if keeping a diversity of Madrean bird and mammal species within an area is a management goal, then maintaining horizontal cover and soil invertebrates needs to be considered in the plans. Sometimes you do need to see the forest for the (little) trees. 🔥



Face to Face with a Cat-Face Scar

By Ceal Smith, Satori School Science Teacher

We had planned to hike to the summit but made it no further than the "tree-cave" about one-quarter of a mile up the trail. When the kids discovered it, there was no moving on. They ran straight to the tree as though they had been there a million times before. They squealed and yelped, climbed in, peered out, up and down. They ran in, out and around the tree for an hour or more as it fed their furtive imaginations. Like magic. A Buddhist would call it a spirit tree. I don't know what the Native Americans would call it, but I'm sure they too would recognize its special power as naturally as the kids did that afternoon.



I've encountered trees like this from time to time, and they have always struck me as weary, old deacons of the forest—their scars like crescendos in the long, slow story of that particular place through time. Unbeknownst to me, trees with "cat-face" scars, as they are called, are important ambassadors for the fire-adapted forest. Scientists, particularly of the tree-ring lab kind, seek out trees with cat-face scars to aid in efforts to understand the history of fire in fire-adapted forests.

Cat-face scars always occur on the uphill side of a tree. Branches, leaf litter and other flammable debris are caught up against the base of the tree on the uphill side. As fire moves through the forest,

the debris pile is transformed into flames licking up against the side of the tree. The black burn mark is wide at the base, then slender and pointy further up the tree trunk—hence the name "cat face." The same trees can be burned again and again, and the scars are permanently recorded in the woody flesh of the trees. Fire-adapted trees like ponderosa pine may live 400 years or longer.

Because of our distinct seasons, scientists are able to use the rings of a tree's growth to find out about environmental changes through time. Each tree ring represents one season of the tree's growth. A normal (unburned) ring has white cambium growth at the beginning of a season and darker growth near the end of the season. A cat-faced fire scar is dramatically different. These scars are typically black, and the ring itself is rolled in and burnt back. The fire often burns out the year's growth in the area where it burns, so the ring itself gets burned out. By examining rings from several trees in a stand, it is possible to reconstruct the fire history of an entire forest. Just as I suspected, these trees are indeed weary, old deacons of the forest. To the kids, they are just plain magic. 🔥

Quaking Aspen...

By Ellis Margolis, University of Arizona
Laboratory of Tree Ring Research

As the monsoons fade and a hint of fall arrives on the first cool breeze that blows through the desert, we begin to look to the mountains for fall color. Without the vast sugar maple or beech forests that draw “leaf peepers” to the northeastern US, we count on quaking aspen (*Populus tremuloides*) to add color to our predominantly evergreen montane landscapes. Aspen is actually much more than just a pretty face; in fact, it is one of the most ecologically interesting and unique trees in the Sky Islands.

Quaking aspen is the most widely distributed native tree in North America, and it has the second largest geographic distribution on planet Earth. It is the dominant deciduous tree species in the high-elevation forests of the Sky Islands, and quaking aspen often exists as the only species filling this important ecological niche. Part of the reason for the widespread success of this species is an ability to re-sprout from a clonal root system, even when all of the aboveground portion is killed (e.g., following a

Carr Peak, Huachuca Mountains: *Brightest patch seen from below.* Fires in 1977 and 1986 cleared swaths of dark pines from the high slopes of Carr Peak. Jump forward in time and these same slopes paint themselves for each season, first shimmering green, then fluttering gold, and finally pale, still white. If you want a preview of what Sky Island seasons are doing before you plan your epic color-seeking hikes, look no further than Carr Peak, one of the regions most accessible aspen stands. *Special thanks to Mills Tandy for his insights into the fire-related botany of the Huachuca Mountains!*

Sierra de la Madera, Chihuahua: *Best wildlife-nesting area.* Containing perhaps the finest aspen stands in all of the Sierra Madre Occidental, a newly created preserve just northwest of the town of Madera in Chihuahua features the thick-billed parrot as its most charismatic inhabitant. Nesting primarily in old flicker holes in the aspens, the thick-bills are specialist feeders on the cones of various conifers in surrounding areas. Recent counts indicate approximately 600 individuals each summer and fall. The stands of giant aspens also host thriving populations of other hole-nesting species, especially eared quetzals, mountain trogons and elegant trogons, but also including spotted owls and saw-whet owls. One recent nest snag contained the nests of three thick-billed parrot pairs, a honeybee hive and a nest of saw-whet owls, all active simultaneously. In times past, but within the memory of local residents, the high-elevation reserve also hosted the legendary imperial woodpecker. The areas surrounding the preserve are now regularly timbered of their conifer species, with the exception of Douglas fir, but the aspens have been left unexploited and the domain of wildlife species. This is the only region in its entire range where the thick-bill is known to nest in aspens. *Special thanks to Noel Snyder for this profile!*



photo by Bob VanDeven

The Galiuro Mountains: Lowest elevation, most surprising stand

Chiricahua Mountains: *Largest Sky Island stands.* Stand-replacing fire patches in 1851 and 1886, though small by today's standards, painted at least 140 hectares (350 acres) of aspen across Fly's Peak, Chiricahua Peak and the ridge that joins them. After a century of fire suppression and fuel buildup, the 1994 Rattlesnake Fire cleared trees from some 5,000 acres (and burned less intensely on an additional 22,000 acres), including some of the old aspen stands. As alarming as this huge fire seemed at the time, it dramatically expanded opportunities for the Chiricahua's aspen stands. The Crest Trail now offers some of the most spectacular autumn hikes in the region. Sure, these stands are a far cry from the huge swaths of white trunks and golden leaves that blanket parts of the Rocky Mountains, but the Chiricahuas boast summer-like weather just a few walking miles away and an understory with wildflowers from the Sierra Madre.

Aspen researcher Ellis Margolis hedges this “biggest” claim: “In our lifetimes,” he says, “the Chiricahuas *do* have the biggest Sky Island stands of aspen we can see on the landscape.” But most of the aspen organism itself lies below ground, where, like some giant subterranean mushroom, it bides its time for thousands of years as clearings in the forest open and close, and its aboveground stems sprout and fall like so many mushrooms. If you include the underground world, the identity of our largest aspen stand remains a well-buried mystery.

Top Aspen Stands in the Sky Islands

Compiled By Gita Bodner

the “Phoenix” Tree of the Sky Islands

high-severity crown fire). Some argue that aspen clones are among the oldest living organisms, possibly thousands of years old. However, current dating techniques cannot accurately age the clones. We do know that individual aspen stems (what we normally think of as aspen trees) live to ages of greater than 250 years.

“Quaking aspen in the Sky Islands,” you might ask? Yes, it is present in most Sky Island mountain ranges in the US and even into Mexico. However, quaking aspen in the Sky Islands is much less conspicuous than the famous large stands in the San Francisco Peaks near Flagstaff, Arizona, the San Juan Mountains of southern Colorado, or the Sangre de Cristos of northern New Mexico.

The reason for the small stands is a combination of multiple factors: smaller areas of potentially suitable habitat resulting from physiographic characteristics of the Sky Islands and historic fire regimes. The island nature of the mountains results in limited contiguous areas of land above 8,000 feet, thus restraining the amount of area that receives sufficient moisture to sustain aspen. This initial restraint on aspen is further limited by fire dynamics.

Aspen in upper montane forests need fire—the right kind of fire—to persist on a landscape. Just like the mythical Phoenix, aspen clones will sprout from the ashes, even in areas wiped clean by the most intense fire storms. Aspen growing amongst other tree species need fire because they are a shade-intolerant species (i.e., they need full sunlight to regenerate, compete and survive). This

means that fires that kill all competing conifer trees are the best type for quaking aspen. That also means that where large patches of quaking aspen are present on the landscape, there were large, stand-replacing crown fires that gave the competitive advantage to the aspen.

What does this mean for the Sky Islands, where aspen have tended to come only in small patches instead of large stands? This is evidence to support the theory that the large, stand-replacing crown fires we’ve witnessed in recent years are unprecedented in the Sky Islands. Having said that, stand-replacing burns are clearly not new to this region—they are just historically seldom seen at the large scale of several of our recent burns.

Some aspen stands in the Sky Islands do seem to have sprouted from pre-1900 stand-replacing fires. For example, relatively large (40 hectares) patches of quaking aspen pop up in the Chiricahua Mountains (e.g., Fly’s Peak). These stands regenerated following a large fire in 1886. This fire was recorded all over the mountain by fire scars on pines that survived the fire. Thus, this fire was largely a low-intensity surface fire with some patches of stand-replacing fire that gave rise to the aspen stands—a mixed-severity fire. Mixed-severity fires were likely common throughout the upper elevations of the Sky Islands, where small patches (less than 40 hectares) of upper-mixed conifer forests would burn as a crown fire and aspen would rise from the ashes.

Galiuro Mountains: *Lowest elevation, most surprising stand.* Common wisdom states that aspens in the American Southwest grow at elevations of 7,000 feet or higher—usually much higher. Yet tucked into one hidden valley in the rugged, remote Galiuro range, some 30 white stems thrive at just 6,000 feet above sea level. This stand is just one reason some tree researchers refer to the Galiuros as “the upside-down mountains,” with shrubs in the high country and tall forests lower down in the range’s many drainages.

Unlike most in the region, this stand is not borne of fire; instead, it’s a spring-fed riparian patch growing among maples and alders. “Self-sustaining” patches like this occur in other places, too, where disturbances from wildlife, rockslides or other factors we don’t entirely understand enable them to persist through time.

Mt. Graham, Pinaleno Mountains: *Most majestic stems.* Mixed in with the perennial green of their conifer forest neighbors, the grandeur of Mt. Graham’s aspens lies not in the stand but in the individual stem—monoliths too big to wrap your arms around and old enough to wear grizzled gray bark at eye level. These ancients turn to smooth white only high in the canopy where their trembling leaves catch sun and treetop breezes. Of all the Sky Islands, Mt. Graham has the largest area capable of harboring aspens, yet as of 2004 had no solid stands bigger than five hectares (12 acres). This seems to be because until a few years ago, the high country of this range had shown no evidence of large—or even medium-sized—stand replacement burns in the last 300 years. Researchers trace the oldest trees on much of the range back to 1686, evidence that a large fire in 1685 cleared a great deal of the mountain’s high elevations. For 200 years after this presumed mega-burn, frequent surface fires seem to have kept fuel loads so low that no burns were able to flame open holes in the canopy. Yet peppered throughout the pines and spruces, this range has some of the largest—and oldest—aspens in the region. Aspen stems rarely, if ever, live long enough to trace all the way back to 1685, but some of Mt. Graham’s giants come close. Perhaps they are remnant progeny of a huge stand from the 1680s, feeding the clonal roots that will soon fill canopy holes left by the 1996 Clark Peak and 2004 Nuttal Fires.



photo by Gita Bodner

The Aspen Trail: Most aptly named

Aspen Loop Trail, Santa Catalina Mountains: *Most aptly named.* Right above the metropolis of Tucson, the relatively easy-going Aspen Loop Trail has long been one of the most popular high-elevation hiking trails in the Sky Islands. Before the 2004 Aspen Fire, this trail was almost entirely under a closed canopy of towering pines and riparian hardwood, with several small stands of aspens in the mix. Now large swaths of pine are gone—but watch for these aspen stands to take their rightful place along the trail of their name. Fall along the Aspen Loop Trail is sure to get ever more spectacular in the coming decades!

Grassland Fires Past and Present

By Guy R. McPherson, Dana M. Backer and Erika L. Geiger, University of Arizona School of Natural Resources

The historical prevalence of fire in Sky Island ecosystems suggests that fire is a necessary component of any comprehensive strategy focused on the retention of biological diversity. Because fire was—and is—a dominant process in these systems, restoration of historical fire regimes would seem to be an important first step toward maintenance of high levels of biological diversity.

Maintenance of biological diversity is important because present and future generations of humans depend on a rich diversity of life for a variety of ecosystem services, such as pollination of crop plants and purification of air and water. We depend on these types of services to maintain our civilization and ultimately our survival. Unfortunately, human actions are responsible for a dramatic and ongoing decline in biological diversity. As architects of the extinction crisis currently facing Earth, we have a responsibility to future generations of *Homo sapiens* and non-human species to retain as much biological diversity as possible. Natural resource managers and land stewards must embrace their capacity and capability to sustain and enhance the diversity and complexity of wildland ecosystems. Reintroducing ecological processes with which species evolved underlies the ability to maintain species diversity in the Sky Islands. The substantial economic cost of maintaining high levels of biological diversity will pale in comparison to the costs of failing to do so. These costs include extinction of myriad species, potentially including our own.

Coincident with Anglo settlement, grasslands of the Sky Islands were noted for the presence of recurrent fires, and the season, frequency and behavior of these fires likely contributed to high levels of biological diversity. Extensive fires occurred relatively frequently, averaging every five to 20 years in most of the region's grasslands. The time between successive fires undoubtedly varied considerably, perhaps ranging from two to 30 years on specific sites, and this variability was an important component of the disturbance regime. Most fires occurred in late June or early July when the first summer thunderstorms moved into the region following the extended hot, dry period in May and June. Summer fires were (and probably are) particularly important for sustaining grasses at the expense of woody plants

and for maintaining myriad species that are rarely noticed by most visitors. Recovery from these fires probably depended to a great extent on post-fire precipitation. Frequent summer thunderstorms doubtless contributed to rapid post-fire recovery, whereas a paucity of precipitation likely delayed recovery for years or even decades.

The consequences of contemporary fires differ from those of fires during the pre-settlement period in two primary



Restoring grasslands with fire in southern Arizona

ways: Pre-settlement fires kept mesquite from establishing, whereas today's fires have little impact on mesquite trees, and contemporary fires apparently contribute to the spread of non-native grasses that were not present during the pre-settlement period.

Mesquite was likely present throughout the region's grasslands, but fire, drought and interference from native grasses ensured that it dominated few grassland sites. The introduction of livestock during Anglo settlement reduced the interference from grasses, spread mesquite seeds in cattle feces, and reduced the cover and biomass of grasses that formerly helped support fire spread. As a result, mesquite assumed

dominance in many former grasslands. Once established, mesquite is amazingly resistant to mortality via fire (or other means). Mesquite plants develop an extensive and seemingly inexhaustible belowground "bud bank" within a few years after germination. Removal of the aboveground portion of the plant, even with recurrent high-intensity fires, rarely induces mortality in mesquite plants that exceed a few years in age. Personal observations indicate that successive high-intensity, early summer fires within a period of five years will cause about 10 percent of established mesquite plants to die; this appears to represent an approximate upper bound on fire-induced mortality.

Fire has been suggested as a management tool for control of non-native grasses. The most abundant non-native

While the desire to restore and maintain ecological processes and native biodiversity are noble ambitions, complete ecological restoration may not be achievable for most ecosystems, especially those dominated by non-native grasses and long-lived woody plants such as mesquite. Nonetheless, ecological restoration offers a goal toward which progress should be measured. We should not abandon efforts to restore ecosystems merely because the most Herculean efforts will fall short. The appropriate metric for restoration likely is some distance, as yet undefined, from the goal of complete restoration. As such, restoration efforts should place high priority on areas that are most similar to the desired condition at the expense of areas that are dissimilar from desired conditions (e.g., historical "reference" condition). Ideally, restoration efforts should focus on ecological processes, not individual species or specific attributes of community structures. In addition, restoration is a site-specific endeavor that must reflect and exploit local patterns of climate and weather. Rehabilitation of local fire regimes that resemble historical regimes is an important step toward retention of biological diversity. We should not allow excessive focus on obvious species such as mesquite and Lehmann lovegrass to obscure the overall goal of maintaining conditions appropriate to the conservation of thousands of species in the Sky Islands. As Albert Einstein pointed out (albeit in a different context), "Not all that is counted counts, and not all that counts can be counted." We should keep "counting" mesquite and Lehmann lovegrass, while recognizing that they are two species from among thousands that occupy grasslands in the Sky Islands.

With respect to restoration of biological diversity, it is particularly appropriate to reintroduce fires into southwestern ecosystems. Important questions focus on the season, frequency, variability and intensity with which fires should be reintroduced, but we know enough about these elements to reintroduce fire into these systems. As a result, societal, political, managerial and logistical concerns likely will continue to constrain reintroduction of fires to a far greater extent than ecological knowledge. 🔥

photo by Guy R. McPherson

Effects of Seeding Ryegrass on Vegetation Recovery Following Fire in a Ponderosa Pine Forest

By Angela D. Barclay, Natural Resource Consultant,
Cottonwood Environmental Consulting

Presettlement natural fire intervals ranged from two to 15 years in ponderosa pine (*Pinus ponderosa*) forests across the southwestern US. Since the late 1800s, however, widespread, low-intensity surface fires ceased across most of this region due to intense livestock grazing and proactive fire suppression. This gradual change in land use and management converted open “parklands” to dense thickets of ponderosa pine, thereby establishing conditions for high-intensity crown fires.

Vegetation loss after a catastrophic fire has the potential to affect biological, geomorphic and hydrological processes. Burned areas are sometimes manually seeded because regrowth of native species may be too slow, or the density of surviving plants too sparse, to maintain soil stability and restore nutrient cycles. Non-native grasses are used most often in seeding because they establish easily and colonize disturbed sites rapidly. Experiments assessing the effects of seeding have provided conflicting results, including reduced erosion, no effect on erosion and variable success controlling erosion depending on aspect and elevation.

A recent synthesis of the effectiveness in post-fire rehabilitation treatments concluded that seeded grasses are not effective in curbing erosion in the first year after seeding. This is particularly a problem in the monsoonal Southwest, where there is always a high probability of intense thunderstorms in July and August at the end of a long fire season, causing significant erosion. Also, an increase in long-term erosion could occur in the lull between the decline of seeded grasses and recovery of native vegetation, particularly if nitrogen depletion or shading by exotic plant species inhibit succession by native species.

Costly post-fire rehabilitation practices, such as seeding with non-native species, have been applied by land managers for more than a century, yet these practices remain controversial. A recent General Accounting Office (GAO) report noted that wildfires burn millions of acres annually, and following the 2000 and 2001 fire seasons, the US Forest Service obligated \$192 million and the Department of Interior gave \$118 million for 421 emergency stabilization and rehabilitation treatment plans—such as seeding, fencing, installing soil erosion barriers, and road or trail work. Neither the GAO nor the agencies could “determine whether emergency stabilization

and rehabilitation treatments were achieving their intended results.”

As part of the Forest Service’s Burned Area Emergency Response (BAER) efforts, exotic plant species such as ryegrass (*Lolium multiflorum*) are often used for seeding, but the effects on native plants are rarely monitored or published in the primary literature. Planting ryegrass has reduced biomass, diversity and species richness of native plants, and it may also inhibit native successional species through competition for nitrogen. Opponents of ryegrass seeding argue that the species is a strong competitor for water, nutrients, light and growing space. Seeding proponents agree that ryegrass may interfere with native species, but it may not threaten the long-term functionality of ecosystems because it leaves the system within three to five years of initial seeding. Although it is only transient in the ecosystem, ryegrass may have long-term effects, such as interfering with the development of deep-rooting native plants essential for long-term protection of watersheds.

Short and long-term effects of seeded vegetation on soil erosion, nutrient cycling and succession of native plants remain uncertain, particularly the effects of ryegrass in ponderosa pine ecosystems. Where ryegrass was used to seed after fire in central California, naturally regenerated ponderosa pine seedlings had lower survivorship in seeded rather than non-seeded plots. Similarly, following wildfires in the Sierra Nevada Mountains, increased ryegrass cover was associated with decreased density of ponderosa pine seedlings. Cover of native herbaceous vegetation and shrub seedling density also decreased as cover of ryegrass increased.

Following the May 1996 Dome Fire in north-central New Mexico’s Jemez Mountains, which burned 6,900 hectares of ponderosa pine, a study was conducted to examine the effects of burn intensity and ryegrass seeding in the



photos courtesy: Angela D. Barclay

Decrease in ryegrass cover from 1997 to 1998 in seeded areas

recovery of vegetation. On the seeded plots, foliar cover of ryegrass declined from 1997 to 1998 due to self-inhibition and/or reduced precipitation. Foliar cover and diversity of native forbs were greater in 1997 than 1998, probably due to a wet growing season the first year. Cover, species richness and diversity of native forbs were highest in non-seeded areas of moderate- and high-burn intensities. In 1997, regeneration and survivorship of conifer seedlings decreased as ryegrass cover increased, particularly in areas of high-burn intensity. Exotic plant cover, mostly horseweed (*Conyza canadensis*), increased from 1997 to 1998 in non-seeded areas of moderate- and high-burn intensity. Both the initial success of seeding and the eventual impacts on native vegetation were strongly modulated by climate variability.

The Dome Fire study suggests that ryegrass cover (or seeding treatment), in combination with the region or year (i.e., time since seeding or annual precipitation), reduced space and resources otherwise available to native forbs. Ryegrass may prevent the establishment of post-fire seeders, or it at least may preclude them from producing a viable seed reserve before the next fire. A limited seed bank study conducted in the summer immediately following the Dome Fire suggests that there were actually higher densities of new non-graminoids (e.g., forbs and shrubs) in seeded than non-seeded areas in 1996. By 1997 and 1998, however, cover, species richness and diversity of native forbs were actually lower in seeded than

non-seeded areas. Ryegrass suppression of native forb production and diversity could in fact have persistent effects on post-fire vegetation recovery.

There are other drawbacks to seeding with ryegrass. First, seeding augments fine fuels prone to rapid rates of fire spread and increases the chances for early reburns. Early reburns are unnatural and kill regenerating shrub and tree seedlings. In high-burn intensity areas with few surviving trees, forest regeneration could be forestalled by a lack of available seed if a reburn occurs within a decade of the initial fire. Seeds were found to rarely come from trees more than 50 meters away, so the impact may be significantly magnified with increasing area of reburn. In addition, early reburns can destroy root biomass and increase erosion potential. Ryegrass also attracts gophers, whose burrowing may increase soil movement and subsequent erosion.

In the near future, seeding and other post-fire rehabilitation methods will be considered indispensable as wildfire severity increases with the present glut in fuels and inevitable high-intensity burns. In particular, massive rehabilitation efforts after severe fire years highlight the need for continued post-seeding studies in ponderosa pine forests of the Southwest. Future studies should address issues of seed banks, ryegrass suppression of native forbs and conifer seedlings, effectiveness of ryegrass in curbing soil erosion and reasons why ryegrass tends to exit the system three to five years from seeding. 🔥

Who Goes Where? A Review of Wildlife Monitoring Techniques

By Sergio Avila, Sky Island Alliance Wildlife Biologist, and Janice Przybyl, Wildlife Monitoring Program

Knowledge of how wildlife moves across the landscape, where they live, how they obtain food and water, what they eat and how they interact are questions not just of curiosity. The answers to these questions help define conservation strategies that protect wildlife and their habitat.

How do we obtain this information? Can we be like investigative reporters and seek opinions and answers from the “animal on the street—or in the tree?” Can we gather a focus group of bobcats and facilitate a discussion on how they exist on the fringes of urban development? Perhaps not, although we can still learn from our furry friends.

Wildlife biologists utilize a variety of techniques to gather data about a particular species. Sometimes it is just a matter of going to a site, finding, observing and counting—that is if you have an observable species, such as burrowing owls or prairie dogs, ducks or geese. However, the species that Sky Island Alliance’s Wildlife Monitoring Program is concerned with are few and elusive, making the task of finding, observing and collecting data more difficult.

“Capture, mark, recapture” techniques may allow monitoring through time and space, depending on the species, habitat and technology used. However, advances in new monitoring techniques coupled with utilization of old methods allow us to collect data without ever having the animal-in-hand. What follows is a review of various monitoring methods, types of data that can be expected and—something very important to recognize—the limitations of each technique.

Wildlife Leave Footprints, We Take Only Photographs

Volunteers in Sky Island Alliance’s Wildlife Monitoring Program are trained to look for and recognize tracks and other signs left by six species: black bear, bobcat, coati, jaguar, Mexican gray wolf and puma. Track surveys are considered “non-intrusive” or “non-invasive” because there is no intended interference or interaction with the wild animal.

A bear moves down a sandy wash, and hours or days later, Sky Island Alliance trackers can document its signature—maybe a track, a scratch on a tree or a pile of scat (feces). Data from this type of method provides only presence/absence information on a particular species at a given site, therefore examination of data from track surveys is limited to spatial and temporal analysis of documented occurrences. Furthermore, absence of sign does not necessarily

mean that a species was not present, only that its sign was not discovered. A benefit of track surveys lies in the low cost and non-invasive nature. At Sky Island Alliance, the conservation value of tracking is strengthened through the inclusion of “citizen scientists” and the educational aspects that accompany the involvement of the public.

Many variables contribute to the challenge of creating valid datasets from track surveys, one of which is the subjective nature of identifying wildlife sign and possible misidentification. To address this, Sky Island Alliance has developed an intensive training program so that tracking volunteers have the skills needed to identify wildlife sign, properly photograph tracks and record data. Other variables that can lessen the probability of finding tracks include soil conditions (muddy, sandy, rocky) and weather (wind, rain), which can obliterate identifying clues.

The merits of tracking are enhanced when this data is used to supplement information gathered through an array of other non-invasive monitoring techniques, such as remote cameras and genetic analysis of hair or scat samples.

Smile, You’re on Candid Camera!

Remote camera set-ups are similar to tracking in that they are non-invasive and photographs provide additional data on the species—a literal snapshot in time. Cameras provide the exact time that photos are taken so that we know when animals are moving: night, early morning, dusk, etc. This presence/absence information, together with time of day and season of

the year, can be analyzed and related with weather conditions, habitat type, presence of other species (prey, predators, competitors), behavior and variations of all these variables through time.

A camera is an “open-eye” where we “observe” wildlife activity. However, it’s not only one eye; it can be a group of eyes throughout our study area (space), collecting information permanently (time) and allowing us to interpret the results according to the study design needs. In addition, we can obtain photos of

wildlife behavior or maybe record new species in an area—all without disturbing the animals (flashes do not seem to bother them).

How do these cameras work? Remote camera set-ups (or camera traps) are devices that include sensors (heat and/or motion), a setting panel, batteries and the camera. These devices can be contained in one box or have several elements that are set up to “capture” the animals.

The traps are set up in areas where the animal’s sign has been found

(tracks, scats, scrapes), in front of bodies of water or in front of fresh kills where predators could be photographed. When the animal walks in front of the camera, the unit “senses” the animal’s heat or movement and... click! a frame is taken.

Because cameras record information only when animals pass in front of them, they do not portray the entire picture of wildlife on the landscape. Other information such as feeding habits, breeding status, dispersing patterns, definite habitat use or detailed movements cannot be recorded with cameras. In addition, costs can be high, depending on the type of camera, the number of stations and the cost of maintenance—batteries, film, developing and fieldwork.

You can visit several websites that feature research projects that have utilized camera traps. Saguaro Park National Park placed cameras in the Rincon Mountains to document different species. Selected photos can be viewed at: www.nps.gov/sagu/research/index.htm. To view jaguar photos and other species, visit the Borderlands Jaguar Detection Project (www.borderjag.org) and the Northern Jaguar Project (www.northernjaguarproject.org).

It’s All in the Genes

If we go back to the bear sign our volunteers found in the wash and carefully remove any bear hairs snagged on the tree or collect the scat, we can send



artwork by Janice Przybyl



**Oh dear! We've been sitting here so long,
I think my mortality beeper went off!**

samples to a lab for analysis—genetic, diet, hormones, pathogens and physiology. Though cost of labwork can be prohibitive and DNA analysis techniques have not been worked out for all species, this method can provide a wealth of information not available from tracks or remote cameras. Species and possible sub-species, gender, individual identification, breeding status, family lineages, distribution and congenital illnesses are some of the possible insights available.

For non-invasive purposes, DNA studies can be conducted using hair or scat samples (invasive studies extract tissue samples from the animal, like blood, skin, mucous and other samples). Collecting hair samples from wild animals is a challenge, though researchers have rigged different devices to snatch hairs either as an animal passes by or deliberately rubs against a device. Barbed wire can capture hairs from bears crossing over or under fences. Often, scent or visual lures are placed on or nearby as an attractant.

Scats are highly useful because they contain elements that help researchers interpret many of the animal's habits or health condition. Food habits, hormone levels, parasite infestation or other illnesses can be identified and provide interesting information.

Most researchers rely on happenstance for locating scat and sometimes the scat from different species is hard to differentiate. Recently, help has *pooped up* from a surprising quarter—scat detection dogs! Several research projects have been testing the feasibility of using specially trained dogs to find scat from specific species. Samuel Wasser, from the University of Washington, found that using trained dogs to locate scats greatly enhances sampling efficiency, especially in large remote areas. Costs include dogs (purchase, training and care) and handler costs. However,

information obtained through this technique has yielded important results, such as biodiversity data on large, remote areas, corridors utilization and individual identification of animals and their offspring. For more information on Wasser's work, visit: www.nationalzoo.si.edu/Publications/ZooGoer/2002/5/scatdog.cfm or www.news.nationalgeographic.com/news/2003/10/1001_031001_scatdogs.html

Abduction and Weight Lifting: Capturing and Radio Collaring

Let's go back to the bear we tracked through the wash, whose scat and hair we collected. If we want to know the route the bear travels between mountain ranges and how he gets under or over a major highway, we need to fit the bear with a radio collar and track his movements using radio telemetry. We can then accurately monitor, in real time, the bear's movements across the landscape over time.

Radio telemetry was developed in the 1950s to study free-ranging wildlife and evolved into one of the most useful tools in wildlife ecology and management. The information obtained can provide accurate descriptions of the animal's distribution, habitat use and travel routes while detailed maps can delineate the animal's territories and interactions with other radio-collared animals.

In general terms, radio telemetry allows researchers to have "communication" with the animals from a distance. This communication is established through a radio device placed on the animal, normally a collar for mammals, under the skin for snakes or a box on top of tortoise shells. The radio sends a signal to a receiver in the researcher's hands.

The incorporation of Global Positioning System (GPS) units into the radio has opened the door to

different lines of research. GPS systems can store data directly on the animal unit for later downloads; data can also be recovered directly across a radio link or indirectly via a satellite system.

Radio collaring and following the animal's movement by telemetry can be prohibitively expensive. Costs accrue through the expense of equipment, the cost of flight time (if monitoring from the air) and through the personnel costs of training, tracking, trapping and fitting animals with collars. This technology depends on batteries for its adequate function, so battery-life is a limiting factor, and the detailed information gathered will only bear results on animals marked—not groups, families or populations.

Economic costs aside, radio telemetry has other costs: animals must be trapped, sedated, manipulated, marked with the transmitter, released to their original site and re-trapped to retrieve the radio and/or information stored in it. The process of trapping and radio-collaring has high risks and can result in mortality from the immobilizing drug or can induce behavior modifications in the target animal soon after recovering from the immobilization. It is important to consider limitations not only for researchers, but also for the species. Some species are more susceptible than others to the dangers of handling, due to their own natural behavior (stress, habitat or weather limitations) or because they belong to a certain category (endemic, endangered, threatened) and risks should not be taken.

Wrap-Up

Depending on the goals and type of data needed, there are various methods available to researchers in their quest to study and learn from wildlife behavior and natural history. While we've provided a cursory summary of several techniques here, there are many other considerations to take into account. Above all, it is imperative to adhere to the Scientific Method, which provides a time-tested and standardized framework for objectivity and study design. With many wildlife species in the Sky Islands, the conservation status and management implications for those animals should play a large role in formulating research goals and methods. Each method comes with various costs and benefits—ecological, monetary and logistical—and we suggest that conservation status play a significant role in deciding how to move forward with research projects. For instance, with rare, threatened or endangered species whose populations may be critically low, more invasive techniques such as trapping and collaring—regardless of the benefits in data and logistics—may not be prudent considering the risks of mortality, stress and other impacts to the animal. As the conservation status of a species becomes more fragile, additional sensitivity to study methods should be given. Because of the many and increasing advances in data collection methods today, we anticipate that research will continue its shift away from the more traditional, invasive techniques of the past while concurrently providing equally significant data that will provide new insights into the natural histories and conservation needs of our wildlife heritage. That's a good thing. 🔥

Sonoran Desert Conservation Plan Update: Countdown to Completion

By Carolyn Campbell, Coalition for Sonoran Desert Protection

After more than seven years of work, Pima County is poised to complete its Sonoran Desert Conservation Plan (SDCP)—a nationally recognized effort to plan for future growth throughout the region in a way that protects our natural environment and quality of life and that meets the requirements of the federal Endangered Species Act. Sky Island Alliance, along with the 37 other conservation and neighborhood groups that comprise the Coalition for Sonoran Desert Protection, has been participating diligently in the process to ensure that the plan truly lives up to its name.

With the Coalition's encouragement, Pima County has made important progress in establishing a plan that will adequately protect our Sonoran Desert environment into the future. One of the most significant steps includes the development and adoption of the "Conservation Lands System" into Pima County's Comprehensive Land Use Plan, which provides guidance for where and how development should occur based on the best available regional science. There will also be \$112 million provided from the passage of

last spring's Open Space Bond to purchase or otherwise protect important SDCP lands.

What's Left to Do

Pima County is working on the final draft of the plan, which is anticipated to be released before the first of the year. The final plan will include all of the details on how the county will provide conservation to the benefit of the species targeted under the SDCP, and we expect that there will be a significant public comment

period before the county submits the plan to the US Fish and Wildlife Service (FWS). Although FWS will also conduct a public comment period, as required by law, we know that our best chance to influence the final draft will be on a local level with the Pima County Board of Supervisors. We've expanded our public outreach efforts in preparation for this opportunity.

In the meantime, we will continue to work with the county as it reviews and permits ongoing development activities, updates current ordinances to be consistent with the plan, and develops management and monitoring plans for conserved lands.

How You Can Help

Visit www.sonorandesert.org to:

1) Stay informed about the SDCP's progress. Sign up for the Coalition's e-newsletter to get updates about important progress and activities related to the SDCP and other Coalition for Sonoran Desert Protection efforts, including information about the final draft.

2) Support the Coalition's work financially. The Coalition has been successful so far only because of the support from our member groups and the community at large. Our policy work and expanded public outreach during the upcoming months will be crucial to the plan's success.

3) Provide comments when the final draft is released. Like the Open Space Bond, the Coalition's efforts can only go so far. When the draft is released, Pima County will need concerned folks like you to again remind them of the community support behind our efforts to conserve our desert home into the future.

Completion of the SDCP will be our last and best opportunity to shape how growth and conservation will occur for the next 50 years—please help ensure that Pima County's future will be a good one!

For more information, contact the Coalition for Sonoran Desert Protection at (520) 388-9925. 🔥

Strengthening Our Partnerships

Thank you to those members, both old and new, who contributed to the "Protecting Our Mountain Islands and Desert Seas" fundraising campaign in August and September. We are immeasurably grateful to those that contributed and helped us to meet a \$25,000 anonymous challenge grant in just six weeks! This is the first time that Sky Island Alliance has undertaken such a challenge. Not only did we reach our goal, the many affirmations of our work to protect and restore the region have been a huge boost as we face our conservation challenges.

A core understanding of our work has always been to ensure long-term conservation of the Sky Islands, we must bring together those who care deeply about the future of the wild places and wild creatures that define our region. Our strong membership and volunteer base empower us with the ability to succeed—whether it is working with the Arizona Department of Transportation to provide safe passage for wildlife or asking our Senators and Representatives to support and advocate for Wilderness designation to protect the Tumacacori Highlands for future generations.

In the six weeks of our fundraising campaign, we met many donors, including some we had previously only known by mail. It has been inspiring to learn about what has drawn folks to Sky Island Alliance, and it gives us great hope for where we can go from here. We weren't able to contact everyone in this brief campaign (so don't feel left out!). We look forward to strengthening our partnerships, connections and friendships with all of you soon.

We would like to thank several volunteers for their help during the campaign. We appreciate the dedicated time that Diana Hadley, Peter Warshall, Paul Condon, Kate Fournier, Tim Van Devender, Rod Mondt, Nancy Zierenberg and Paul Hirt unselfishly donated to make our efforts such a success! 🔥

Thank you.



Critical Connections for Wildlife

As many of you are aware, I am a member of the Regional Transportation Authority (RTA) Citizens' Advisory Committee, which has put together a list of transportation projects that voters will be asked to vote on sometime in 2006, along with a half-cent sales tax increase to fund these projects.

Pima County Administrator Chuck Huckelberry is also involved in this effort as the chair of the Technical Management Committee. Mr. Huckelberry and I have been successful thus far in including funding for a "Critical Wildlife Connections" category that will fund wildlife-crossing structures in transportation projects (sites not identified). This funding is critical in accomplishing the vision of the Sonoran Desert Conservation Plan and in complementing possible land acquisitions as a result of the 2004 Open Space Bond.

With the help of many members of the community who showed support for additional funding for critical wildlife

connections, the RTA Citizens' Advisory Committee included \$45 million in its recommendations for this category. It has since been approved by the RTA board, which is made up of representatives from the jurisdictions involved in the RTA plan. The plan is now being considered for approval by the individual jurisdictions, including Pima County. Once the individual jurisdictions approve the plan, it will go back to the RTA board for final approval and the Pima County Board of Supervisors will then set up a special election for 2006.

There are many additional elements in the plan that you may also want to learn about. The details of road and intersection improvements, transit, safety, bicycle and pedestrian facilities can be found at www.rtamobility.com.

Please contact me if you would like any further information at (520) 388-9925 or carolyn@sonorandesert.org.

—Carolyn Campbell

Field Schedule Winter and Spring 2006

Defend Your Mother!

Get your hands dirty, your boots muddy and your soul back!

Join Sky Island Alliance in the Field – 50 Years of Conservation Since 1992

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

January 13 – 15. Santa Rita Mountains Road Inventory. Come out and help us in a new project to assess and rehabilitate wildlands in the eastern Santa Ritas. 1.5 hours from Tucson.

February 03 – 05. Huachuca Mountains Riparian Inventory. Join us in the beautiful Huachuca Mountains! Home of the mountain tree frog! Ramsey Canyon leopard frog! Trogons! Turkeys! Bears and lions! 2.0 hours from Tucson.

February 17 – 19. Peloncillo Mountains Riparian Inventory. Visit the beautiful and remote Peloncillos in a project to assess restoration potential of historic cienegas and degraded streams. 4 hours from Tucson.

March 03 – 05. Santa Rita Mountains Road Inventory. Come out and help us in a new project to assess and rehabilitate wildlands in the eastern Santa Ritas. 1.5 hours from Tucson.

April 07 – 09. Joint Sky Island Alliance and New Mexico Wilderness Alliance (NMWA). We will meet the great NMWA folks somewhere along the Arizona/New Mexico Border for a service project to benefit wildlife and wildlands!

April 21 – 23. Huachuca Mountains Riparian Monitoring. Join us in the beautiful Huachuca Mountains! Home of the mountain tree frog! Ramsey Canyon leopard frog! Trogons! Turkeys! Bears and lions! 2.0 hours from Tucson.



SKY ISLAND ALLIANCE
Protecting our Mountain Islands and Desert Seas

Join Us!

Join or renew here or through our website: www.skyislandalliance.org

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.

Your Name _____

Address _____

City _____ State _____ Zip _____

Phone _____ E-Mail _____

\$35 \$50 \$100 Other \$_____ (any amount helps and is appreciated!)

My check is enclosed.

I'd like to pay by: Master Card Visa American Express

Fill this out, or donate online. It's quick, easy, and safe!

Amount \$ _____ Card # _____ Exp. Date _____

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

Card billing zip code (if different) _____

Sky Island Alliance, PO Box 41165, Tucson, AZ 85717

\$ What Are the Sky Islands Worth to You?

\$10 a month*? \$25 a month**? How about \$40***?

Set up monthly **AUTOMATICALLY DEDUCTED DONATIONS** and know that your dollars are working day in and day out to protect the places you love.

Equal to: *1 beer or latte per week **1 lunch out per week; ***one dinner out per month.

Don't delay! Visit www.skyislandalliance.org for online instructions, or contact Acasia at 520/624-7080 ext. 207. Make sure your dollars count!

Tumacacori T-Shirts!!



"The vanishing wilderness is yet a part of our western heritage. We westerners have known the wilds during our lifetimes and we must see to it that our grandchildren are not denied the same rich experience during theirs." ~ Senator Frank Church

Get your "Friends of the Tumacacori Highlands" t-shirts now!

- 100% organic cotton; **not** pre-shrunk.
- Pen-and-ink Jaguar logo on the front!
- Wilderness quotation (see above) on the back!
- Men's on a light-tan shirt, women's on a green-tea shirt.
- See pictures on our website at: www.TumacacoriWild.org

How many? What sizes?

Men's cut		Women's cut	
Quantity	Size	Quantity	Size
_____	XL	_____	XL
_____	L	_____	L
_____	M	_____	M
_____	S		

Where would you like your shirt(s) shipped?

Name: _____

Address: _____

City, State, ZIP: _____

Phone number (just in case): _____

Send this form with payment to:
(\$18.00 + \$3.00 shipping and handling per shirt)

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



Become an SIA Program Fund Donor

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

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

- Wildlife Monitoring (Tracking),
- Restoration,
- Wildland Inventory,

- Jaguar Conservation, and
- Wilderness

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



SKY ISLAND ALLIANCE

Protecting our Mountain Islands
and Desert Seas

PO Box 41165, Tucson, AZ 85717

Trial by Fire

Controversy about what we humans should do about fires in the Sky Islands—start them, prepare for them, guide them, try to stomp out every spark or walk some precarious balance between these—rages as hot these days as our recent fires themselves. By now many of us (certainly most of you readers) know that fires are a natural and vital part of Sky Island ecology. This knowledge steers us away from the “stomp out every spark” camp, but it doesn’t solve the dilemma of what to do next. Even as our region’s fire ecologists, land managers and community safety teams try to chart a new course, every charred home or ashen, muddy flood intensifies the rhetoric around us.

What we should do *after* a fire has gotten less attention among the general public, but is debated almost as fiercely. Do we let Nature take care of herself, figuring that any intervention will likely just make things worse? There’s certainly history to back that position. Or have we gotten these systems so out of balance that leaving them alone would be a breach of our responsibility, like leaving the scene of an accident we helped cause? Even if we decide we must intervene, what can we do that would actually help?

Amidst all this haze, one thing is clear: In the face of such uncertainty, we must take every opportunity to learn from each of our fires. Fires featured in our aspen centerfold, for example, teach us that stand-replacement burns turn out to have a long history in the region, though seldom on the scale of some recent burns. Tried-and-true post-fire restoration methods like reseeding with ryegrass turn out to have unexpected side effects (page 11). Out-of-season prescribed burns may reduce risks of stand replacement burning, but they can also catch wildlife off guard (page six). Many Summerhaven homes lost to the 2003 Aspen Fire could have been saved by acts as simple as raking duff (page five). Grass fires may not reduce mesquite densities as quickly as we had all hoped and sometimes boost Lehmann’s lovegrass, but they still bring many benefits (page 10).

And there’s more: The 2004 Nuttall Fire on Mt. Graham showed that dire predictions of whole mountains going up in flames don’t always come true; only 11 percent of the 30,000-acre fire qualified as a high-intensity burn. Because much of this hot 11 percent were swaths intentionally charred to steer wildfire flames away from the Mt. Graham telescopes, Nuttall also showed how the back burns that firefighting teams light to help corral wildfires can be as intensive and ecologically damaging as the wildfires themselves—or more so.

The 2005 Florida Fire in the Santa Ritas, however, demonstrated how involvement of local land managers who understand the ecological values of an area (in this case, staff of the Coronado National Forest) can reduce impacts of the single-minded incident command teams that are brought in to put out large fires at all costs. The Florida Fire also showed the Coronado National Forest trying new approaches like spreading locally collected native grass seed on low-elevation slopes in the hopes of giving natives an advantage over potential colonizers from nearby patches of exotic lovegrass. We’re eagerly awaiting the results of this grand experiment!

—Gita Bodner, Editor

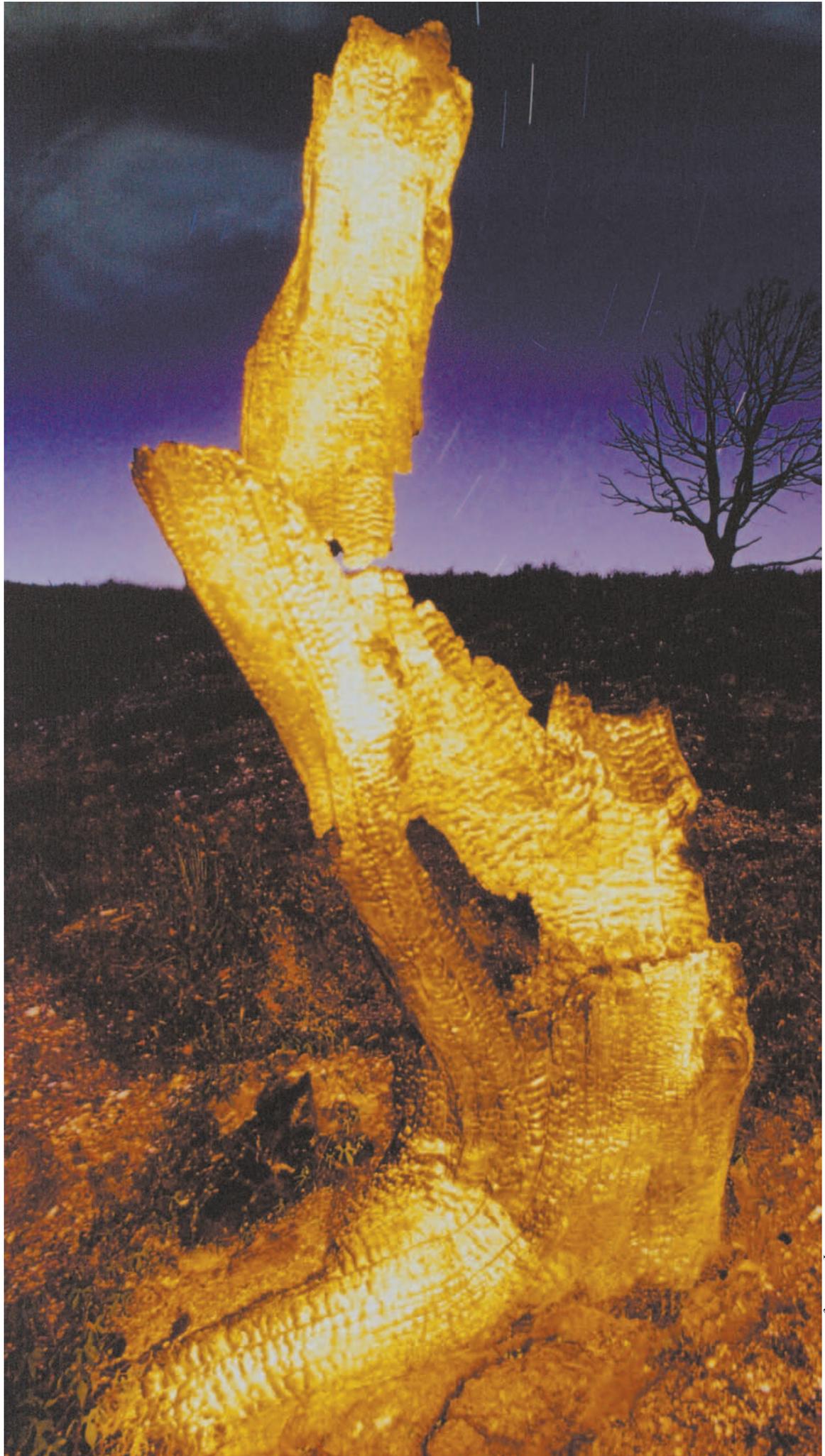


photo by Bob VanDeven

Memory of fire

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