



**GREAT NEWS! Friends of Ironwood Forest Honor Dove Mountain Hikers with Young Cage Volunteer of the Year Award... see page 4 for article**

## Third Annual *Meet the Monument* Event a Success!

by Gordon Hanson, Event Chair,  
Board of Directors

You may have seen emails or postcards that invite you to join us for Meet The Monument. But what is Meet The Monument? Meet the Monument is a one-day event that introduces the Ironwood Forest National Monument (IFNM) to the public and allows you to come out and experience this national treasure in your own backyard.

The Friends realize that there are many people in the greater Tucson/Marana area who have no idea what the Ironwood Forest is, or where it is located. As one of our nation's newest national monuments, the rugged and scenic beauty of the area safeguards some of our rarest flora, fauna, and culturally significant history, and we want to share it with you!

The Proclamation that created the IFNM in 2000 cited the presence of the endangered Nichol Turk's head cactus and Lesser long-nosed bat; the Desert bighorn sheep as the last viable population indigenous to the Tucson Basin; the irreplaceable and abundant cultural sites, dating back 5,000 years; and the highest density of Ironwood Trees recorded in the Sonoran Desert; as reasons to set this parcel of land aside for protection.



Meet The Monument crew left to right: Jim Avramis, Gordon Hanson, Gaile James, Gary Borax, Richard Muzzy, Ray Kuhn, Gene McCormick, Lahsha Brown, and Peter Anderson. This year we had new directional banners right off the interstate at Marana and Sandario Roads. Thank you to our business sponsors who helped make these signs possible: Rusty Lizard Press, Cactus Huggers Photography, David Livingston Printing, New Moon Lounge and Grill, Cynthia Williams – Long Realty.

Meet the Monument is a fun, interactive event that introduces the area and its unique, undeveloped character to the people of the Old Pueblo and surrounding areas. The most recent event on November 16, 2013, was the third held, with attendance tripling that of last year's event to around 300 people.

Working with the Bureau for Land Management (BLM) and local hiking clubs, the first event was held under the shadow of Ragged Top Mountain in April 2012. It was designed to bring people out to the desert, give them several options to experience it first-hand, and introduce them to the Friends group that is committed to preserving and protecting this special place.

*continued next page*



Friends of Ironwood Forest is a local non-profit organization that works for the permanent protection of the biological, geological, archaeological, and historical resources and values for which the Ironwood Forest National Monument was established. The Friends provide critical volunteer labor for projects on the Monument, working with the Bureau of Land Management and many other partners, and to increase community awareness through education, public outreach, and advocacy.

### **Friends of Ironwood Forest Board of Directors**

*Gaile James, President, Marana*

*Gordon Hanson, Marana*

*Bill Thornton, Tucson*

*Jim Avramis, Marana*

*Trevor Hare, Tucson*

*Cynthia Williams, Tucson*

Lahsha Brown, Executive Director

Contact us at:

**738 N. 5th Avenue, Suite 114  
Tucson, AZ 85705**

**520.628.2092**

**lahsha@ironwoodforest.org**

**www.ironwoodforest.org**

*Newsletter design by Julie St. John*

We set a new record for the Ironwood Forest National Monument — there were over 300 people who attended Meet The Monument! Thank you to our hike leaders Drew Milsom, Gary Borax, and Ries Lindley. Thank you to the awesome line-up of speakers that were a big hit — Frank Rose, Bob Schmazel (pictured above), Joe Sheehey, Ed Moll, Sally Ziegler, Dr. Paul Fish, Felipe Molina, and Gary Borax. Thank you to the walkabout leaders — Royce Ballinger, Murray Bolesta, Allan Morgan, and Mary Ellen Flynn. Thank you to all the great volunteers who made the event possible.

## **Meet the Monument** *continued from page 1*

Meet The Monument is structured to be a learning experience, not a festival. There are no vendors and we pack out everything we bring in. To ensure security, BLM law enforcement sweeps the area a few days prior to the event. Building on the success of past events, we have expanded the learning and hiking experiences in subsequent gatherings.

This year former and current faculty members from the University of Arizona and other local experts gave short lectures on the flora, fauna, natural history, cultural history, and recreation opportunities of the Monument, then led short walkabouts into the desert to illustrate what they had just talked about. One presenter concentrated on the trees of the Monument, one on the cacti of the region, and another discussed the bighorn sheep and what was being done to protect and propagate this fragile population in the Monument. In addition to these “sit and get” presentations, a retired University of Arizona professor set up a display of live herpetology samples, discussed the creepy-crawlies of the Monument, and gave us all a chance to relate up-close-and-personal to Gila monsters, snakes, and lizards.

For those interested in longer forays into the desert, several options to experience the desert “their way” were available to choose from. Two professional landscape photographers led several hikes into the surrounding area at the base of Ragged Top Mountain and provided

## April 09, 2014: The day our state unites to build a better tomorrow.



*Please mark your calendar,  
OR SCHEDULE YOUR DONATION  
TODAY, for April 9, 2014 at  
[www.azgives.org](http://www.azgives.org) and show  
your support for the Ironwood  
Forest National Monument!*

Arizona Gives Day is a day when people all over Arizona go online in one 24-hour period to make donations to nonprofits they care about. Last year, over 800 nonprofit organizations raised just over \$1 million.

A heartfelt thank you to everyone who donated to the Friends of Ironwood Forest on Arizona Gives Day last year. Your generosity helped us gain a spot in the top six small nonprofits with the most donors statewide. This was a great achievement and thanks to your support, we received a \$1,500 cash prize.

Will you help us again this year? Arizona Gives Day is on April 9, 2014. With your help, we aim to double the number of individual donations made from 70 to 140. Our goal for Arizona Gives Day is to raise \$5,000 in one 24-hour period. To do this, we need your help.

**New this year, you can schedule your donation in advance of Arizona Gives Day.** Yes, that's right. You can go online today to [www.azgives.org](http://www.azgives.org) and schedule a donation to be processed on April 9, 2014.

## Meet the Monument *continued*

instruction on how to photograph the desert. Hike leaders from the U of A Ramblers and two local Marana hiking clubs teamed up with local naturalists to point out plants, bushes, and trees of interest on 8k and 5k jaunts around Ragged Top and Walcott Mountains. A bird-watching specialist from the Tucson Audubon Society led a birding walk along the washes close to Silverbell Road and 14 species of birds were sighted within the two-mile trek.

A retired professor of herpetology from the University of Nebraska, along with a volunteer environmental education ranger at Saguaro National Park, led a natural history hike for those not inclined to a longer walking challenge. The archaeologists who did the original field survey of the Monument in the 1980s were on hand to discuss the cultural pre-history of the area and displayed artifacts from some of the local archaeological sites. And again, this year the event was closed with a Yoeme (Pasqua Yaqui) Deer Dance ceremonial.



Meet The Monument Botany Hike participants, led by Gary Borax and Ries Lindley.

This year's Meet the Monument event will be held on November 15, 2014 and will continue to build on the successes of past events. Volunteers are needed to help ensure the event is enjoyable. Please reserve this date on your calendar and plan to join us for another chance to experience first-hand the Ironwood Forest National Monument.



Volunteers install barriers to keep people from driving in washes of Ironwood Forest National Monument. Left to right, Al Mezzano (Bureau of Land Management Park Ranger), Ed Nigl, Kathy Church, Gary Borax, Richard Muzzy, and Jim Avramis. *Photo courtesy Jim Avramis.*

## Thank you, Young Cage Volunteers of the Year:

Peter Andersen, Jim Avramis, Bill Binkert, Jeff Blackburn, Gary Borax, Don and Camille Braun, Kathy Church, Barb Farr, Leslie Glass, Gordon and Lin Hanson, Ron Ireland, Beth Kane, Ray Kuhn, Jim Maben, Gene McCormick, Drew Milsom, Allan Morgan, Richard Muzzy, Ed Nigl, Jim Phillips, Diane Prater, Barry Stevenson, Jack and Marge Taylor, Don and Audrey Weber, and Cynthia Williams

## Dove Mountain Hikers honored with Young Cage Volunteer of the Year Award

The Friends of Ironwood Forest are extremely pleased to name the Dove Mountain Hikers as the Young Cage Volunteer of the Year award winners for 2013. The Board of Directors unanimously voted to recognize this group which has selflessly volunteered its time to protect the precious resources of the Ironwood Forest National Monument.

At the end of February, the Friends were able to honor the volunteers at a potluck/barbeque dinner. This award is given to those volunteers who contribute to making our world a better place for all species. In this way, the Friends hope to carry on the spirit that was the life's work of Young Cage.

Young was schooled as an aeronautical engineer and led a long and distinguished career as a United Airlines captain. In retirement, he twice served as President of the Tucson Herpetological Society, was on the Board of Directors of the Friends of Ironwood Forest, and was an accomplished photographer. He was an avid naturalist and herpetologist and had traveled most of the world (Africa, South America, Australia, Central America) in search of amphibians and reptiles.

His optimism and enthusiasm for the natural and human worlds was evident from the moment you met him. Young was especially gifted at public presentations and combined his stunning photographs and humor to educate thousands of newcomers to life in the desert. Young was one of the most generous and caring individuals you could ever meet and was known for his leadership, thoughtfulness and humanity in all that he did.

In May of 2012, Young entered hospice and passed away at the end of the month. On May 15, 2012, Young was given the second-ever Volunteer of the Year award from the Friends. At the same time, we announced that the award was going to be named in his honor. The Young Cage Volunteer of the Year award continues to carry on a legacy of recognizing those extraordinary contributions that are made by volunteers. The previous recipient was Gary Borax in 2011.

This year, the award was given to individual volunteers with the Dove Mountain Hikers, as well as several individuals who have contributed in significant ways towards protection of the Ironwood Forest National Monument.

# Thank you for your donations!

## Our work would not be possible without your support.

*The Friends of Ironwood Forest rely on the generous donations of our supporters. Thank you to everyone who has made our work possible! The following individuals, businesses and organizations provided financial or in-kind support from February 21, 2013 through March 5, 2014.*

Briggs and Pat Ackert  
Jay and Mary Lou Adler  
William Adler  
John Alanis  
Carlyn Alexander  
Dabney Altaffer  
Jim Ambrose  
Florence Anderson  
Barry Armstrong  
Robert Ashbaugh  
Kirk Astroth  
Sergio Avila and Jenny Neeley  
Jim and Marilyn Avramis  
Royce Ballinger  
Mackenzie Banta  
Jean Barchman  
Ed and Linda Bartlett  
Peter Bazzoni  
Deron Beal  
Vanessa Bechtol  
Pete and Betty Bengtson  
Evelyn Carswell-Bing  
Jeff Blackburn

Murray Bolesta  
Michael Bookman and Maria Platia  
Rodney and Connie Boorse  
Gary and Carol Borax  
Kay Botel  
Molly and Erin Brannon  
Steve and Lindy Brigham  
Judith Bronstein  
Betsy Buffington  
Shawn Burke  
Jonathan Burton  
Cactus Huggers Photography  
Dennis Caldwell  
Carianne Campbell  
Susan Carberry  
Carolyn Chilcote  
Kathy Church  
Joseph Ciaramitaro  
Bill and Beth Clark  
Glen and Marion Collins  
Robert and Valerie Conforti  
Chuck and Louise Conrad

Georgia Conroy  
Conservation Lands Foundation  
Stephen Joel Coons  
B.J. Cordova  
Les and Bonnie Corey  
Gail Corkill  
Beverly Cospers  
Steve Cox  
Scott and Betty Cram  
John Crow  
CSX Transportation  
Kevin Dahl  
Stephen Darling  
David S. Livingston  
Printing and Promos  
Will and Linda DeBoer  
Arthur and Pamela Deters  
Mark Dimmitt  
William and Denise DuPont  
Don and Carol Eagle  
Larry and Judy East  
Andrea Eberz  
Richard and Anne Edwards

Ted and Rose Emery  
Charlotte Engvall  
Grace Evans  
Nancy Evans  
Butch Farabee  
Farmers Investment Company  
Karen Farufia  
Gloria Fenner  
Holly Finstrom  
Daniel Fischer  
Lillian Fisher  
Paul and Vicki Flemm  
Mary Ellen Flynn  
Teresa Foley  
Julia Fonseca  
Bob Foster  
Joseph and Patricia Frannea  
David and Diana Freshwater  
Fred Fruchthandler  
John and Linda Garrett  
Mary Gaverth  
Judith Gehman

*continued next page*



Ironwood Forest Desert bighorn sheep photos from Silverbell Peak wildlife camera at watering tank. Photo courtesy Joe Sheehy/AZGF.

## Thank you for your donations! *continued from page 5*

Jim and Debby Gessaman  
Joseph Giordano  
Leslie Glass  
Bruce and Vivianne Gold  
Fred Goodsell  
Lucinda Grace  
Matt Griffiths  
Diana Hadley  
Sally Hammond  
Gordon and Lin Hanson  
Marilyn Hanson  
David Hardy Sr.  
Trevor Hare  
Betty Hazzard  
Donald and Marilyn Heller  
Peter and Pattie Hellmann  
Ron and Marian Hill  
Roger and Margaret Hinkle  
David Hodges  
Mary Hoover and Vaughn Smith  
Todd and Suxanne Horst  
Peter and Evelyn Hubbell  
Robert Huebsch  
Thom Hulen  
Robert and JoAnne Hungate  
Dianne Huston  
Tom and Gaile James  
Frederic and Gayle Jandrey  
Frank and Jennifer Jennings  
Claudia Johnson  
Jan Johnson  
Scott Jones  
Beth Kampschror  
Beth Kane  
Adelina Kempner  
Jeff and Kathleen Kennedy  
Linda Kimura  
Megan Kissell  
Bart Koehler  
Carl and Sharon Koprowicz  
Sue Kozacek  
Gary Kozel

Norman Dresge  
Mark and Mika Lambert  
Curtis and Meg Larson  
Kathi LaTourrette  
Aaron Leifheit  
Long Realty, Cynthia Williams  
Phil and Pam Lopes  
Fred Lupton, Jr.  
John and Rosita Lutzel  
Jim and Sharon Maben  
Kristine Maish  
Wanda Wynne and Craig Marken  
Ross Markwardt  
Larry Marsh  
Bill Martin  
Beau McClure  
Patrick and Rachel McCusker  
Una Song and Bobby McEnaney  
Shelia McFarlin  
James and Carole McLean  
Roger McManus  
Michael and Linda McNulty  
Becky McSwain

Douglas and Christina McVie  
Matthew McWenie  
William and Sally Meadows  
Bob and Ann Meling  
Trudy Mertens  
MET Foundation  
Charles Miles  
Saralaine Millet  
Susan Mosdell  
Dino and Elizabeth Murfee DeConcini  
Danielle Murray  
John Nevins  
New Moon Lounge and Grille  
Robert Newton, Friends of Saguaro National Park  
Ed and Carol Nigl  
Brian O'Donnell  
Katharine Olmstead  
Scott and Erin Olmstead  
Trica Oshant-Hawkins  
Barnes and Terry Parker  
Michael and Karen Payne  
Ron Pelech  
Leslie Perez

Dennis and Carol Peterson  
Gary and Susan Peterson  
Robert and Vicki Peterson  
Paul and Judy Peterson  
Liz Petterson  
Roger Pfeuffer  
Jim and Marcia Phillips  
Lorel V. Picciurro  
Alburt Pifer  
Lollie B. Plank  
Dale Pogorelski  
Diane Prater  
Clive Probert  
Liz Storer and Luther Propst  
Michael Quigley  
Shelley Rasmussen  
Diana Raymond  
Sam Richard  
Ted Richardson  
Mike Ritz  
Janet Robertson  
Bill and Alice Roe  
Stan Ross  
Brit Rosso  
Mike and Susan Roth  
Catherine Rowlette



Over 40 volunteers joined us on National Public Lands Day, Sept. 2013, to improve wildlife habitat on the Ironwood Forest National Monument. Thank you to the Tucson Soaring Club for hosting the volunteer brunch at El Tiro Gliderport. *Photo courtesy BLM.*

Rusty Lizard Press  
Danielle Sandsedt  
Amy Schlossberg  
Chuck Schroll  
Jerry and Shanna Schudda  
Audrey Sears  
Joe Sheehey  
Matthew Sheldon  
Emma Si Nae  
Paul and Diane Simmons  
John and JoAnne Skillicorn  
Emmett and Carol Smelser  
Eldon and Jean Smith  
Jaye Smith  
Joan Smith  
Julie St. John  
Mary Stadel  
George and Claire Stahler  
Barry and Sandy Stevenson  
Kristen Suzuki  
Virgil and Erica Swadley Jr.  
Diane Szollosi  
Michael Tamarack  
Donna Tang  
Charles and Anne Tatum  
Bill and Sue Thornton  
Ann Tousley  
Trico Electric Cooperative  
J.T. and M.J. Turner  
Virginia Vander Veer  
Ken Ventura  
A.J. Vonarx  
Nancy Wall  
John Wallin  
Don and Audrey Weber  
Christi Wedig  
Meg Weesner  
Bill Astle and Karen Wiley  
Lynn Willard  
Charles Williams  
Patricia Williams  
Bill and Beth Woodin  
David Yetman  
Loraine Zagula  
Elaine Zielinski

## Remote Cameras, Installed by Volunteers in 2013, Document the Monument's Rich Wildlife

Thanks to volunteers and AZGF, a new camera was installed at the watering tank for big horn sheep on National Public Lands Day, Sept. 28, 2013. With water being so scarce, the camera caught other species utilizing this source, including deer, javelina, quail, coyotes, rabbits, fox, and even a bobcat. The bobcat's visit is at 4:18 in the afternoon, when the temperature was 106°F.



# Weird Saguaros

by Bill Thornton and Matts Myhrman

*Reprinted with permission from Cactus and Succulent Journal, a publication of the Cactus and Succulent Society of America. Vol. 82, No. 5, September – October 2010. Edits by Lahsha Brown, Friends of Ironwood Forest, 2014. Authors article references available upon request.*

Early in 2009, Matts Myhrman and Ned Brown noticed a group of saguaros with strange patterns of growth constrictions along a desert wash near Tucson, in close proximity to a copper mine. Hoping to at least determine the geographical uniqueness of these saguaros, Myhrman began to contact friends particularly familiar with “Saguaro Country,” local saguaro researchers, and serious cactophiles, including Bill Thornton. By accretion, there gradually developed an informal, eclectic group of individuals who share an interest in documenting the existence and characteristics of these saguaros and in trying to determine the cause(s) of their aberrance. This article is based on field information gathered, and speculation indulged in, by members of that group.

Although we know now that others had noticed these unusual, morphologically aberrant (MA) saguaros prior to our “discovery,” we have encountered no mention of them in literature, nor have we found anyone who had chosen to study them further. In the interest of brevity, we will henceforth take the liberty of referring to them as “our” saguaros.

## THE NATURE OF THE ABERRANCE

Growth constrictions, normally attributed to meristem damage from frost, sunburn, or insects, are well known to cactus fanciers. Scar tissue develops at the point of injury. After a new tip emerges, usually somewhat off center from the original tip, normal growth resumes. The plant is disfigured, but usually not seriously injured. Proper care can prevent growth constrictions in cultivated cacti. Wild plants are on their own.

Growth constrictions in our saguaros appear unique in the sense that each attempt by the plant to produce a new meristem is somehow aborted. In some cases, an aborted meristem will produce several separate new buds, each of which will then be aborted. In rare cases,



One of three locations in central and southern Arizona where these saguaros with strange patterns of growth constrictions are known to occur. This population is visible off of Silverbell Road, on the west (back side) of the Silverbell Mountains, near the boundary of the Ironwood Forest National Monument. *Photo courtesy Allan Morgan.*

when this separation/abortion process continues, it will result in a cluster of meristems and an atypical, compact form. Some of the affected meristems will build up a series of nominally spherical “beads,” ranging in size from that of a large grapefruit to a golf ball. In some cases as many as five of them will form a “tower” with the beads getting successively smaller as the tower grows. Rarely, a bead will be disc-shaped rather than spherical. As for degree of aberrance, we have observed a continuous spectrum from those with a dense cluster of severely growth-constricted meristems to those with only a small amount of aberrance. Despite diligent observation during our fieldwork, we found no evidence of morphological aberrance within any other plant species at our sites.

## LOCATIONS AND GEOGRAPHICAL EXTENT

We have now found our saguaros in three locations. What we will refer to here as Location 1 includes portions of three desert washes which lie very close to one another. The upper end of these washes is truncated by materials generated by the same large, open-pit copper mine. One wash has a continuous stretch of our saguaros about 2.9 km (1.8 miles) long, and is unique in that this stretch extends all the way up to the base of the mine operation. It also has the greatest number of our saguaros, which we estimate to be well over a hundred. In the second wash, they occur along a stretch of about



0.45 miles (0.72 km). In the third wash, we have found only a few individuals.

In the wider parts of all three washes, the great majority of our saguaros are found either in the bottom of the washes, on their sloping sides, or barely up onto the essentially flat terraces that flank the washes. In one case, however, an anomalous patch of our saguaros extends away from the wash for several hundred yards.

Location 2, discovered more recently by group member and long-time saguaro researcher, Ray Turner, lies on the steep, southeast-facing slope of Sentinel Peak (aka "A" Mountain), a large hill just west of downtown Tucson. The slope consists primarily of basaltic boulders overlaying soil derived from the weathering of volcanic formations. In contrast to Location 1, no mining has occurred at or near this site. Here, our saguaros are distributed without regard for the few small, shallow drainages, and arguably exhibit a lesser degree of aberrance than those at Location 1.

Location 3 came to the attention of coauthor Thornton who noticed saguaros with our MA characteristics during the telecast of a college football game. An on-site investigation in January, 2010, revealed that virtually all saguaros on a hill immediately east of Sun Devil Stadium in Tempe, Arizona, show varying degrees of aberration. In this regard, Location 3 differs markedly from Locations 1 and 2, where our saguaros are interspersed among normal ones of similar height.

#### PROBABLE UNIQUENESS

The uniqueness of any natural phenomenon is rarely possible to establish with absolute certainty. However, based on our communications with many people from a variety of disciplines who are intimately familiar with the

natural history of the Sonoran Desert, we have growing confidence that the three locations described above are unique in having our type of MA saguaros.

#### POSSIBLE CAUSES

Frost-induced growth constrictions are common in young saguaros, especially in the northern portion of their range and at higher elevations. Younger plants have a greater surface area in proportion to volume and are more susceptible to frost damage. Mature saguaros are usually affected only by hard freezes that occur at infrequent intervals. The pattern of growth constrictions on our saguaros would require a repeated series of localized hard freezes that affected a relatively small percentage of plants. Not likely!

Sunburn can cause growth constrictions when transplanted cacti are not properly acclimatized. Obviously these saguaros haven't been transplanted, so we can probably rule out sunburn as a likely cause.

Meristem damage from sunburn should not be confused with epidermal browning, a condition that affects saguaros and other columnar cacti and that develops gradually over time. At present we are not aware of a relationship between epidermal browning and MA growth, but this is an area for further research.

The tender, growing tips of cacti are often eaten by insects; e.g., our native Pinacate beetle. However, in over fifty years of cactus observation and cultivation, Thornton has never seen a saguaro meristem obviously eaten by insects. While

*continued page 10*

**These morphologically aberrant saguaros appear to have unique and strange growth constrictions. Photo courtesy Allan Morgan.**





Dear Friend,

Every day Friends of Ironwood Forest is making a difference by working to protect the Ironwood Forest National Monument. Now more than ever, your investment means the world to us.

Join us on April 9, 2014, Arizona Gives Day, and help us continue to protect and raise awareness of this national treasure in our backyard.

**Your donation of \$10 or more on Arizona Gives Day** helps conserve some of our rarest flora and fauna, and extraordinary landscapes for current and future generations to enjoy. The Ironwood Forest National Monument safeguards the Tucson region's last remaining population of native bighorn sheep, the richest stand of Ironwood Trees ever recorded, historic and culturally important areas, recreation opportunities, and the wild, undeveloped landscapes that once characterized our beautiful Sonoran Desert.

**We are counting on you!** Please mark your calendar on April 9 and help us spread the word. You can set up your donation pledge today at [www.azgives.org](http://www.azgives.org).

Thank you.



Could a pathogenic, genetic, or a localized environmental factor be causing the aberrance? *Photo courtesy Allan Morgan.*

## Weird Saguaros *continued from page 9*

this does not totally eliminate insect damage as a possible cause, we would have to ask why these saguaros would have been affected while others nearby were left untouched.

As the usual causes of growth constriction do not seem likely, what's left? There appear to be two possibilities:

1. A pathogenic, genetic, or environmental factor, or combination thereof, that renders these saguaros more susceptible to frost, sunburn, or insect damage that in turn causes the repeated constrictions.
2. A new or previously undiscovered cause of growth constriction that directly affects relatively few saguaros in localized areas.

A "crest gene" that requires an external trigger to express itself, may be common in cristate cacti. These cacti, including saguaros, have a well-documented tendency to concentrate in "hot spots." Existence of hot spots suggests a localized environmental factor that has yet to be positively identified. Do our saguaros offer a parallel? We seem to have identified a hot spot near a large copper mine and warm spots on hills that have never been mined. Do other such hot spots exist? Where are they, and what factors might they share in common with our known locations?

When Gene Joseph observed a similar pattern of growth constrictions on *Trichocereus pachanoi* at his commercial nursery, plant pathologist Jerald Wheeler suggested calcium deficiency as a possible cause. Desert soils are rarely lacking in calcium, but high levels of manganese have been thought to inhibit some plants' ability to utilize available calcium. To initiate exploration of this "thread" at the first location, a single tissue sample was taken from an MA and a non-MA saguaro. Analysis revealed a level of manganese in the former more than double of that in the latter. Only further analyses will determine whether or not this difference is consistent. If so, why would plants in relatively close proximity to each other concentrate widely varying levels of manganese in their tissue?

Chemical analysis of several soil samples has not yet been completed. Could levels of soil manganese vary at a comparable rate, or is something else causing our saguaros to take up more manganese? If soil in the vicinity of our saguaros does contain elevated levels of manganese, the nearby mine and the area's long history of copper production suggest a possible source.

Although, as mentioned above, no mining has ever occurred at Sentinel Peak, there has been one activity that could have introduced manganese into this location. For at least the last forty-four years, on the Fourth of July, fireworks displays have been staged on Sentinel Peak. In recent years this staging has been located in a parking area adjacent to the uphill end of the patch of our saguaros. We have learned that modern fireworks use manganese dioxide to brighten the display, and that manganese is a component of fireworks fuel. Although the linkage seems tenuous, it is reinforced by the presence of our saguaros on "stadium hill" in Tempe. As with Sentinel Peak, the site has not been mined, but fireworks displays at Sun Devil Stadium have occurred.

Regarding the possible direct or indirect role of pathogenic, genetic, or environmental factors at both locations, we are actively seeking collaborators to explore possible connections. Regardless



Author and Friends Board Member Bill Thornton would like to know if you've spotted any saguaros or other cacti with these characteristics. Please send photos and locations to Bill at [cactusworld@msn.com](mailto:cactusworld@msn.com). Photo courtesy Allan Morgan.

of the cause(s) for the aberrance we observe in our saguaros, it would also be very interesting to know when the aberrant growth began and whether the date of initiation is the same for all of them. We have learned recently of a technique that enables the dating of saguaro spines back to about 1954. This raises the possibility of using spines, from just below where the aberrant growth starts, to date the beginning of that growth. We hope to interest the developers of this technique in becoming involved in our investigations.

## Coming Soon, the *First Ever* Friends of Ironwood Forest T-shirts!



Check our website  
and Facebook page  
to vote for your  
favorite design  
*soon.*



# Friends of Ironwood Forest

738 N. 5th Avenue, Suite 114, Tucson, AZ 85705 [www.ironwoodforest.org](http://www.ironwoodforest.org)

**AZ GIVES.ORG**



Yes! I would like to support Friends of Ironwood Forest by becoming a member!

\$35.00 \_\_\_\_\_

\$50.00 \_\_\_\_\_

\$75.00 \_\_\_\_\_

\$100.00 \_\_\_\_\_

\$250.00 \_\_\_\_\_

I want to give more! \_\_\_\_\_

Please make checks payable to  
Friends of Ironwood Forest  
738 N. 5th Avenue, Suite 114  
Tucson AZ 85705

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_

Email \_\_\_\_\_

## Curious about what's going on at the Ironwood Forest National Monument?

Visit our website at [www.ironwoodforest.org](http://www.ironwoodforest.org) and sign up for email updates. Feeling social? Like the Friends of Ironwood Forest on Facebook.

*Photo courtesy Arizona Game and Fish Department.*



## Inside.....

Third Annual Meet the Monument Event a Success!	1
April 09, 2014: The Day Our State Unites to Build a Better Tomorrow	3
Dove Mountain Hikers Honored with Young Cage Volunteer of the Year Award	4
Thank You for Your Donations!	5
Remote Cameras Document the Monument's Rich Wildlife	7
Weird Saguaros	8