



**SKY
ISLAND
ALLIANCE**
Protecting our Mountain Islands
and Desert Seas

Restoring Connections

Vol. 13 Issue 1 Spring 2010

Newsletter of Sky Island Alliance

Conservation Biology A SKY ISLAND PRIMER

~ plus ~
El Regreso del Tigre



"After the great excitement felt when we saw the jaguar photographs for the first time, after congratulating hugs with my wife and SIA's Sergio Avila, I came to a conclusion: I am not only a romantic conservationist anymore, I am now a *committed* romantic conservationist."

— Carlos Robles, Rancho El Aribabi

EXTRA! EXTRA! READ ALL ABOUT IT! *see pages 14-15*

"I saw a dream coming true, a dream I thought would not happen; I was giving up thinking of the jaguar's presence... I thought of my father, it was one of the biggest news that I've heard, for my own happiness, but more for my father. He has been the best example for following my own dreams."

— Carlos Robles, Jr.

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Through the Director's Lens

by Melanie Emerson, Executive Director

2009 was a dynamic and capricious year, replete with change at every level. Climate change, economic transformation, and new political leadership framed our conversations and our thinking. SIA progressed with its own share of changes. Dale Turner graciously assumed the role as SIA's new Board President. Kevin Dahl, Patricia Frederick, and Adrian Quijada all joined the Board while Brooke Gebow and Chris Roll rotated off, after years of committed service. I feel extremely fortunate to have transitioned into my role as executive director in the incredibly supportive company of SIA's stellar staff, Board, members and supporters, who joined me on this journey to embrace change, to keep the organization nimble and responsive in the ever-changing political and economic landscape, and to advance the organization's mission by acting on our core values and priorities for conservation.

As we transitioned into 2010, we made a significant change as well... we moved! Well, only a few hundred yards. In mid-February, SIA's staff and a cadre of dedicated volunteers transferred all our offices from the fragmented mixture of spaces on the 1st and 2nd floors of the southwest end of The Historic Y, to contiguous offices on the north side of the 2nd floor of the same building. We are now occupying the offices formerly held by the Center Desert Archaeology, right above the Rogue Theater and the Paolo Freire Freedom School, looking north to the Catalinas and west into the building's picturesque courtyard. Please come and visit us in our new space!

While moving itself is never a fun time, staff, volunteers and one of our newest Board members, Pat Frederick and her husband Howard, pitched in and made the move swift and, frankly, enjoyable.

Looking ahead, 2011 will be SIA's 20th anniversary. I have no doubt for those of you involved in the organization since its inception, this seems barely possible. We all have you to thank for your vision, commitment and effort to make this organization and its critical work in the region a reality. And now we want to celebrate this milestone and that vision. Throughout 2010 we will be planning 20th anniversary events and we are looking to YOU, our members, supporters, and volunteers to make these events momentous, memorable and deserving of the SIA tradition of celebration! ***I invite you to join me on the 20th Anniversary Events Committee to plan for a year to remember.***

As Rachel Carson so aptly penned, "Like the resource[s] it seeks to protect, [sic] conservation must be dynamic, changing as conditions change, seeking always to become more effective." SIA is constantly adapting to changing conditions out in the field, within the halls of Congress, and around the development of new ideas and strategies to ensure that resources (both human and financial) are applied to yield the best possible outcomes. As your regional conservation organization, we strive to be the effective organization that is poised to adapt to and thrive within dynamic internal and external environments. Thank you for your continued commitment to and support of SIA as we evolve and grow, learning about ourselves and our world and making that change we wish to see.

Melanie Emerson

SIA's Move

I would like to extend a big thank you to Shawn Burke, owner of the The Historic Y, and his staff Joey Schwanz and Anthony Taylor, who went above and beyond to ensure that our new space met our needs, even making building modifications to provide us with the best environment possible to support our work. I also wish to commend and thank Acasia Berry, Sky Jacobs, and Juan Rascón of Sierra Network Solutions for ensuring the smooth transition of complex phone and computer systems. This was a monumental task that was handled with grace and precision, affording the rest of staff peace of mind and very little virtual downtime.

On behalf of the staff and Board, a resounding thank you to the volunteers who donated time, supplies, energy and a cheery disposition! Without their help, this move would not have been possible:

- | | |
|------------------------|-------------------|
| Juan Caciado | Dwight Metzger |
| Paul Condon | Krista Schmidt |
| Don Davis | Randy Serraglio |
| Desert Archaeology | Julie St. John |
| Pat & Howard Frederick | Jack Strasburg |
| Tom Gibbons | Bill Thornton |
| Bruce Hilpert | Anna Van Devender |
| Andrea Hopper | Jeff Whitmore |
| Pat Hux | |

From the President

by Dale Turner, President, Board of Directors

As we roll into Spring, I'm reminded that the contrasts of this Sky Island region are part of what make this an exciting place. Last weekend, the desert spiny lizards made their appearance in my back yard, basking on rocks and bricks to take advantage of the first truly warm day. But from my front yard, I could see huge patches of white snow on the mountains, evidence that winter still holds onto the high country. In the low deserts west of Tucson that looked baked and brown from last year's drought, now the creosote bushes are green and wildflowers are popping up. And it's nice to rediscover that rivers look good with water in them.

Another exciting contrast is the chance to talk about healthy living jaguars along the U.S.-Mexico

border. After all the wrenching news last year about Macho B, seeing new photos of a big spotted cat brought a lot of smiles. While jaguars aren't the only reason Sky Island Alliance put out all those cameras, they're sure a big part of it.

The same could be said of other efforts. Jaguars aren't the only reason to protect the Tumacacori Highlands wilderness, but they're a good one. Jaguar tracks aren't the only things our trackers seek, but they'll do. And jaguars aren't the only critters that might use a highway crossing structure, but they're reason enough.

I may never see a jaguar in the wild, but they're a great reason to get out there and look.



In other changes, David Hodges has left SIA for new adventures. As one of our earliest staff members, David worked on many issues, including policy, public lands, wilderness, and fundraising. He served as our Executive Director for several years, and contributed his strategic insight and silver tongue to many of our key initiatives. We're grateful for his efforts, and wish him well.

OUR WISH LIST

Thank you to all members and supporters of Sky Island Alliance. We are currently seeking additional support from the SIA community from individuals who will:

- ✿ Help organize SIA's *Artists for Conservation* fundraiser and reception
- ✿ Commit to bring in 10 new members
- ✿ Become founding members of SIA's San Pedro Society, businesses supporting conservation
- ✿ Host a house party in 2010 to support SIA or a particular program area
- ✿ Volunteer to serve on our 20th Anniversary Events Committee (events in 2011)
- ✿ Commit to a Sustaining Membership level of \$20/month
- ✿ "Fan" SIA on Facebook and invite their Facebook friends as fans
- ✿ Introduce your family and friends to the wild places of the Sky Islands!

And the donation of materials/services:

- ✿ Digital video camera
- ✿ Outdoor patio furniture (table, 4-6 chairs)
- ✿ Indoor and outdoor plants
- ✿ Gently used vehicle (4 passenger with high clearance and low mileage)
- ✿ Website design
- ✿ Document printing

It's an organic process and YOU are integral to its success *by Julie St. John, Editor*

Thanks to the vision of Carlos Robles and his family, the steadfast efforts of Sky Island Alliance staff and volunteers, and the generosity of the many people who provided the necessary financial support, we have again testimony that our Sky Islands are so biologically rich that our continent's King Predator, *El Tigre*, calls them home. The dream, and the commitment and faith to make it come true, were integral to this success, bringing all the pieces to the right place at the right time.

Where we are today is the confluence of many efforts (founders, board, staff, volunteers, supporters alike) over the past almost twenty years... *and* what we are planning to accomplish in the next twenty years. We are not only ramping up our efforts to protect and restore native landscapes and species, we are documenting the intricacies of their natural systems through our Madrean Archipelago Biodiversity Assessment. Like a tree, our roots are diving into deeper knowledge while our programmatic branches are reaching for the sky... and you? The gifts of your time, your voices, and your financial support, provide the moisture, sunshine, and rich nutrients that sustain our work. It's an organic process that offers a steady stream of challenges, opportunities and rewards.

What better way to prepare for the next twenty years than to revisit what we have learned thus far. This issue, our Sky Island Primer on Conservation Biology, will be followed by primers on the importance of connectivity (corridors, linkages) and cores (habitat, especially endangered habitat). Beginning with an eloquent introduction by Louise Misztal, a set of key articles from past issues of *Restoring Connections* unfolds the expression of conservation biology which drives our programmatic work and decision-making — the reason why we are here today, setting remote cameras, getting volunteers out into the field, advocating for the best possible management of this landscape... because this is our home, the air we breathe, the water we drink, the land we live upon... *depend upon* for our very survival. It's not just that it's the right thing to do — these mountain islands and desert seas are inherently deserving of our efforts — it's also because it's really the only choice we have if we want to keep it a viable environment for our children and our children's children.

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.



SKY ISLAND ALLIANCE
Protecting our Mountain Islands and Desert Seas

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Conservation deserves more than 2%*

Only 2%!

Please help us meet the Earth Friends Challenge by sending your tax-deductible donation today... thank you!

Over the last 18 years, SIA has been your local conservation organization, focused solely on restoring and protecting the Sky Island region. This could not have been achieved without your support. SIA relies on its membership to meet its fundraising goals.

Since 2003, the Earth Friends Wildlife Foundation has been encouraging SIA and its supporters to give more, recruit new members, and build capacity through challenge grants. These grants help your donations go further, allowing SIA to continue to be the regional leader in Sky Island conservation. The Sky Islands deserve more than 2%. Please make a tax-deductible contribution today.



* Of the \$307.65 billion donated in the United States in 2008, only 2% went to environmental conservation. Source: Giving USA Report.

Protecting Our Mountain Islands and Desert Seas...

Sky Island Alliance's dedicated staff advance the organization's goals every day — in the field with volunteers, around the map table planning strategies, in the office, at the meeting, reaching out to Sky Island residents... you name it. If it's important to the Sky Island region, we are there. We hope you're inspired — let us know!

Madrean Archipelago Biodiversity

Assessment by Tom Van Devender & Marc Trinks

Although MABA started last May (less than a year ago), it has grown into a dynamic program that is rapidly developing into a major regional information source for all kinds of conservation activities. Since Ed Gilbert (from ASU), Marc, and Sky launched the MABA database last August, about 105,000 observations have been entered! These include over 40 plant lists from many areas in northeastern Sonora. The biggest set of records was about 39,000 observations of birds that were the basis for *The Birds of Sonora* written by Stephen Russell and Gale Monson. We are very thankful to Dr. Russell for these observations. MABA collaborator Aaron Fleisch is also providing his observations of breeding birds in Sonoran Sky Island ranges. One of the strengths of the MABA database is the use of observations and images as mappable data points.

Volunteers Krista Schmidt's and Jefferson Carter's data processing assistance continues to be invaluable. In 1948, Stephen S. White published the *Flora of the Río Bavispe*, based on expeditions to Sonora each year from 1938 to 1941. These dedicated volunteers have been working with topographic maps and Google Earth to pull geographical coordinates from this and other published biological inventories from the region. Margaret Fusari, a new volunteer to the MABA program, will begin working in The University of Arizona Entomological Collection to mine records of Sonoran insects.



A greater short-horned lizard (*Phrynosoma (Tapaja) hernandesi*) in the Sierra San Luis. Photo by Sky Jacobs.

The other primary component of the MABA project is field expeditions to high priority Sky Island ranges with teams of zoologists, botanists, photographers, students, agency representatives and landowners to study the flora and fauna of the region. In September, the first expedition to the Cuenca Los Ojos Foundation ranches in the *Sierra San Luis* was a great success, with over a thousand new observations!

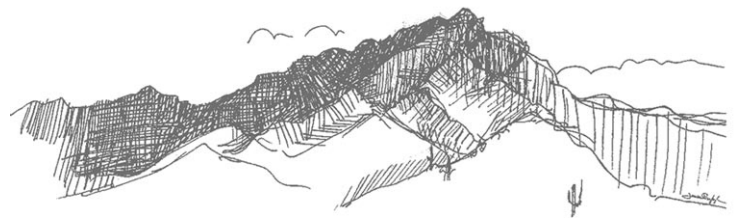
The first MABA expedition for 2010 was conducted in the *Sierra El Tigre* this March. Tom and Marc recently went on a scouting trip with the guidance of two biologists from the Ajos-Bavispe CONANP (a Mexican agency similar to the U.S. National Park Service) Reserve. Ajos-Bavispe is a co-sponsor for this expedition, which is leading approximately 25 participants for 10 days into one of the most remote and rugged of the Sonoran Sky Islands. Plans for a second expedition to the *Sierra de la Madera (Oposura)* in the first week of August are well under way. Gertrudis Yanes-Arwayo, a biology instructor at the Universidad de la Sierra in Moctezuma, will help with logistics and recruiting UNISIERRA students to participate and receive hands-on training in the field with MABA biologists.

On a personal level, Tom is learning that many aspects of his career were leading to the MABA project. His projects on rare plants, including the Cochise pincushion cactus, Chihuahuan night-blooming cereus, false rainbow cactus, and Gentry's indigo bush, provided plant records for the Cuenca Los Ojos Foundation properties and adjacent areas in the *Municipio de Agua Prieta*. His packrat midden projects in New Mexico and Texas led to interest in Chihuahuan desertscrub habitats on limestone near Agua Prieta. His study of the flora of the Yécora area in eastern Sonora provided background information on the mainland Sierra Madre Occidental. His three-year project with the National Fish & Wildlife Foundation on migratory pollinators yielded about 450 records of hummingbirds in Sonora. The MABA database is a wonderful opportunity to share and use these observations. All of these activities are helping the MABA project coalesce into a major regional resource for conservation and research. To learn more about the MABA project, visit www.skyislandalliance.org/maba.htm.

Northern Mexico Conservation Program: Celebrating the Chinese Year of the Tiger Our Own Way!

by Sergio Avila

The year 2010 started off positively for jaguar recovery in the Sky Island region! According to the



Chinese calendar, 2010 is the “Year of the Tiger” (14 February 2010 to 2 February 2011). The Tiger, the third sign in the Chinese Zodiac cycle, is a courageous and fiery fighter that keeps away the three main tragedies of a household: fire, thieves and ghosts.

For North and South American native cultures, the jaguar, or *el tigre*, is a powerful spiritual guide, warrior and god. For us at Sky Island Alliance the jaguar is a symbol of hope — protecting the jaguar and its habitat is our way of protecting and restoring the native species of the Sky Islands.

This year, the U.S. Fish and Wildlife Service (USFWS) finally decided to develop a recovery plan for the jaguar and reclaimed authority of jaguar recovery in the United States. Sky Island Alliance celebrates and supports this decision, and will continue to cooperate with the USFWS to develop a robust recovery plan. On this matter, *The New York Times* published a letter to the editor from Sky Island Alliance on 1 February 2010 where we expressed the importance of jaguar recovery in the region, with benefits to an array of less-prominent species. Also in February, *Arizona Highways* published an article titled “Emerald Isle.” Authored by Terry Greene Sterling, with outstanding photography by Jack Dykinga, the article describes the cross-cultural, landscape connections in the region and how Sky Island Alliance is collaborating with landowners working to preserve this unique region through a bi-national approach. You can find these publications on the “News” section of our website.

And, did you hear about the recent jaguar photos? Let's just say it's a spiritual connection when the elusive northern jaguar grants you with a track, a kill, a sighting (all of which we have documented in northern Sonora). This is a testament to habitat restoration activities by the Robles family from El Aribabi. The Northern Mexico Conservation Program is lucky to collaborate with such forward-thinking, conservation-minded citizens.

Finally, at the conclusion of 2009, we completed our fundraising goal for the **Bring Back the Cats!** campaign. A heartfelt *thank you* goes to all donors, supporters and friends of Sky Island Alliance — our success is your success. In the upcoming months, we will be searching for volunteers to help us with two high profile events related to jaguar

conservation. If interested, please contact Sergio at Sergio@skyislandalliance.org or 520-624-7080 x16.

Wilderness Program by Mike Quigley

Recent news stories and opinion pieces surrounding the USFWS decision to designate critical habitat for jaguars have focused on the possible pros and cons — and the politics — of designating critical habitat. While that is a worthy discussion, we submit that we should not wait to take positive actions now to preserve habitat in southern Arizona.

For more than a decade there has been direct, repeated, reliable evidence of jaguars living in the southwestern United States. A lengthy scientific monitoring study in the Tumacacori Highlands of southern Arizona identified two individual male jaguars (named Macho A and Macho B) as well as a third unidentifiable individual. Macho B appeared on dozens of photographs taken over several years, helping researchers learn about his territory, ecological interactions, survival skills and communication in the wild. The long record of Macho B's life is clear evidence of the viability of jaguars in southern Arizona where quality habitat exists.

Preservation of quality habitat areas — and preservation of connectivity between those areas to allow for species to move between them — is essential to the survival of species. Macho B and other jaguars reliably sighted in the southwest have shown us what quality habitat looks like here. We now have an opportunity, and an obligation, to preserve this habitat.

While mysterious and magnificent species like jaguars are often the rallying point for conservation, habitat preservation benefits all species, including those deemed “small, ugly, non-charismatic endangered species at the back of the line.” All species depend upon quality habitat supporting functioning biological systems; by preserving habitat we preserve a key factor for the survival of many species.

Much of the remaining quality habitat is federal public land, often National Forest and National Wildlife Refuge lands. Wilderness designation is a way to preserve this quality habitat on our federal public lands. Wilderness designation, bestowed by Congress, recognizes our most important natural landscapes and directs that they be managed primarily for their natural characteristics — the very characteristics that make these landscapes quality habitat.

The Tumacacori Highlands is 80,000+ acres of quality habitat within the Coronado National Forest. This land was the home of the jaguar Macho B, and is the home to Mexican brown opossums, elegant trogons, tropical vine snakes, Chiricahua leopard frogs, peregrine falcons, Mexican free-tailed

bats, white-tailed deer, javelina, mountain lions, and many, many other species. The Tumacacori Highlands is a deserving candidate for Wilderness designation. Indeed, Congressman Grijalva, Sky Island Alliance, and many conservation partners and concerned Arizonans have been working towards this goal.

While Wilderness designation for the Tumacacori Highlands is not a substitute for jaguar critical habitat evaluations, nor will it bring back Macho B, it will preserve a special landscape and important habitat for many species today — and it will preserve the opportunity for other jaguars to call this land home tomorrow. This is something positive that we can do now. Our elected representatives in Congress should make this happen without further delay.

Landscape Restoration Program

by Sarah Williams

At the end of October, Trevor and I headed to the Bureau of Land Management offices in Safford to attend a Proper Functioning Condition Training for streams and riparian areas. Over the course of two days we learned how to assess the functionality of the hydrology, vegetation and erosion/deposition attributes and processes of riparian-wetland areas. This training not only provided us with new tools to use in the field but gave us a fresh eye on how to inventory and monitor streams and riparian areas.

The autumn weather was just right for our Annual Volunteer Appreciation Party which was held on a Sunday in Reid Park last November. Prizes from supporting local businesses were raffled off to the volunteers in attendance and the Volunteer of the Year Award went to Jefferson Carter for his endless hours spent mapping and entering field data in the office. Food, frisbee games and smiles were in abundance, making for a well-spent afternoon among friends.

More than 20 volunteers made it out to Las Ciénegas National Conservation Area (LCNCA) the first weekend of December to close and restore sections of a large camp area that has been a playground of sorts for the ATV crowd. Volunteers worked to rehabilitate an unauthorized hill climb, jumps, and barren areas under a large oak tree through vertical mulching techniques. Unfortunately, negative impacts from unmanaged recreation continue to be the greatest short-term threat to the ecological integrity of this landscape. Although our efforts out at LCNCA can sometimes feel repetitive, it is so important to continue the hard work to ensure that this grassland complex remains intact and healthy. Join us in 2010 as we ramp up an advocacy campaign that promotes an ecological emphasis in management decisions, while continuing our current important on-the-ground work of road inventories and closures, restoration, and wildlife monitoring.

Policy & Planning Program: Focus on Climate Change Adaptation by Louise Misztal,

Climate change is already disrupting wildlife and ecosystems in the Sky Island region. Record-breaking high temperatures and high nighttime lows, extreme drought and unusually intense storm events are some of the most visible disruptions. Wildlife, vegetation and human communities are experiencing new, challenging conditions they may not be adapted to. Safeguarding ecological systems and the wildlife and human populations that depend on them will require thinking about land and wildlife management in different ways. In response to increasingly dramatic changes in the region, Sky Island Alliance has undertaken a climate change adaptation project.

Climate change adaptation is the term used to describe efforts to prepare for and cope with the impacts of a changing climate. Development of adaptation strategies for specific places and ecological systems in the Sky Island region will require collaborative efforts across many fields of expertise and among numerous stakeholders. To assist managers and planners in this difficult task, Sky Island Alliance is surveying experts, forming an Arizona Climate Change Network, and will hold climate change adaptation workshops. Our survey will help us prioritize the most pressing ecological issues, understand the perceptions of participants and their concepts of climate change adaptation, and identify challenges to planning for and implementing climate change adaptation. The Network will connect leading planners and thinkers in natural resource management and conservation with experts on regional climate impacts. We seek to foster knowledge-sharing and the generation of new ideas and connections. The climate change adaptation workshops will prompt participants to look at management and conservation through the lens of uncertain climate impacts and create adaptation strategies. Although uncertainty exists regarding the magnitude and ecological impacts of climate changes, it should no longer be a reason for inaction.

Helping species and natural systems withstand and adapt to new climate conditions is more important than ever. New management and monitoring techniques can be articulated and implemented if all those who work to protect natural resources work together to facilitate change.

Wildlife Linkages Program by Janice Przybyl

Back-to-back tracking workshops! For 2010 we decided to add a training workshop in early spring for new tracking volunteers. This change resulted in our completing the 2009 workshop in the final months of the year and immediately rolling into the New Year with plans and preparation for the 2010 workshop in February and March.

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WHAT IS CONSERVATION BIOLOGY?

by Louise Misztal

Conservation biology is really all about the diversity of life, something Sky Island Alliance and our supporters are passionate about protecting. It's not just about species diversity. Genetic and ecosystem diversity are also a crucial part of the diversity of life. Our work to protect and restore native species and ecosystems is rooted in compassion and respect for the natural world and in a belief that all species are valuable. It is also rooted in the application of the science of biology to the care and protection of plants and animals to prevent their needless destruction or unsustainable exploitation. This is the science of conservation biology. It is a melding of traditions such as game and forest management with academic disciplines such as population biology and genetics. It is a bridge between theoretical science and applied science. It is the application of the principles of ecology, biogeography, population genetics, economics, sociology, anthropology, philosophy and other fields to the maintenance of biological diversity. That's all very definitive and interesting, but how does conservation biology play out on the ground?

Human influence has altered every ecosystem on the planet and is now an inescapable factor in natural systems. Driven by this reality, conservation biology is a mission-oriented science focused on preserving biological diversity where quick action can be critical and the consequences of failure great. To successfully protect natural systems in the face of human influence requires answering three questions: How is the diversity of life distributed around the planet? What threats does this diversity face? What can people do to reduce or eliminate these threats and restore biological diversity and ecosystem health? We ask ourselves and our volunteers these questions every day when we decide where to put the next tracking transect, which mountain range to explore, or where to embark on the next restoration project. Sky Island Alliance works to address these questions with projects like the Madrean Archipelago Biodiversity Assessment, with volunteer weekends that record the location and status of roads on public land, with volunteer trackers and remote cameras that determine presence of wildlife, and with volunteer weekends that restore roads and riparian areas to a natural state.

Conservation in America grew out of several philosophical movements. In the mid-1800s Ralph Waldo Emerson and Henry David Thoreau wrote about nature having uses other than human economic gain, and John Muir argued for

a national movement to preserve nature in its wild and pristine state. At the turn of the century the concept of resource conservation was developed and promoted as an ethical relationship between people and the land. Driven by such figures as Theodore Roosevelt, an outdoorsman and naturalist, and Gifford Pinchot, the father of the "multiple use" concept now engrained in public land management agencies, this conception of conservation focused on management of the lands and resources so as not to destroy their ability to serve future generations. Roosevelt's and Pinchot's ideas and work led to management of lands and resources in the public trust and the systems of national parks, forests, wildlife refuges, and public lands that now encompasses nearly a third of the land area in the United States. Following this utilitarian conception of conservation, the first recorded use of the term "conservation biology" appeared in the 1937 inaugural issue of the Wildlife Society's *Journal of Wildlife Management* in a paper discussing nest failure in the game bird ring-necked pheasant. In the mid-1940s Aldo Leopold, a forester previously employed in the hunting and killing of predators in New Mexico to assuage ranchers, developed and wrote about a land ethic. His land ethic was based on the scholarly disciplines of ecology and evolution which had conclusively demonstrated that nature was not a simple collection of independent parts, but a complicated and integrated system of interdependent processes.

In the 1960s and 1970s public and scientific concern was growing about the extinction crisis caused by human influence on natural systems; the publication in 1964 of Rachel Carson's *Silent Spring* provided a critical turning point in public perception and engagement in environmental conservation. People began asking such questions as "How big must a population be in order to minimize the risk of extinction?" The science of ecology made large strides. The focus of conservation biology, initially defined in terms of maintaining populations of game species for hunting, shifted to protecting populations of all native plant and animal species, many of them uncommon, and to protecting biological diversity in general. Unlike many other areas of science that strive to remain completely objective, conservation biology emerged as a value-laden discipline. It holds that natural systems and biological diversity are inherently good, and establishes their conservation as a primary goal.



Ash-throated flycatcher. Photo by Sky Jacobs.

I started my career in biology as a research technician monitoring southwestern willow flycatcher nests on the lower San Pedro River. An endangered species with an estimated population of 1,200 pairs, their decline is due primarily to human-caused destruction of cottonwood-willow riparian habitat they require for nesting. At the end of my field season, I had the satisfaction of answering research questions about the number of breeding pairs present, the number of young fledged, and the specific habitat of successful nesting sites on the 5 miles of river I had meticulously monitored, but I was not able to pursue an answer to the question of whether there would be pairs of flycatchers nesting on the river in the next year, or in 10 years.

I began working at Sky Island Alliance because as a scientist, I wanted to do more than answer questions about the population status of a small, endearing bird. I wanted to use such answers to inform work that would ensure the survival of species like the flycatcher and ecosystems like the lower San Pedro River. My work is driven by a belief that the world I live in will be less rich and fulfilling with even one less species of ant, beetle, bird, plant or fungi. I found a place at Sky Island Alliance to work on behalf of all the critters in the region by protecting cores and corridors, restoring land to its natural condition, and generating science. When the day is done, I want to know that we used our collective smarts, and drew on our ethics and the scientific information available to ensure that every species enriching the region we call home has the space it needs and a fighting chance to live. To me, that is the heart of conservation biology.

SKY ISLAND RICHNESS

by Peter Warshall, SIA Board Member & Maniacal Naturalist At Large

PART I: REFLECTIONS OF SKY ISLAND MARGINS AND FRINGES FROM SUMMER 2006

Borders are beautiful. Some faded, ragged, or sharp, contrasting colors or shadows and light, outlining patches of Earth, appearing or disappearing with time. Especially now, when borders can be seen from satellites or through microscopes, their boundaries delineate so many thoughts and important images — where the fence separates grazed from over-grazed, riparian from hillslope, lichen into fungal filaments and algal blobs. Of course, as a local maniacal naturalist, I have a special affection for borders of the southwest, especially those of the Madrean Sky Island archipelago.

The hugest borders enclose the air masses that travel over the sky islands — the Arctic air mass, the Pacific maritime air mass, and the Caribbean maritime air mass. In summer, a highly unstable, dry, hot but clearly defined tropical continental air mass hovers over the sky island region, only to disappear each fall. (You can go to gacc.nifc.gov/swcc/ and click on “weather” and then “GOES Satellite Imagery” to see the boundaries of these air masses that impact the sky islands in the visible, infrared, and water vapor.) These borders are quite distinct if somewhat seasonal and ephemeral. They scud the lower atmosphere bringing the *equipates* of winter and the lightning-strewn monsoons of summer. Sometimes, the edge of the Pacific maritime air mass creeps northeast into the sky islands and brings fall tropical storms. These borders teach a lesson: you can be coherent (an air mass has predictable moisture and temperature content) and yet moveable. The maritime air masses are well-circumscribed moveable feasts of water. In nature, a border does not mean “nailed to the landscape.”

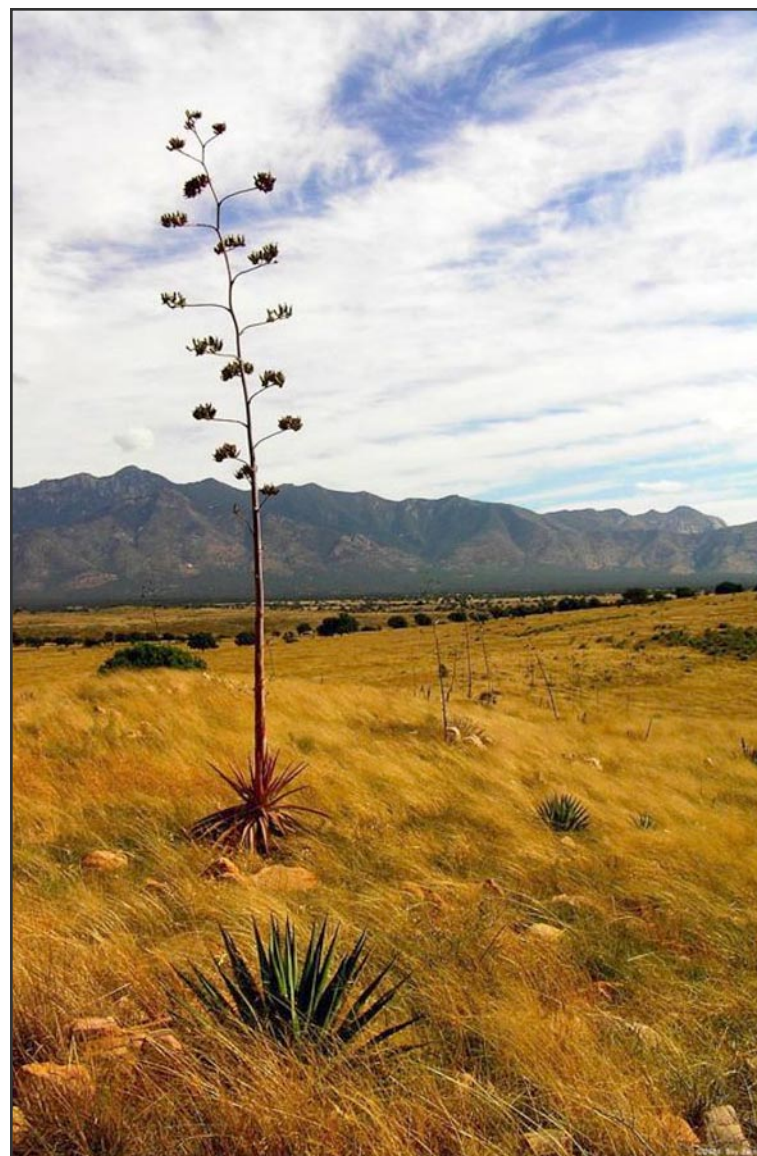
Some sky island borders change slowly. The borders between the Neotropical/Holarctic flora and the Nearctic/Neotropical fauna are a good example. These borders became more clearly defined when the land bridge between North and South America allowed the movement and mixing of very different cohorts of species. The border organized itself over millions of years and through dozens of climate changes and animal/plant movements. The border is, in some sense, a belt of points — the unique limit of one species meeting another species also at its unique limits. Maples can grow with organ pipe cactus; oaks with palms. Fourteen plant families reach their northern limits in the sky island region (including the northern Sierra Madre). Seven bird families reach their southern limit and four their northern limit. Until recently, thick-billed parrots

and trogons mixed with nuthatches. About 30 bird, over 35 reptile, and 145 mammal species reach their limits. The edges of their distributions form the border. The border is not a thin line but an exceptional strip of the planet — a kind of beaded belt of creatures at their geographical fringe.

Since the “border” is a matrix, many details remain mysterious to humans. Why the yellow-eyed junco, a perfectly capable flyer, draws a psychological (or some other) line between two sky islands, we do not know? Similarly, another capable migrant, the Mexican chickadee refuses to fly north and cross a line paralleling I-10; while its counterpart, the Mountain chickadee, rarely crosses the same border going south. Sometimes, we can guess at what a border means to a bird. The Mexican duck should have probably been named the cienega duck. In the past, it gave up long-distance migration and only flew short distances between wetlands. With the coming of cattle tanks, wetland pockets increased and some long-distant migrant mallard ducks stopped migrating and settled in cattle tanks or sewage ponds. Today, they breed confidently with the Mexican (sic *Cienaga*) duck. The Mexican duck is now losing its identity (it’s been downgraded from species to race) as its homeland security disappears.

The most famous borders of the sky islands are part of their definition. Sky islands are isolated mountain ranges with a stack of biotic communities, layered one on top of another. One layer must be an oak-pine forest to be part of the Madrean archipelago. Each layer has a top and bottom border. Naturalists try to understand these borders — they slant downward on the south and west side of a mountain more than on the north and east; they vary with canyons and self-shadowing from adjacent peaks, and they vary with soil types. The pine-oak appears as a slither on the Pinalenos; fattens out on the Huachucas; and blossoms on the Sierra Oposura.

Crossing the vertical borders on a sky island can be beneficial. Black bears, for instance, ignore the vertical borders of their homeland sky islands, eating cactus fruit at the bottom, then wandering past the encinal, the pine/oak, the mixed conifers, and into the high mountain *ciénegas* for a few roots. They do their border crossing in a few hours, leaving telltale signs of cactus fruit in conifer forest



Looking to the Huachucas from Rancho Los Fresnos in northeast Sonora. Photo by Sky Jacobs.

scat. Many migratory birds nest at elevations that take the skirt of snowfields into account. If the border of the snowfield is thick and distinct in June, they will nest downhill. Like the air masses, it is important to keep in mind that borders can be vertical, not just a line on the ground.

Over time, the montane borders of each layer move up and down. The sky island borders have moved fifteen to twenty times over the last two million years of glaciations. About 11,000 years ago, the glaciers were at a maximum with small glacial bodies on the Pinalenos. The Pinyon-Juniper woodland border was about 2,900 feet ASL but now is at 4,800 to 7,700 and climbing. During these fluxes, the valleys were, at times, not borders between the mountains, but bridges. The yarrow spiny lizard, for instance, marched north as the glaciers retreated, crossing valleys that may have had oak riparian or oak woodland valleys.

Right now, with climate change and human disturbance for instance, the upper edge of the Engelmann spruce/corkbark fir layer is moving up and “off the top” of the Pinalenos. Fire has literally sacrificed the forest edge to the atmosphere. Spruce, stressed by climate, has also been attacked by five species of insect pests and thousands have died. The clear border between the high elevation spruce/fir and the lower elevation mixed conifer (which includes much more Doug fir) has fragmented.

continued next page

SKY ISLAND RICHNESS *continued*

Until there is a new glacial advance, the border may never return.

In short, all borders are temporary. We look at them within “time frames” that are of interest. We can trap ourselves into believing that a border is somehow “solid” or immovable. This mindset is common in both human and natural history. But, borders sing a wistful improvised frame-of-reference blues.

Perhaps the most sacrilegious attitude toward borders occurs among invasive plants and animals. They have not experienced the bio-geo-history that defined their niche or place in the community. Exotics ignore natural borders. Starlings move into saguaros displacing the desert form of the purple martin. Buffle grass does not stay within the grassland where it was planted. A major goal of ecological restoration is to keep the natural borders — prevent the southwest from becoming a homogenous landscape of exotics and human-adapted cultivars. At times, as with various sky island lilies, the protection of the species requires an actual perimeter fence around the cluster of plants.

We are now in an era where humans are interposing barriers, inserting dividing lines that have little relationship to Nature’s borders. These intrusions have the greatest impact on the large carnivores and migrating hoofed-animals like pronghorn, who need large tracts and many habitats for survival. The jaguar has become emblematic of “borderless wildlife” in search of homeland security. It reminds us how arbitrary lines on maps are not in any way comparable to the rich and textured margins of the sky island stack of biotic communities, or the north-south mix of tropical and temperate creatures.

PART II: GEOLOGY AND SOILS *FROM WINTER 2002*

Lovers of the Madrean Archipelago know that these mountains hold tremendous mysteries, and that we have precious little field data to explain them. We keep looking for what has made our sky island cluster so unique on the planet. Many of us have thought about the number of islands, their size, their position in North America (especially in the North American Cordillera and Gila River Basin), their three weather systems, their unique overlap of floral and faunal provinces, their complex paleohistory, their topography, and their latitude. Here’s more food for thought: what do geology, geomorphology, and soils add to our picture?

The sky islands dot the landscape between two of the largest massifs of different rocks in North America. The “continent” of the north (the Colorado Plateau/Mogollon Rim) is a stable sedimentary platform with a few explosive volcanic rocks. The “continent” of the south (the Sierra Madre Occidental) is a more recent layering of volcanic ash-flow, some of the rocks more welded together than others. The volcanics of the Sky Island/Sierra Madre complex may be the biggest single volcanic ash-flow-based mass on the planet. In addition, the sky island cluster includes “metamorphic core complexes” which are a series of mountains along the seam between “old” North America (from Canada through Sonora) and the terranes formed by its crash with the Pacific Plate. The metamorphic core complexes such as the Pinalenos are built from predominantly granite and granitelike rocks. In short, the sky islands sport three general types (or mixes) of mountains — volcanic, granite, and limestone.

Some plants and animals prefer one kind of rock or its derived soils more than others. When the volcanic lovers, for instance, meet the sedimentary or granitic rock and their soils, they may evolve new forms to “jump” rock types. Or, older rocks may have very different soils as they have been

weathered for hundreds or tens of thousands more years. Some species may have adapted to these paleo-soils better than others. Or, some soils may have blown in from somewhere else and accumulated in layers of wind-blown caliche or sand; they too have their own specialists. Or, some soils may hold water better and, for instance, create “wetland islands” which harbor special plants and animals. The more soil varieties and rock outcrops, talus slopes and topographic forms, the more species numbers.

Another important but little studied aspect of rocks/soils/diversity is erosion from the mountain slopes to the valleys. The textures, layers, and depth of the valley soils are part of a long story of mountain contributions and valley accumulations. For sky islands, it’s crucial to note if the valley soils have a calcic (caliche, carbonate) or argillic (clay) layer.

Here are a few examples:

☞ Yucca prefers sandy soils. When paleo-lakes receded, some of the sand accumulated into dunes alongside the sky island mountains. For instance, look for yuccas along the San Simon, Animas, or Willcox Playa valleys. Wherever you see thick yucca groves, there’s usually sand. In turn, more yuccas mean more *Xylocopa* bees, a bee that lays its eggs inside the dried yucca stems, in sealed chambers with one pollen ball of food for each egg. Usually the chambers are excavated in the stem, deep within the rosette of leaves, safe from the probing tongues of Gila woodpeckers who actually listen for the churning of the larval bee. But, if too deep within the rosette, water can pond and cause fungal rot which can kill the larva. In addition, if a female bee takes too long between furnishing pollen balls, another parasitic bee may sneak into the hole and lay its own egg containing a larva which will grow faster and kill the *Xylocopa*’s. So sand sustains this five-species food chain (actually many more).

☞ The barking frog prefers cracks and fissures in limestone or dwells in certain locales with calcium-rich soils like gypsum soils. It does not occur in granitic mountains nor the sandier soils derived from granite. Similarly, the little known Wet Canyon talus snail of the Pinalenos (which exists in about a one mile-long talus slope) may have particular needs for carbonate water and a unique mix of soil and rock.

☞ The Huachucas have a greater diversity of plants than the Pinalenos, even though the Pinalenos are taller with a greater elevational difference between valley and peaks, and a more developed spruce/fir forest. The Pinalenos are predominantly granite, while the Huachucas have a combination of rocks with quartzite, limestones, some shales and siltstones, conglomerates and some volcanics. Especially in the upper elevations, the soils and outcrops of limestone increase the number of vascular plant species on the Huachucas compared to the Pinalenos.

In short, I have a confession. I have always looked at sky islands from the oak woodland up, and kind of preferred to “see” the mountain and not the valleys. But geology and soils connect the two. To understand what we want to protect and where the diversity lives, we do well to look at what scientists call the “substrates” of the sky islands to see how much they can explain diversity, and how they can help in restoring sky island habitats whose soils have been lost to human enterprise. When we include the consideration of soils in the sky island ecosystems, the need to protect valley floor land becomes even clearer. Along with high granite boulder fields and limestone cliffs, we need to conserve special soils like relic sand dunes and ciénega clay loams that nurture extensive food webs. Noticing and caring about rock and soils should bring us back to Earth.





Leaf cutter ants. Photo by Sky Jacobs.

THE DESERT AT THE EDGE OF THE TROPICS by Michael Wilson, FROM SPRING 2006

In one small canyon complex in the Rincon Mountains of southeastern Arizona, a plant grows that is found nowhere else in the United States. There the plant, *Lysiloma watsoni*, grows as frost-stunted shrubs among the heat-reservoirs of rocks and canyon walls that keep these subtropical legumes from freezing to death. At warmer elevations in the metropolitan areas of Tucson and Phoenix, the plant develops into an attractive tree and feathertrees, as they are known in the nursery trade, are valued as landscape subjects around grocery stores and subdivisions and auto dealerships. Such a place can be found at the corner of a busy intersection in Tucson. Lawyers, mortgage brokers and merchants strolling between the buildings of this office complex may possibly appreciate the shade of these trees, but I doubt they ever notice the large orange butterflies flitting among the plantings and automobiles. They certainly aren't aware of the story that, for me, is an example of one of the more important phenomena of our Sky Islands.

So, here is the story, told in the years we will call "good years" when the monsoon has blessed us with abundant rain, when the brutal foreshummer has not been so brutal and our winter is the dream of snow-weary tourists from the Midwest. It is repeated with thousands of creatures time and time again, year after year. The names and many details change but this particular case — even with its artificial elements — is as good as any. In fact, it is because the situation is somewhat artificial that we understand more about it. Every so often this butterfly, known as the large orange sulphur, *Phoebis agarithe*, makes its way into Arizona from green subtropical areas to the south. A gravid female will wander into a hostile desert. Often by

no luck at all, she might find the shade and relatively cool canyons and cliff faces of those stucco buildings. There, she will deposit just enough eggs on *Lysiloma*, the only native Arizonan foodplant of her caterpillars, so that a small population will be established. Normally not able to survive the rigors of winter at higher elevations here, her progeny will persist for some time and then will die out — casualties of too much cold or heat, too much inbreeding, too-efficient predators, too much or too little of something. Right at this moment, somewhere on a Sky Island, a small population of some small creature or another is perishing. I say this with certainty because our winter has been just cold enough and dry enough to cause local extinctions of some subtropical plant that itself may be barely holding on. For a biologist, this very instability and changeability is a major reason why our region is so very intriguing and so very important.

Sonora, the Mexican state just south of Arizona, is a transition zone for temperate and tropical faunas and floras. Within this state occur the northernmost tropical deciduous forests in the world and the northern reaches of the great coniferous forests of the Sierra Madre Occidental all bordering some of the driest and hottest areas in North America. Whatever else they are, the mountain islands of northern Sonora and southern Arizona are stepping stones. Fragmented isolates of habitat surrounded by lowlands with a very different environment, they are outposts of plants and animals that are at the very limits of their ranges. Bean-counter conservationists who want to make a case for regional protection always want to find areas with high endemism — meaning that there are a lot of

animals and plants found nowhere else but in the region at hand. The truth of the matter, however, is that the endemism of the sky islands is not particularly high. Rather, many of our plants and animals — from jaguars and hummingbirds to more than 60% of Sonoran trees — are the northernmost examples of the mega-diversity of the American tropics. Either these organisms were marooned in the shrinking mosaic of amenable environments when the climate began changing thousands of years ago or they have traveled to our mountain islands in recent times. Many of them, like the large orange sulphur, test the limits of occupation constantly. The whole region is a natural laboratory that constantly challenges the adaptability of organisms. It is natural selection more raw and real than any other place I can think of.

In southwestern North America the transitioning, establishment and extinction of local populations can be incredibly rapid and surprising. What is here today can certainly be gone tomorrow. But the chances are that if you wait long enough, if there haven't been too many houses built, too much bulldozing, too many corridors cut, that — just like jaguars — they will all come back again. Vampire bats, boa constrictors, macaws, freshwater crabs, orchid bees, strangler figs, ocelots, leaf-cutter ants, burrowing tree frogs, cycads, sleeper gobies. It is deeply thrilling to discover some animal or plant on a mountain island that one associates more with Amazonia than a desert or oak and pine forest. Every year something turns up, some strange bird, or plant, or snake or beetle that will make some specialist take in a sharp breath of surprise. This is particularly true for those of us who study the

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“The border region is more than a place where two countries meet. It is a vibrant community with rich culture, spectacular wildlife, and fragile ecosystems. The International League of Conservation Photographers has beautifully documented the region’s ecology and highlighted the effect of the border wall on the region. As a citizen of the border region, I have witnessed the harm caused by ineffective policies crafted in Washington, D.C., far from the realities of our community. I know this exhibit will be an eye-opening experience for many people unaware of the impact these misguided policies are having on our border.”

— Congressman Raul Grijalva



Continental Divide by Melanie Emerson

In early 2009, the International League of Conservation Photographers (www.ilcp.com) sent a team of 17 world-renowned photographers, with writers, filmmakers and scientists, to the borderlands of the United States and Mexico to document the wildlife, ecology, and effects of the border wall on this imperiled landscape. The team spent 24 days traversing the borderlands, photographing spectacular wild places, elusive wildlife, borderlands communities and the damage that the construction of and associated infrastructure from the border wall have caused.

ILCP selected the borderlands to conduct what it calls a RAVE: Rapid Assessment Visual Expedition, because the region is a shared conservation treasure of international importance that harbors some of the most biodiverse landscapes on the continent. The ILCP had a tripartite goal in raising awareness of the beauty and biodiversity of borderlands ecosystems and supporting the work of borderlands organizations: (1) To end or revoke the waiver authority that Congress gave the Department of Homeland Security to expedite building of the wall; (2) To mandate that environmental damage from wall that has already been built, be addressed and mitigated; and, (3) To encourage increased international cooperation on borderlands ecological issues and migration corridors.

In conjunction with the ILCP’s RAVE, the Cornell Lab of Ornithology produced a compelling 12-minute video about the RAVE and the borderlands. This film features a number of SIA partners as well as SIA Board member, Ana Cordova. Please view it at www.ilcp.com/?cid=93 and share it with friends, relatives, and colleagues outside the border region.

The ILCP in coordination with Art for Conservation, created a photographic exhibition, **Continental Divide: Borderlands Wildlife, People and the WALL**, of 30 photographs from the expedition to raise awareness of the beauty and biodiversity of borderlands ecosystems. The exhibit debuted in April, 2009 in the U.S. House of Representatives’ Rayburn House in Washington, D.C. and since has been traveling around the country and the world, bringing the stark visual reality of the border to hundreds of thousands of people. The exhibit is comprised of photographs by international award-winning photographers like Pulitzer Prize winner Jack Dykinga, Kevin Schafer, Wendy Shattil, and Roy Toft, conveying the natural beauty and biodiversity of the region’s public and private lands, ranches and communities, as well as the ecological and cultural impacts of the border wall.



this page, clockwise from top left: **Due North** by Krista Schlyer, **The Photographers** by Ian Shive, **a portrait of the border wall** ©Jack Dykinga, and **Jack Dykinga at the Continental Divide exhibit opening, December 2009** ©Melanie Emerson.



this page, clockwise from bottom left: **Against the Wall by Krista Schlyer, American Tropics by Krista Schlyer, Enduring Wild by Roy Toft, Return of the Bear by Santiago Gilbert, Tucson opening at the Historic Y.**

SIA teamed with ILCP Borderlands RAVE organizer and photographer, Krista Schlyer, to bring the exhibit to Arizona for the month of December. Melanie Emerson and Sergio Avila, in coordination with Board member Paul Hirt and a host of volunteers and staff, organized five showings of the exhibit at Arizona State University (Tempe), the Historic Y, the 4th Avenue Street Fair, The University of Arizona Poetry Center, and the Central School Project (Bisbee). Approximately 5,000 people viewed the exhibit while in Arizona. At each of these events, public presentations were made including a dynamic talk by Jack Dykinga describing his experiences on the RAVE and photographing wild places in the southwest for decades. Congressional staffers, Ron Barber and Natalie Luna, representing Congresswoman Giffords and Congressman Grijalva respectively, shared their remarks on the importance of the exhibit and the ecological impact of the wall. SIA Northern Mexico Conservation Program Coordinator Sergio Avila and photographer Krista Schlyer joined Jack at the Tucson opening in The Historic Y and also presented at the Arizona opening of the exhibit at ASU. At both the UA Poetry Center and the Central School Project, award-winning nature writer Ken Lambertson shared a reading, *Jaguar Heavens*, describing his experiences in and observations in the Tumacacori Highlands. Learn more about the ILCP's exhibit at www.ilcp.com/borderlands.

It is difficult to understate the ecological impacts to the Sky Islands from the construction, operation, and maintenance of this wall. SIA, ILCP, and many other groups are advocating for removal, mitigation, and monitoring as well as revocation of the waiver authority that produced the wall with essentially no environmental assessment. SIA extends a huge *thank you* to ILCP for its vision and commitment to raising public awareness of this environmental disaster, and especially to photojournalist Krista Schlyer, without whom neither the expedition nor the exhibition would have happened. In addition to the ILCP's contributions, bringing this exhibit to the Tucson, Tempe, and Bisbee communities would not have been possible without the generous support of partner organizations, University departments, businesses, individual sponsors and a host of dedicated volunteers:



Our Warmest Appreciation to our Co-Sponsors...

Art for Conservation, ASU College of Liberal Arts and Sciences, ASU Institute for Humanities Research, ASU Northern American Center for Transborder studies, ASU School of Geographical Sciences & Urban Planning, ASU School of Historical, Philosophical & Religious Studies, Bisbee Coffee Company, Border Action Network, Bruce Pheneger Architect, Center for Biological Diversity, Central School Project, China Mist Tea, Cuenca Los Ojos Foundation, Defenders of Wildlife, the Emerson Family, Engrained Café, Paul Hirt, Latin America Network, Migrant Resource Center & Shelter, Northern Jaguar Project, David Pijawka, Juan Rascón R./Sierra Network Solutions, Sierra Club, Andrew Smith, The Historic YWCA, The University of Arizona Poetry Center, Trinity Presbyterian Church, The University of Arizona Latin American Studies Department, Tucson City Councilman Rodney Glassman, and Tucson City Councilwoman Regina Romero.

and Volunteers (* denotes SIA staff, and ** denotes SIA Board)

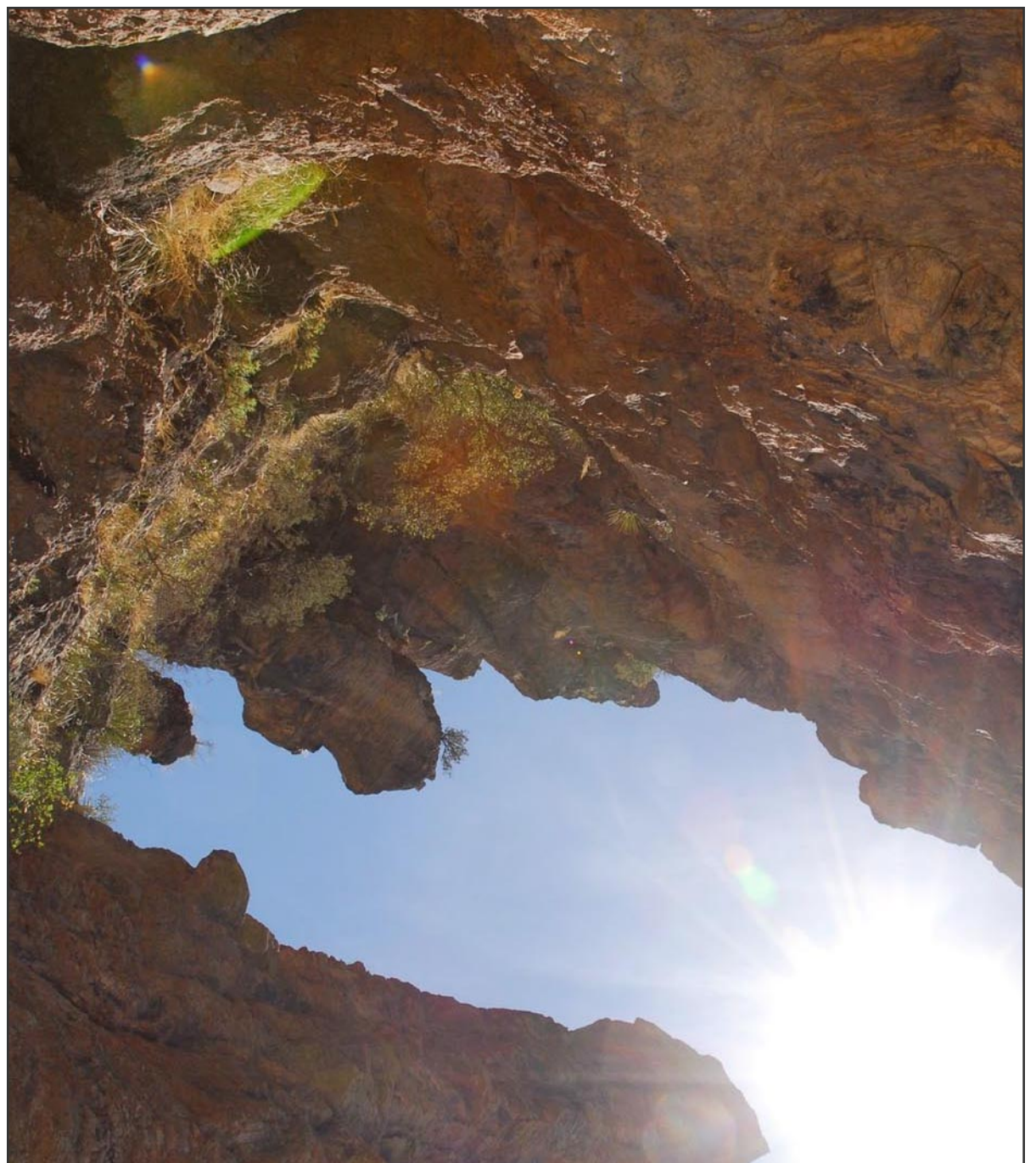
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THE DESERT AT THE EDGE OF THE TROPICS *continued*

smaller organisms. Partly because there are just more of them. Partly because they are just easier to miss. Most of the time these unexpected things are not new species, but an organism that you believe to be from *somewhere else*. Yet these creatures from somewhere else are right here. And perhaps they have been here all along, nothing new except to those of us who poke at them and measure them and put them in small bottles. The survivors, the plants and animals that have remained from before the time of the last glaciation, are no less remarkable than those that have recolonized recently. It is the seeming *unlikeliness* of these things that I am reminded of every time I see those subtropical butterflies darting about the Hummers and Volvos and Mercedes. I marvel at the fortitude that sends these creatures hurtling off in new directions, sometimes a hit and sometimes a miss, resilient in total but ephemeral in the specifics. It is some sort of miracle really. And it is for these reasons that the Sky Islands are so terribly, terribly important.

Michael Wilson has served as Research Director of Drylands Institute since 1993. Involved in environmental and public health, agriculture and horticulture, his primary areas of interest are entomology and botany. He is a coauthor of Trees of Sonora, and is writing a series of articles on the insect life of Sonora. A current project is the Medicinal Plants of Arizona and Sonora co-authored with Richard Felger, a book that will cover nearly 1000 species of plants with medicinal uses.



There's always new perspectives at Sycamore Canyon. From picasaweb.google.com/skyislandalliance.

DEEPENING THE TIME SCALE: A PUZZLE IN SYCAMORE CANYON

By Walt Anderson, Prescott College FROM SPRING 2004

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

Join me, then, for a little time travel, not to see it all (who has time?), but for a sample of how informed imagination works.

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

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DEEPENING THE TIME SCALE

continued

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

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

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

Over a year later, that puzzle still on my mind, I asked W. L. Minckley, who knew fish distributions within the Sky Island area better than anyone, about this puzzle. I first asked if he or any other native fish expert might have moved the fish to this tinaja. No, he hadn’t had a thing to do with it. His guess was that the fish were there before the canyon was. What? Yes, if you go back a few million years, this canyon would not yet be eroded and sculpted into its present form. The tributary then would have had

continuous connection; the canyon as we see it now did not yet exist. He’s seen this up near the Grand Canyon, too: an isolated fish population high in a side canyon up which no fish could possibly swim today. The carving action of the Colorado River there and Sycamore Creek here pulled a fast one on the fish living in those ponds.

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

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

Minckley and collaborators in 1986 gave another remarkable example of how geology may have shaped modern fish distributions. The Arroyo Chub, *Gila orcutti*, is found in the Los Angeles Basin today, but its nearest relatives appear to be the Sonoran Chub (*G. ditaenia*) and the Desert Chub (*G. eremica*), both in stream systems that drain into the Gulf of

California in northwest Sonora. That geographic gap might suggest pretty impressive dispersal, but the ancestor of these fish has been around for quite some time. If you go back 30 million years or so, the Gulf of California didn’t even exist. Things changed dramatically 29 million years ago. When the East Pacific Rise crashed into the North American Plate, the San Andreas Transform system developed, sending microplates, continental fragments, off to the northwest. The ancestors of *Gila orcutti* did not swim to southern California; they rode there! Other lines of evidence, genetic and geological, support the likelihood of this zoogeographic terrain track.

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



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"Jaguars in northern Mexico are the hope for jaguar recovery in the United States; these recent photographs are a reminder of our responsibility and an opportunity to do things right this time."

—Sergio Avila



"What came to my head when I heard the news about the jaguar in El Aribabi was to realize that this is real. That the Sonoran Desert is more than saguaros, sun and sand. I realize the importance of this Desert and its biodiversity. I am impressed and satisfied for what Nature can give us when it's managed appropriately" — German Robles

Last January, almost one year after Macho B's tragic death in Arizona, Sky Island Alliance photographed a northern jaguar in northern Sonora. These are SIA's first photographs of this elusive cat, and were taken only thirty miles south of the US/Mexico border, in Rancho El Aribabi. ©Sky Island Alliance / El Aribabi.

2010: "The Year of the Tiger" IS THIS THE YEAR OF THE NORTHERN JAGUAR TOO?

by Sergio Avila

Northern jaguars are a reality

Whether in northern Mexico or in the southwest U.S., jaguars don't recognize political borders; instead they choose healthy habitats, robust prey populations, open space and safe corridors. The recent jaguar photographs in the Sierra Azul Mountains confirm the excellent ecological conditions of the region, resulting from local efforts to protect biodiversity.

In a recent opinion published in *The New York Times*, world-renowned jaguar biologist Dr. Alan Rabinowitz stated that jaguars that cross into the United States most likely come from the northernmost population of jaguars in Sonora, Mexico. For this reason, the identification of wildlife corridors that connect feline breeding grounds in Mexico with potential habitat in southwestern U.S. is critical for this species. Jaguars in northern Mexico are the hope for jaguar recovery in the United States; those jaguar photographs are a reminder of our responsibility and an opportunity to do things right this time.

USFWS decision to develop a Jaguar Recovery Plan in the U.S.

Over a decade ago, under previous leadership in the Department of Interior and the U.S. Fish and Wildlife Service (USFWS), management of the jaguar was relegated to the wildlife departments of Arizona and New Mexico, which formed the Jaguar Conservation Team (JCT) — a "collaborative team of stakeholders" taking the place of a federally convened recovery team. Based on the argument that northern jaguars are only occasionally seen in the U.S., state and federal wildlife agencies refused to develop a recovery plan and designate habitat for the endangered animal since 1997 when it was listed as an endangered species. The idea that jaguar habitat in the U.S. is *non essential* to the species resulted in a tremendous waste of time and money by the JCT.

Last January the USFWS finally agreed to develop a recovery plan for the jaguar. This decision is supported by evidence of resident jaguars living in the United States for over a decade. Sky Island Alliance supported this decision and encouraged this agency to reclaim authority over jaguar recovery in the United States. Similarly, we celebrated the USFWS decision to rescind authority over the Mexican gray wolf Recovery Program from Arizona and New Mexico state agencies. In order to cooperate with the recovery efforts, Sky Island Alliance has shared the recent jaguar photographs with the USFWS. Additionally, we have offered to collaborate and actively participate on recovery actions for the jaguar in Arizona, New Mexico and northern Mexico.

The capture of Macho B and the resulting criminal investigation

Macho B was the name used by scientists to identify a wild jaguar first photographed roaming southern Arizona's sky islands in 1996. Macho B became both a symbol and proof of Arizona's unique biodiversity, highlighting the need to preserve wildlife core habitats and connecting corridors in the region. Trapped by the Arizona Game and Fish Department in February 2009, he was fitted with a radio collar and released. Twelve days later, Macho B was recaptured, found to be in medical distress, and euthanized.

Sky Island Alliance advocated for non-invasive jaguar studies and consistently opposed the capturing — deliberate or inadvertent — of wild jaguars in the borderlands region. Our position is based on the lack of clarity by the JCT as to what the expected benefits of collaring one individual would be and how this information would benefit conservation of the species. When weighed against the potential risks of capture, including death, capturing and collaring just didn't make sense.

According to a preliminary report by the Department of Interior's Office of Inspector General released in January, the capture of Macho B was intentional. After reviewing material gathered

by the USFWS, investigators concluded there is evidence of criminal wrongdoing by an Arizona Game and Fish Department employee and a subcontractor. As of press time, a criminal investigation led by USFWS is ongoing. Additionally, a biologist with Arizona Game and Fish Department was fired after lying to investigators about his and a consultant's actions in relation to the jaguar's capture. Sky Island Alliance commends long-time volunteer Janay Brun for her integrity in bringing to light the use of jaguar scat as a lure. It is thanks to her courage that one year after the death of Macho B, agencies and associated consultants are being investigated and held accountable.

Effects and impacts of the U.S./Mexico border wall

Construction of the border wall and its related infrastructure, in addition to law enforcement activities along the border of Sonora and Arizona, block the corridors that jaguars and other large, medium and small-sized mammals use to move to and from northern Mexico, further threatening the establishment of a viable jaguar breeding population in the U.S.

Sky Island Alliance's approaches to protect jaguar habitat and corridors

Sky Island Alliance is working on bi-national approaches for jaguar habitat conservation in the region. In the U.S., Wilderness designation is the most effective tool to protect habitat — not only for jaguars but for all the species that live there. In fact, Representative Raúl M. Grijalva of Arizona has introduced a bill in Congress to protect more than 80,000 acres of public land — known jaguar habitat — in southern Arizona.

In northern Mexico, our work focuses on the area between the U.S./Mexico border and the northernmost breeding population of jaguars, 150 miles south of the border. Working in partnership with Mexican ranchers and agencies, we seek to promote Federal land designations to create a

continued next page

Jaguar Bike-a-thon!

Join Sky Island Alliance and many jaguar advocates, supporters and friends across the southwest on this multi-day bike trip to support a recovery program for the Great American cat!

Our Goal:

The purpose of the Jaguar Bike-A-Thon is to build public awareness and support for recovery of the endangered jaguar in the American Southwest. We will talk to people along our route and carry conservation messages and proposals to restore the jaguar. We'll present these to federal and state officials and elected leaders in Phoenix.

What:

An 8-day, 300-mile long bike ride through southern Arizona wild lands.

Who:

Conservation groups, friends, advocates and supporters of the American jaguar.

When:

Starts on Thursday, April 15, ends on Earth Day, April 22

Where:

The ride begins in the Sky Islands around Nogales, Arizona and ends in Phoenix. We'll pass through the towns of Nogales, Patagonia, Sonoita, Tucson, Oracle, Mammoth, Globe and Superior along the way. We'll build support for jaguar conservation with evening presentations and other activities. In Phoenix we will hold a rally and enjoy a closing fiesta.

Would you like to ride the whole route or only a part of it? Volunteer? Help organize? Spread the word?

For more information visit our website:
jaguarhabitatusa.wordpress.com/category/jaguar-bike-a-thon/
or contact Tony Povilitis at a_povilitis@yahoo.com
or Sergio Avila at Sergio@skyislandalliance.org

YEAR OF THE NORTHERN JAGUAR *continued*

network of conservation ranches. In the last three years we have surveyed northern Sonora, documenting a wide array of native wildlife species thriving in riparian, desert and oak woodland habitats. Individual, conservation-minded Mexican and U.S. ranchers are showing this can be done.

Sky Island Alliance's pledge for 2010

- ✿ Protecting core jaguar habitat both sides of the international border: Tumacacori Highlands Wilderness in Arizona (over 80,000 acres of Forest Service Land); El Aribabi Preserve in Sonora (10,000 acres of private property).
- ✿ Jaguar corridor monitoring: maintain and expand non-invasive monitoring efforts in public and private lands.
- ✿ Trans-border connectivity — assess and describe border infrastructure within the Sky Island region borderlands.
- ✿ Support and inform jaguar recovery efforts in the U.S.: continue to participate in conservation planning, Wilderness assessments, habitat restoration and other efforts.
- ✿ Promote public appreciation of jaguar and other wildlife species and their habitats on both sides of the border.
- ✿ Support conservation and restoration actions by private landowners, and encourage others to explore conservation models and protective designations.

Rebutting Rabinowitz *by Steve Pavlik*

I will state at the outset that I have the greatest respect for Alan Rabinowitz. Few if any have fought harder for jaguar conservation. Having said that, his January 25, 2010 op-ed published in *The New York Times* is inaccurate and misleading.

In criticizing the decision made by the U.S. Fish and Wildlife Service to designate critical habitat for jaguars in the American Southwest, Rabinowitz maintains — as the title of his piece proclaims — that “Jaguars Don’t Live Here Anymore.” On March 2 of last year the Arizona Game and Fish Department — in what we now know was a criminal action (see “Arizona Intentionally Snares Last Jaguar, Inquiry Finds,” *The New York Times*, January 23, 2010) — killed what some claim to have been the last borderlands jaguar, Macho B. But jaguar movement along the border has always been fluid, and while Macho B might be gone, other jaguars will emerge from the shadows, if they are not already there. When I was conducting research for my article “*Rohonas* and Spotted Lions,” I interviewed a number of Tohono O’dham elders who told me they continue to see jaguars from time to time. I have no reason to doubt these people. They also told me that they simply keep quiet about such sightings, knowing that a reported jaguar — as proven by the Macho B tragedy — will most often prove to be a dead jaguar.

Rabinowitz dismisses Macho B as being a “transient” jaguar. He knows better than that. Rabinowitz was very familiar with this jaguar and knew that Macho B was first videotaped in southeast Arizona in 1996, and then later photographed over 50 times until his death in 2009 — 13 years of sharing his secrets. The fact that Macho B was a *resident* jaguar, however, poses something of an “inconvenient truth” for Rabinowitz, Arizona Game and Fish, and others who oppose designating critical habitat for jaguars. When captured, Macho B was believed to be between 15 and 17 years old and was in excellent condition for a wild jaguar of his age. He was described as being “healthy and robust,” and “thick and solid.” In light of this appraisal, Rabinowitz’s claim that Macho B “was not having an easy time surviving in this dry, rugged region,” seems somewhat disingenuous, perhaps even dishonest.

The landscape that Rabinowitz describes is indeed dry and rugged. But it has always been jaguar country. Since the turn of the century nearly 100 jaguars have been recorded in Arizona and New Mexico, mostly in the borderlands region. This land is not, as Rabinowitz maintains, “marginal” jaguar habitat. It is simply not the stereotypical tropical and neo-tropical jaguar habitat that he is accustomed to. The fact is that Macho B not only survived, but thrived in this area. Other jaguars can as well. The mountainous regions of borderlands are wild and in many places nearly inaccessible.

The Endangered Species Act was first passed in 1973. Jaguars were not listed until 1996. In the interim, many jaguars were killed and this magnificent cat lost ground in the United States. The time has come to do what we can to correct this. The future of jaguars in the American Southwest has less to do with finding suitable habitat than it does with protecting the remaining suitable habitat that is already there. Rabinowitz’s dream of establishing a “Jaguar Corridor” is a laudable one that we can all support. But it must include the big cat’s historical and natural northern range in the Southwest borderlands. Designating critical habitat is one way to help accomplish this.

Steve Pavlik teaches Native American studies and Native environmental studies at Northwest Indian College in Bellingham, Washington. He was a long time member of the Jaguar Conservation Team and also helped to write the AGFD jaguar education curriculum.

A FINE MESS FOR THE HEART AND MIND

by Ann Wendland, SIA volunteer FROM SPRING 2004

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

Put another way, the attitude was even more sinister: Any place nobody mowed was a weed patch, good for dumping. To the people I grew up around in Detroit's pretty new suburbs, 'open space' was an embarrassment. Mowing was next to godliness. Nearly everyone lived in subdivisions with white curbs dividing brilliant turf from pure black asphalt. Men double-mowed their lawns in diamond patterns. Women scrubbed the driveways. We told jokes about Jesus and St. Peter on the golf course.

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

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

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

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

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

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

hybrids in the Catalina foothills. Realtors advertise "sanctuary" and "preserve" settings and foothills houses sell for a premium.

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

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

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

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

continued next page

IT'S SO EASY, AND HELPS US TREMENDOUSLY...

By donating just \$10 a month, you can turn your yearly \$35 membership contribution into \$120. Or, by donating \$50 every quarter, your yearly contribution would total \$200! There are many different donation options through our giving program. If you are interested, please call Acasia at 520.624.7080 x10 or click on the DONATE NOW button at

www.skyislandalliance.org

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

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

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

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

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

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

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

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

Sky Island Alliance is right on the pulse of personal connection to living with the wild — bringing



Volunteers in search of animal sign in the Sierra Azul. Photo courtesy Paul Condon.

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

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



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A New Paradigm in a Time of Uncertainty

by Melissa Lambertson

On February 17 the Tucson City Council approved a report that outlined recommendations for securing Tucson's water supply. At its heart were countless meetings, stacks of technical documents, and nearly two years of carefully collected data—a labor of love by the city and county officials who wrote the document.

The City/County Water and Wastewater Study calls for a new paradigm—a sea-change in the way we view water in this region. It says that we must recognize scarcity and uncertainty as unalienable facts. We must understand that we rely on a healthy environment to provide us with water. We must ensure our demands do not outstrip the available supply.

It's the kind of balancing a thoughtful person does every day with their checkbook, but Tucson has never thought about water this way. At Council meetings, some objected to the report's "philosophical" tone, claiming there wasn't enough science to back it up. Yet the report calls for core strategies that scientists in the Southwest have been advocating for decades. It asks that the City think carefully about where growth should occur, and discourage development in regions where water isn't available. It suggests that neighborhoods should be designed to make use of stormwater and rainwater. It advocates for comprehensive planning and open dialogue.

All this is based on common sense and careful observations—the heart of scientific research—and it's in keeping with international best practices for protecting natural resources. Science unequivocally supports the report's central conclusion: We live in a dry place. We must be wise with the resources we have.

Part of that, of course, is protecting the environment that provides water for human use. Homebuilder associations spoke out strongly against the report's proposal to set aside effluent for conservation efforts. It's a sign of the changing times that such quibbling would arise over wastewater, historically dumped into riverbeds because nobody wanted it.

The lovely thing about effluent is that it's a truly renewable source, growing in concert with population. In other ways, it is entirely unlovely—unfit for most uses without expensive treatment. That makes it perfect for riparian areas, those crisscrossing avenues of green that are barely noticeable until monsoon season turns them

muddy brown and roaring. Ignored, drained and cemented over, these desert streams are all but extinguished.

Setting aside effluent to restore these areas makes good economic sense, for environmentalists and developers alike. If we lost them, Arizona would have to spend billions of taxpayer dollars every year to replace their essential functions—groundwater recharge, improved water quality, and flood control—to say nothing of decreased property values and lost tourism dollars.

What hurts worse are other kinds of measurements: The number of songbirds on tired wings that would find no place to roost. The children that would grow up knowing willow flycatchers exist only in books. The generations to come that would never hear a flowing desert stream.

Nobody likes preparing for a difficult future. As the report's authors affirm, we live in a time of great uncertainty. Because of climate change, the past is no longer a reliable predictor of the future. In the last century, we overdrafted Tucson's groundwater, dried up the Santa Cruz, and brought Colorado River water on a 336-mile journey across the desert to slake our thirst. We've always had enough to keep lawns green and faucets flowing, but feats of engineering and denial will not sustain us forever. Climates and ecosystems are transforming, and our water management strategy needs to transform with them.

Philosophical statements, yes. But when did philosophy become an unacceptable result of scientific research? It may be the best benefit that science can give us. Science tells us that we face a future of change—societies, economies, ecosystems and climates all shifting out from under our feet. Science presents us with a charcoal sketch of dry wells and empty gullies, one of many possible vistas. Now we need philosophy to transform that knowledge into a set of principles that will guide our city's choices.

Anyone who grew up in Tucson or chose it to be their home must harbor some love for the Catalina Mountains blushing under the sunset, the rich rose of an opening cactus flower, the sprawling, luminous city lights that welcome you home from any road. What is asked of us is simple: That our shared love becomes a shared ethic; that the quality of our lives not diminish the lives of our neighbors, human and otherwise, who also call this place home.

WILDLIFE LINKAGES PROGRAM NEWS

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Our focus for recruitment and workshop location is Cochise County. Training workshops take place over two weekends spaced about a month apart and the first weekend of both workshops was held in East Cochise Stronghold in the Dragoon Mountains. We stayed at Half Moon Ranch and Shaw Cabin, cozy facilities with gorgeous views of stunning rock formations that dramatically reflect the changing sun and moonlight. Oh, and yes, the locale offers unique opportunities for tracking.

Nine new tracking volunteers from the Fall 2009 workshop and 20 from the Spring 2010 workshop are now locating and documenting wildlife sign in critical Sky Island wildlife linkages. Two new transects were established. We expanded our data-gathering on the international border by adding a second transect on the San Bernardino Wildlife Refuge. Both transects end at the border wall, which at this stretch consists mostly of Normandy barriers and therefore remains somewhat permeable for cross-border wildlife movement.

Closer to Tucson, we added a new transect in Davidson Canyon — our third transect in the Canyon and the second south of Interstate-10. Mining of the lands adjacent to Davidson Canyon would have a devastating impact to the wildlife movement between the Santa Rita, Empire, Whetstone and Rincon Mountains. Our three new tracking volunteers who adopted this transect are very active with the Empire-Fagan Coalition and oppose the proposed open pit quarries in the valley. Please check out <http://empirefagan.org/>

Finally I'd like to announce additions to the Sky Island Alliance workshop staff. During the Fall workshop, our longtime tracking and wildlife instructors, Sergio Avila and Cynthia Wolf, were joined by two highly experienced instructors: Janay Brun and Aletris Neils. Both Janay and Aletris took our second tracking workshop way back in 2002. Since then, Janay has monitored mountain lions on the Buenos Aires National Wildlife Refuge and was involved with jaguar research in southern Arizona and Sonora, Mexico. Aletris is interested in the dynamics of human-carnivore conflicts, and her Masters research in Florida is focused on black bears. She conducted research on caracals, servals, cheetahs, leopards, and lions on Namibian farms in Africa, and is currently researching these cats for her Ph.D. at the University of Arizona. Welcome Janay and Aletris.



We Need You... to Volunteer!

Sky Island Alliance formed in 1991 when a group of concerned citizens came together to protect the Sky Islands adjacent to Tucson. Wanting to ensure that future generations would have an equal opportunity to enjoy the quiet solitude of a mountain meadow and experience a landscape where native species still roamed, they worked to keep our public lands intact and wild. Today, Sky Island Alliance is still a place where people come together to protect our rich natural heritage and restore native species and habitats. New volunteers come out all the time, whether they are seasoned backpackers or have never looked at, much less know what a topographic map is.

There are always opportunities to rejoice in / restore our Sky Islands!

Watch www.skyislandalliance.org for the latest schedule!

Join our Landscape Restoration Field Weekends

Riparian and Recreational Impact Surveys: Volunteers gather at a base camp and are paired up with 3 to 4 other volunteers, a map, GPS unit, digital camera, and data sheets. The teams are sent out to adjacent areas to walk out a riparian area or road transect. Each team collects photo and geospatial points to document their findings. Depending on the distance to the site, volunteers drive out for the day or camp out.

Road closures and habitat restoration weekends: These trips are more physically demanding though there is still a wide variety of tasks to suit different skills and fitness levels. Closures include placement of barriers and signs to block roads; breaking up the road surface behind the closure to allow water to penetrate and seeds to take hold; and planting native vegetation to help bring back the ecological balance to the area and disguise the roads' existence. Eventually natural processes take over and what was once a road becomes unfragmented habitat.

Contact Sarah at 520.624.7080 x23 or sarah@skyislandalliance.org

Adopt a Transect

Monitoring the presence of mammal species in important intermountain corridors: This volunteer program involves the largest commitment. After an extensive training in identification and documentation of wildlife sign, volunteers are teamed up with other trained trackers to monitor a transect (tracking route) every six weeks.

Our next tracking workshop to train new volunteers is scheduled for two 3-day weekends: October 15–17 & November 20–22.

Contact Janice at 520.624.7080 x15 or janice@skyislandalliance.org

Promote Wilderness

Wilderness outreach stewards are needed for any of the following three areas: public presentations, guided hikes and tabling events. Stewards are trained volunteers whose major responsibilities are to help people in the community learn more about Sky Island Alliance and its mission, to better understand and appreciate the importance of Wilderness, and to promote Wilderness for the Tumacacori Highlands. Public presenters and tabling stewards interact with the general public as well as with specific interest groups, such as the faith community and sportsmen's groups. Wilderness hike leaders guide local area hikes and present themed talks on wilderness, sometimes in conjunction with a guest speaker. Schedule is flexible. Stewards will receive a tshirt and free Sky Island Alliance membership. Training and volunteer orientation required.

Wilderness advocates are needed to help collect signatures and written letters in support of the Tumacacori Highlands Wilderness bill. Letters and petitions, addressed to Arizona Senators John McCain and Jon Kyl and to your State Representative can be mailed, copied-to, or hand-delivered to Sky Island Alliance. Send your own letter of support, or help us coordinate ways to reach supporters in your community to do the same!

Contact Jessica at 520.624.7080 x21 or jessica@skyislandalliance.org

Make a Difference

Data entry/analysis and office needs: The data collected in the field is compiled into a database so that Sky Island can put that hard-earned information to work.

Contact Sarah at 520.624.7080 x23 or sarah@skyislandalliance.org



Bernice Isaacs documents coati tracks.

VOLUNTEERS MAKE IT HAPPEN

Un Día Maravilloso en el Paraíso

Gene Isaacs' report on his team's 23 November 2009 tracking survey in North Davidson Canyon

The drought continues unabated with only a scant bit of rain falling since our October report. But, paradoxically, Cienega Creek actually has more water flowing than it did last month. We at first thought an ungauged torrent was responsible and that it had also scoured the clutter out of the canyon; but, Mike diligently "tracked" the spoor of the various wind-tossed vegetables, and we determined that the gusty (or is it lusty?) son's of Aurora, the dawn goddess, the promiscuous mother of the four winds, were responsible for cleaning up the substrate.

There is more creature activity now than there was last month, what with the cooler temperatures and a little bit of water. The herps are all snug in their warm dens, and the rodents seem to be enjoying a cold-season reprieve; the skunks and bunnies are having a good autumn, probably because the cats and coyotes are still in the mountains; and there's more deer sign than there has been. The "regulars," the javelinas and lions and foxes, are missing—who knows where? We really didn't expect to see any sleepy bear tracks: they usually just drop by for a quick snack after their wake-up in the spring.

An old friend, the tracks of a solitary male coati, found us. Although most were double registered, several individual prints had the characteristic little knob on the back of the front paw. We are certain it's the regular visitor because the prints are always the same size and because we find them in the same place year after year—as if he prefers this path to get from wherever to wherever, to opportunistically find his harem in the late-winter breeding season, to avoid them and his frolicsome progeny the rest of the year, and to deliberately give us the thrill of discovery.

A single bobcat print on a little trail that mountain bikers use led us to a series of such prints (overlaid on top of the bike tracks) that stretched for about a tenth of a mile. Rodent holes on both sides of the trail explained the kitty's persistence: hunger is a powerful incentive, is it not?—at least it is with our tracking team. This find, coming as it did after we had finished our outward trek and were heading back to our cars, was special and capped un día maravilloso en el paraíso.



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Protecting our Mountain Islands
and Desert Seas

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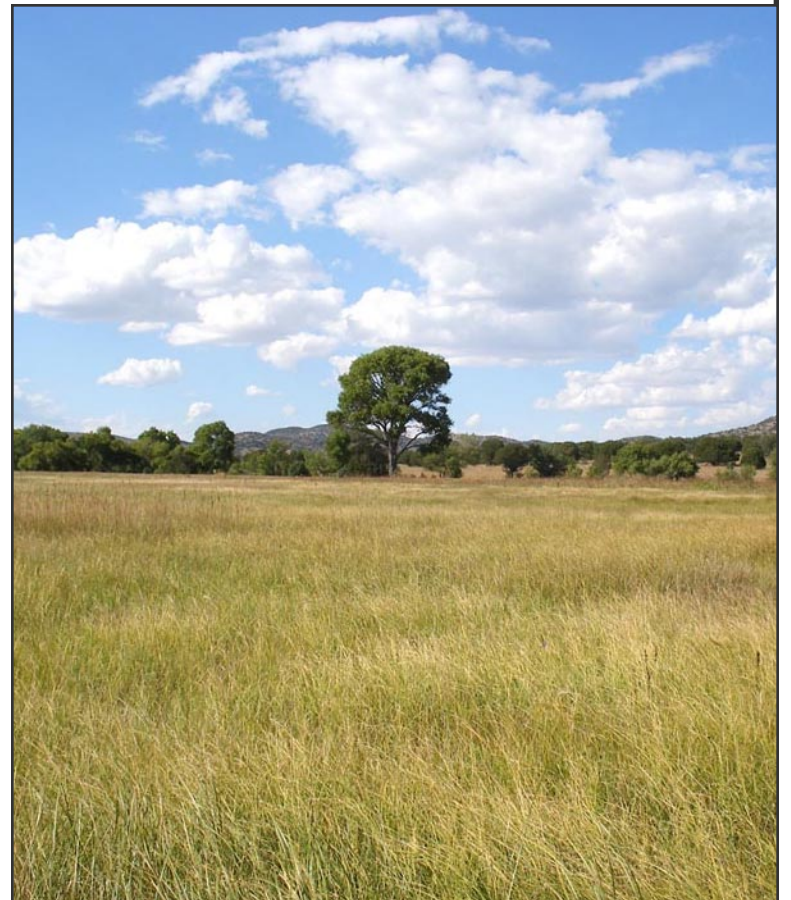
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Peloncillo Mountains Ciénega Restoration Project Breaks Ground in March!

The largest project in Sky Island Alliance history is about to break ground — restoring one of the largest ciénegas in the Sky Island region, located in a grassland valley of the remote Peloncillo Mountain range.

Imagine a vast, gently sloping, desert marsh (or ciénega), irrigated by a 10,000-acre watershed that is in near-perfect condition. The ciénega is nurtured by a half dozen stormflow-dominated ephemeral creeks, and is so large in relation to its watershed size that it is able to harvest the bulk of the runoff from a typical storm event by super-charging its alluvial underground water storage. At the down-valley end of the ciénega, parallel wetland swales dip into the landscape, bringing overflow waters to the creek, creating the only perennial stream reach in the entire Peloncillo Mountain range. The ciénega wetland is thick with a yellow green riparian bog of rushes and sedges. Very large walnut trees thrive in the margins of the ciénega adjacent to the super-saturated soil, which is also sequestering carbon under anoxic conditions, and filtering the water to the highest purity. The creek is shaded by tall willow trees and graced with a wide variety of native berry bushes. It has many deep pools full of cold clear water, even on the hottest day at the end of the dry season, when water is just barely moving into and out of each pool through long, broad mats of thick and squishy wetland sod. The entire wetland complex is jumping with frogs, teeming with birds, and visited daily by legions of mammals.

Starting March 15 we are removing man-made levees and plugging a man-made gully that is robbing water from the ciénega. Picture the ciénega fully restored to its historic flow regime with a relatively simple prescription: Just add water! This vision is now being realized after two years of planning with dozens of experts and support from the State of New Mexico River Ecosystem Restoration Initiative and the National Fish and Wildlife Foundation.



For additional information and to learn how you can make a difference in the protection and restoration of our rare Sky Island wetlands contact the Landscape Restoration Program Manager Trevor Hare at 520 624-7080 x14 or trevor@skyislandalliance.org