

Swann_2011_saguaro freeze event

We had a severe freeze that killed many saguaros in the park. This document is mainly a series of emails between Don Swann and other saguaro experts, reports, and park staff about follow up from the freeze.



"Tom Orum"
<torum@email.arizona.edu>

02/03/2011 01:30 PM

Please respond to
<torum@email.arizona.edu>

To <Don_Swann@nps.gov>

cc "Nancy Ferguson" <ferguson@u.arizona.edu>,
<Becky_MacEwen@nps.gov>

bcc

Subject RE: Parking for B2

Thanks Don,

We have been reviewing Jan Bowers' criteria for catastrophic freezes and it looks like this is going to meet her criteria of more than 15 hours under 32F with a low below 22F at the Tucson International Airport. So, we'll see. (J. E. Bowers 1980, Catastrophic Freezes in the Sonoran Desert, Desert Plants 2 (4): 232-236). This event is as cold as I have seen it since December 1978.

It will be interesting to see how some of the small saguaros that are out in the open do.

We'll let you know when we come out next.

Stay warm!
Tom and Nancy

-----Original Message-----

From: Don_Swann@nps.gov [mailto:Don_Swann@nps.gov]
Sent: Thursday, February 03, 2011 12:30 PM
To: torum@email.arizona.edu
Cc: Nancy Ferguson ; Becky_MacEwen@nps.gov
Subject: Re: Parking for B2

Tom and Nancy,

You're wise to take some time off. If you let me know what day you'll be out in the field, I'll let the rangers know. Should be no problem. We can also get you the vehicle permit; I'll cc Becky MacEwen and we can leave it at the Visitor Center with your map. Thank you for the map - we had not seen that version, and we have scanned it, which will allow us to resolve some geographic problems we had earlier.

Are we going to be seeing saguaro mortality occurring this week? I've been reviewing the Steenbergh and Lowe paper, and the my brief dip into it so far suggests that it may be cold enough for long enough. Any opinions or insights would be appreciated!

Brrr. I've only been here 20 years, but I don't remember anything quite like it!

Don

Don Swann
Biologist, Saguaro National Park
(520) 733-5177

"Tom Orum"
<torum@email.ariz
ona.edu>

To

02/02/2011 08:19
PM

<Don_Swann@nps.gov>

cc

"Nancy Ferguson "
<ferguson@u.arizona.edu>

Subject

Please respond to
<torum@email.ariz
ona.edu>

Parking for B2

Hi Don,

We are taking this week off from the census to await warmer weather
(retired volunteer syndrome).

I assume you got the section 17 tracing that we left for you last Saturday
at the Visitor's Center.

I wanted to ask you about parking for our B2 plot since we can no longer
park along Freeman Rd. Last year you were with us when we parked on Twin
Hills Rd. The landlord made a polite inquiry and let us park there, but I
was wondering if it would be okay to park at the Cactus Forest Overlook
along the loop road before the loop road descends to the turn for Mica View
Picnic Area. There are four or five parking spots at the Overlook site so
it would seem that there would be room for tourists if we only took up one
spot. From there, we can walk north along the west side of the enclosure
on to B2. We don't have a parking permit this year, but could leave a 5x8
card on our windshield if that would be helpful to the park rangers.

Let me know what your think.

Thanks,
Tom



"WILLIAM C THORNTON"
<cactusworld@msn.com>

02/10/2011 03:56 PM

To <pat.hill@millersville.edu>, "Gene Joseph"
<gj@lithops.com>, <fgray@usgs.gov>,
<EJForce@aol.com>, <mattsmy@gmail.com>, "rayturner"

cc

bcc

Subject Saguaro frost damage survey

Hi All: Our recent cold snap could have serious long term consequences for our spiny friends. Hopefully there won't be another mass die off, but young saguaros, especially seedlings, may have been injured or killed. Mature saguaros could also be affected but the extent of damage may not be evident for some time to come.

I've exchanged a few e-mails with Don Swann of Saguaro Nat'l Park about conducting a survey of damage and plan to get out a few times in the coming weeks. If anyone would be interested in an outing please let me know. Also, I'd encourage everyone to look for frost damaged saguaros while you're out and around. On young saguaros look for blackened tissue on growing tips. On seedlings that were killed outright the entire plant will be discolored. Estimates of the percentage of damaged saguaros would also be useful with, of course, a general description of location.

There may be another paper in this and I'll appreciate any observations you have to offer.

Best Regards,
Bill Thornton

Don Swann/SAGU/NPS
02/15/2011 04:13 PM

To "WILLIAM C THORNTON" <cactusworld@msn.com>
cc
bcc
Subject Re: Saguaros vs. recent freeze 📎

Thanks for this, Bill! Here are some photos I took at higher elevations on Saturday. The tall one was at the top of a ridge, so not protected by a rock. Two of the photos are of this one saguaro (about 2 meters tall). The other is a small one (less than 6") on the same plot that looks like it is on the way out, although it could be from something else other than freeze. Any thoughts would be appreciated.

Don



P2120032.JPG



P2120018.JPG



P2120025.JPG

Don Swann
Biologist, Saguaro National Park
(520) 733-5177
"WILLIAM C THORNTON" <cactusworld@msn.com>



"WILLIAM C THORNTON"
<cactusworld@msn.com>
02/15/2011 03:45 PM

To <pat.hill@millersville.edu>, "Gene Joseph"
<gj@lithops.com>, <fgray@usgs.gov>,
<EJForce@aol.com>, <mattsmy@gmail.com>, "rayturner"
<rayturner@cox.net>, "drezner" <drezner@yorku.ca>,
<duraznomemo@juno.com>, <KBOOBC@aol.com>,
<Don_Swann@nps.gov>, <rgbrittain@msn.com>,
<ferguson@u.arizona.edu>, <torum@email.arizona.edu>,
<ehbrown@geol.wvu.edu>, <kit.schweitzer@comcast.net>

cc

Subject Saguaros vs. recent freeze

Hi all: Today's casual survey of 32 young saguaros (ranging in height from < 1 ft. to approx. 5 ft.) in the vicinity of the Eskiminzin Picnic area at Saguaro West revealed no visible damage attributable to hard freezes on Feb 2, 3, and 4. The closest weather station, Red Hill Visitor Center, recorded a minimum temp. of 10 F on Feb 3.

Two plants each < 1 ft. had growth constrictions probably caused by previous hard freezes. One of the two showed a substantial amount of reddish discoloration that's commonly associated with cold or drought stress. The apex, however, appeared intact and the plant should resume normal coloration and growth when the weather warms.

The big majority of plants observed looked healthy and well hydrated.

A friend on the northeast side near Bear Canyon recorded a low temp. of 10 F on Feb 3, and 7 F in the bottom of a nearby wash. Her property has a good rate of saguaro seedling recruitment but no freeze damage was noted.

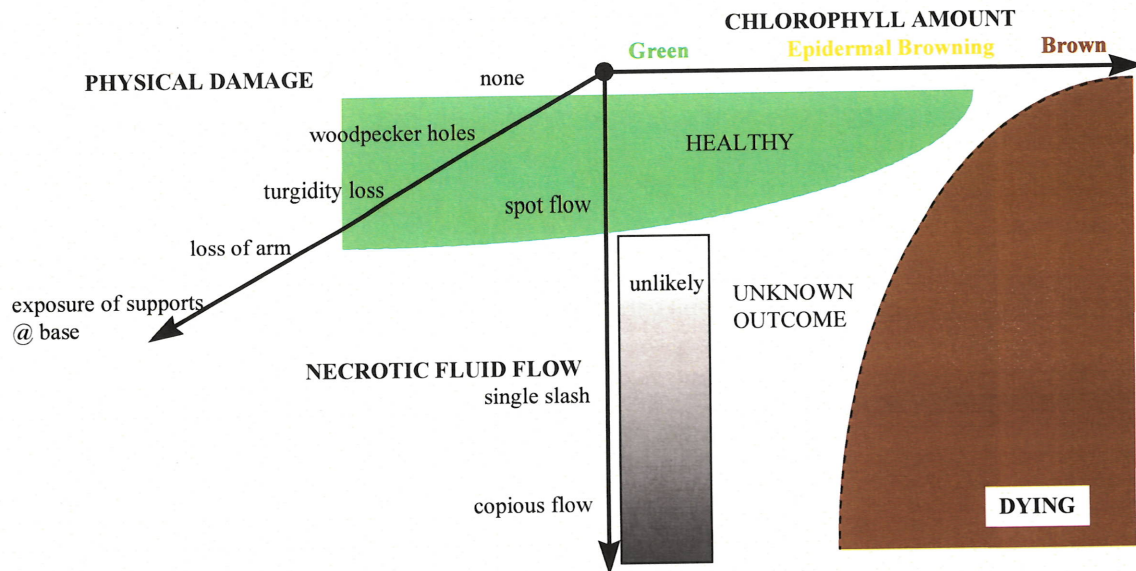
Although these observations involve small samples and small plots, the degree of

geographic separation (at least 20 miles) and very low recorded temps at each site may indicate that our spiny friends dodged a bullet.

Cheers! Bill Thornton

SAGUARO HEALTH CRITERIA

Based on Chlorophyll Amount, Necrotic Fluid Flow, Physical Damage



4-2/21/11

Recent hard freeze likely will be death knell for many weaker saguaros

By Doug Kreutz
ARIZONA DAILY STAR

MONITORING EFFECTS

A prolonged freeze three weeks ago almost certainly was a death sentence for some members of a prized desert species: the saguaro cactus.

Biologists say similar freezes in the past killed saguaros, but it could take months or years before affected plants succumb.

They emphasize that damage or death would be most likely in very old, very young or diseased saguaros. By no means is a large-scale die-off expected.

See SAGUARIOS, A4

SN On StarNet: Find stories on nature, wildlife and the environment in Southern Arizona at azstarnet.com/environment

SAGUARIOS

Continued from Page A1

pending on the size of the cactus and the extent of the damage."

Temperatures dipped into the teens in the Tucson area during the first week of this month. That brought the kind of hard freeze that "certainly did kill saguaros in the park in the past," Swann said.

"There was a prolonged cold spell in 1971," Swann said. "Scientists working in the park at that time documented the effects and found that the freeze caused saguaro deaths. It tended to affect the oldest and the youngest ones."

TOO COLD, TOO LONG

Philip Jenkins, a curatorial specialist at the University of Arizona Herbarium, said he expects "some saguaro mortality" from the freeze.

"That's because it stayed so cold that one day, with teens for two nights," Jenkins said. "Saguaros can take cold temperatures, but they can't take them for a prolonged period of time. If it drops down to 20 for six hours, say, they will be fine. But if they are subjected to sustained below-freezing temperatures — more than six or eight hours — they begin to show damage."

The big questions now, Jenkins said, are: "How bad is it, and when are we going to see it?"

He said a "full-grown saguaro with arms will often live on its inner resources for about five years after freezing — and then suddenly collapse and die."

DROOPY ARMS

Mark Dimmitt, director of natural history at the Arizona-Sonora

Desert Museum, said staff members recently observed that "the saguaros on the lower museum grounds have droopy arms, which indicates freeze damage."

Other possible signs of cold damage include a sort of bleaching or discoloration at the top of saguaros. In addition to the apparent damage to saguaros, "ironwood foliage was killed, and some jojoba and brittlebush also froze," Dimmitt said.

Joshua Taitz, a biologist with the U.S. Forest Service, said he expects saguaros near the upper end of their elevation range — such as areas near Molino Basin in the Catalina Mountains — "would be hit the hardest" by effects of the freeze.

The scientists said they will be monitoring saguaro populations in the coming weeks and months in an attempt to determine the extent of damage.

A BENEFIT OF THE FREEZE

There might be an upside to the recent freeze.

Buffelgrass, an invasive species that drives out local plants and poses a high fire danger, could have taken a hit when temperatures plunged into the teens.

"A hard freeze in 1983-84 destroyed large acreages of buffelgrass in south Texas, so conceivably our February 2011 freeze could have impacted buffelgrass in the area," said Julio Betancourt, a senior scientist with the U.S. Geological Survey. "We will not know how buffelgrass fared with the February freeze until this coming summer, when large patches may fail to green up after monsoonal rains."

Contact reporter Doug Kreutz at dkreutz@azstarnet.com or at 573-4192.

Don Swann/SAGU/NPS
03/04/2011 08:29 AM

To Doug Kreutz <dkreutz@azstarnet.com>
cc Bob Love/SAGU/NPS@NPS, Natasha
Kline/SAGU/NPS@NPS, Sue Rutman/ORPI/NPS@NPS
bcc
Subject Re: saguaros 📎

Hi Doug,

I enjoyed your article last week.

I believe that we are seeing damage to some larger saguaros at the park related to the freeze. Like you, I can't say with certainty at this point that the damage is caused by the freeze event, because we haven't yet done a formal assessment that compares known individuals (or known plots) before and after the freeze. We will do this comparison at some point, but are waiting because we think it will take some time before some saguaros show damage.

That said, I feel fairly certain that some of the browning of tissue we are seeing on stems of larger saguaros are associated with the freeze, because the browning seems unusual and in some cases the tissues are soft. These saguaros have generally been above 4000 feet elevation in the Rincon Mountains. In some small saguaros we are seeing a dark yellow-brown color that seems consistent with damage caused by freezing. It's important to add that I have observed only a few of these damaged small saguaros so far, and a few more have been reported by our staff and volunteers.

As for falling and bending arms, I have seen them, as you have - but have seen them other years too, and I'm not ready to judge if there has been an increase or not. However, we should be able to quantify that over time if it is occurring.

I can't say yet how widespread the freeze damage is. As I said previously, we're keeping an eye out for evidence, so feel free to ask again soon. I know there is a lot of discussion going on about this around town, so I would definitely call your other sources too.

I have exchanged emails with Sue Rutman at Organ Pipe about this, and I know she would be happy to talk to you - I think you already have her contact info and I've cc'd her on this email.

Don Swann
Biologist, Saguaro National Park
(520) 733-5177
Doug Kreutz <dkreutz@azstarnet.com>



Doug Kreutz
<dkreutz@azstarnet.com>
03/03/2011 10:41 AM

To Don_Swann@nps.gov
cc
Subject saguaros

Hello Don,

Just checking in to see if you've seen some fairly certain signs of freeze damage to saguaros. Along several trails around Tucson, I've seen many with very browned skins and quite a few green saguaros with what appear to be drooping arms - and others that have lost arms or

fallen over entirely. Of course, saguaros age and die all the time for various reasons, so these things may not stem from the freeze. But I'd like to follow up with whatever recent observations or conclusions you might have.

Many thanks.

Doug Kreutz
Arizona Daily Star
520 573-4192



Bob Love/SAGU/NPS

03/09/2011 11:29 PM

To Don Swann/SAGU/NPS@NPS

cc Andy L Fisher/SAGU/NPS@NPS, Dana Backer/SAGU/NPS@NPS, Darla Sidles/SAGU/NPS@NPS, Natasha Kline/SAGU/NPS@NPS, Sue

bcc

Subject Re: Damage to saguaros from February freeze 

History:

 This message has been replied to.

Don:

Looks great! Thanks for preparing this - it will help staff better understand the situation and serve as resource for responding to visitor inquiries. The only suggestion I have is to perhaps summarize, in brief bullet statements, what the key talking points are at the end of your narrative. Something like:

- damage to saguaros has been documented from past freezing episodes or events (1930's, 1971, 1978)
- saguaros are subtropical plants, and SAGU is at the northeastern edge of their range
- saguaros can tolerate frost, but not a hard freeze
- minimum temps in Tucson on Feb 3 and 4 was 18 (record lows for both dates), likely colder in some portions of SAGU
- some saguaro damage associated with Feb. freeze is now being seen
- at this time we are not seeing evidence of extensive, widespread die-offs due to the Feb. freeze
- it will likely take some time for the full extent of damage to be known - we'll learn more over the next few months
- staff are encouraged to report saguaro damage - see memo

Thanks again Don!

Bob Love
Chief Ranger
Saguaro National Park

(520) 733-5110

Don Swann/SAGU/NPS

Don Swann/SAGU/NPS

03/09/2011 12:10 PM

To Bob Love/SAGU/NPS@NPS

cc Andy L Fisher/SAGU/NPS@NPS, Darla Sidles/SAGU/NPS@NPS, Dana Backer/SAGU/NPS@NPS, Natasha Kline/SAGU/NPS@NPS, Sue Rutman/ORPI/NPS@NPS

Subject Damage to saguaros from February freeze

Bob and Andy - here is an all-employee memo I've written about the freeze damage, with an attachment containing photos. If it looks OK to you, I'll send it today or tomorrow.
Thanks,

Don

All Employees,

This email is to update park staff and get your input on damage to saguaros in the park caused by the deep freeze on Feb. 3-4. This freeze was unusual, and certainly the coldest weather we have had in the park at least since the 1970s. Given that the freezes in 1971 and 1978 (and previous freezes going back to the 1930s) are believed to have caused many saguaro deaths here, the 2011 freeze is definitely cause for concern.

What might we expect to see as far as freeze damage goes, and what are we seeing so far? Volunteers and park staff have so far reported the following (see the attached photos):

1. Unusually colored saguaros - colors ranging from reddish purple to orange-yellow to dark brown.
2. Very small saguaros that are turning black and appear to have been killed by the freeze.
3. Arms dropping off larger saguaros (or drooping).
4. Larger saguaros with "squishy", discolored tissue.

So far, most of these reports have been from higher elevations at RMD - which is what we might expect, given that it is colder there. In addition, damaged saguaros are more common on north-facing slopes and near canyon bottoms - that is, where they were probably not able to warm up during the day on February 4th. Saguaro are subtropical plants, at the northeastern edge of their range in the Rincon Mountains. Like many citrus trees, they can tolerate frost, but not a hard freeze.

I have set up a folder on the p drive for viewing example of saguaro damage, as well as a place for anyone to drop in photos of saguaros (or other plants) that they see: p/freezing saguaros. Please encourage your volunteers to take photos of unusual conditions. The ideal photo sets will include both long shots and close-ups, and will have an associated GPS location, or at least a general location, and date. We are particularly interested in "repeat photos" that may show changes over time.

Because we have not had a serious freeze here in so long, it's been hard to find good information about what freeze-damaged saguaros look like, how long it takes for damage to show up, and many other questions. We do know that it may take some time for damage to show up. We also know that saguaros die, and their arms drop off, from other natural causes. It is probable that not all the damage we are seeing is the result of the freeze - and that we are not yet seeing all of the damage there is.

The bottom line is, there is still a lot we don't know. We think we will have some saguaro deaths as a result of the freeze, but we are not finding evidence for an extensive, widespread die-off of saguaros in the park. And, we hope to learn more over the next few months.

For more information on the freeze itself, a good source is:
<http://www.wrh.noaa.gov/twc/climate/monthly/feb11.php>. Please feel free to email me with questions, or if you have information that might be helpful.

Thanks,
Don Swann



Freeze damage examples_March 9 2011.doc

Don Swann
Biologist, Saguaro National Park
(520) 733-5177

Don -
although you did not ask
for my comments
here they are if you
want them

From: Don Swann/SAGU/NPS
Recipients: Bob Love/SAGU/NPS@NPS, Andy L Fisher/SAGU/NPS@NPS, Darla Sidles/SAGU/NPS@NPS, Dana Backer/SAGU/NPS@NPS, Natasha Kline/SAGU/NPS@NPS, Sue Rutman/ORPI/NPS@NPS
Subject: Damage to saguaros from February freeze
Date: 12:10:39 PM Today

Bob and Andy - here is an all-employee memo I've written about the freeze damage, with an attachment containing photos. If it looks OK to you, I'll send it today or tomorrow.

Thanks,
Don

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For more information on the freeze itself, a good source is:

<http://www.wrh.noaa.gov/twc/climate/monthly/feb11.php>. Please feel free to email me with questions, or if

• Shorten it if possible

• make a climate change stmt

• next steps
• suggest hope to learn from everyone's observations
• summarize & develop salient talking points?

Take photos
You are inviting
wonderment

Can this be simplified?

staff?
comment
(for follow-up
credits
etc)

and who took the photo?

warm coordinate or lat/long.

awkward

too early to know?

you have information that might be helpful.

Thanks,
Don Swann



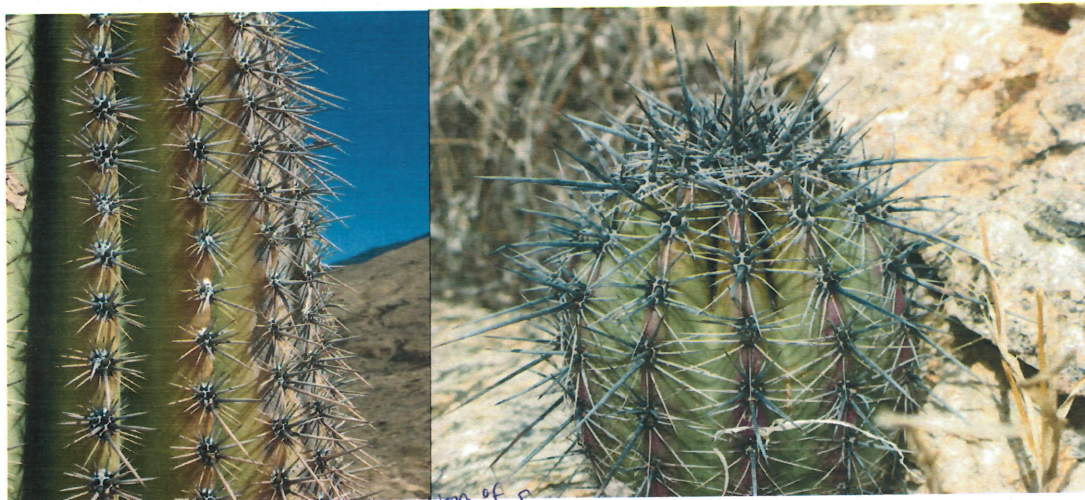
Freeze damage examples_March 9 2011.doc

Don Swann
Biologist, Saguaro National Park
(520) 733-5177



Left: Small (about 4" tall) saguaro – note brown, squishy material. Found several weeks after freeze event, above 4000 feet at RMD. Appears to be dying, possibly due to freeze. *Do we know pre-event condition*

Right: Large saguaro (about 8" tall) saguaro – note yellow-brown (squishy tissue) damage on south side of cactus. Saguaro was above 4000' in RMD on exposed ridge.



is this a close up or other portion right of same saguaro
Left: Same large saguaro as above, yellowish area between needles. Damage probably the result of freeze. It is not certain how serious this will be.

Right: Small saguaro (about 4" tall) showing purple color, which we are seeing a lot of – we are not certain if this is serious damage or not. Also note yellow color in center, at top, which appears to be tissue damage. *insert arrow*



**Julio L
Betancourt/WRD/USGS/DOI
@USGS**

04/05/2011 09:18 AM

To Tom Van Devender and Ana Lilia Reina
<yecora4@comcast.net>

cc Don Swann/SAGU/NPS@NPS

bcc

Subject Re: BGWG Wildland Weed Mapping Training Supplement

History: This message has been forwarded.

good point, Tom.

Julio

Julio L. Betancourt
U.S. Geological Survey
National Research Program
Water Resources Division
1955 E. 6th St.
Tucson, AZ 85719
tele: 520 670-6821 ext. 107
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jlbetanc@usgs.gov
http://www.paztcn.wr.usgs.gov/julio_cv.html
<http://www.paztcn.wr.usgs.gov/>

Related web pages-

USA-National Phenology Network: www.usanpn.org

Buffelgrass: www.buffelgrass.org

Tom Van Devender and Ana Lilia Reina ---04/05/2011 09:15:07 AM---If the nodes were killed, it was probab

From: Tom Van Devender and Ana Lilia Reina <yecora4@comcast.net>
To: Julio L Betancourt <jlbetanc@usgs.gov>
Date: 04/05/2011 09:15 AM
Subject: Re: BGWG Wildland Weed Mapping Training Supplement

If the nodes were killed, it was probably every where, not just at the upper elevations. The freeze reached Sinaloa.

Tom

At 09:08 AM 4/5/2011, you wrote:

We've been wondering what the frost did for buffelgrass in the Catalinas. If the living nodes were killed, you're suggesting that it will regrow back from the roots. Sounds like we should do some monitoring ahead of time at ~4000' and higher.

Julio

Julio L. Betancourt
U.S. Geological Survey

National Research Program
Water Resources Division
1955 E. 6th St.
Tucson, AZ 85719
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jlbetanc@usgs.gov
http://www.paztcn.wr.usgs.gov/julio_cv.html
<http://www.paztcn.wr.usgs.gov/>

Related web pages-
USA-National Phenology Network: www.usanpn.org
Buffelgrass: www.buffelgrass.org

From: Tom Van Devender and Ana Lilia Reina <yecora4@comcast.net>
To: travis bean <trav.bean@gmail.com>, bgworkinggroup@buffelgrass.org
Date: 04/05/2011 08:17 AM
Subject: Re: BGWG Wildland Weed Mapping Training Supplement
Sent by: owner-bgworkinggroup@buffelgrass.org

Just a thought. We just returned from the Northern Jaguar Reserve N of Sahuaripa. There's frost damage everywhere in foothills thornscrub, some areas worse than others. We saw lots of damaged *Stenocereus thurberi* and *Pachycereus pecten-aboriginum*. The spring phenology of almost everything is messed up -- flowers, new leaves, etc. All of the buds on *Ipomoea arborescens* were frozen. Saw no cactus flowers of any kind.

You should look to see if the living nodes of buffelgrass were killed by the frost. If so, it will revert to a bunchgrass life form and regrow just from the roots.

Tom

At 01:08 PM 3/30/2011, travis bean wrote:

-

Hi All,

Stephanie Christiansen from Utah State University sent me the link below which contains a great reference for mapping invasive plant populations.

<ftp://ftp.usace.army.mil/pub/nae/NRM%20Conference/Utah%20State%20University%20Wildland%20Weed%20Training%20Supplement.pdf>

I hope you find it useful- IMO it contains very good comparisons of the benefits and drawbacks of several methodologies. The point-buffered method of mapping seems like it would be of particular

interest to some in our group. Best, Travis

Travis M. Bean
Principal Research Specialist
School of Natural Resources and the Environment
University of Arizona
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<http://snre.arizona.edu/sabcc>

-



Ray Turner
<rayturner@cox.net>

04/09/2011 04:55 PM

To "duraznomemo@juno.com" <duraznomemo@juno.com>,
Don_Swann@nps.gov

cc

bcc

Subject Re: Tucson Mtn. Freeze damage

Bill, Don,

Your observation of possible frost damage in Gates Pass on the south-facing slope is just the opposite from what I would expect. As you drive through Gates Pass it is remarkable to see the difference in number of saguaros on the north-facing versus south-facing slopes. The far fewer plants on the north-facing slope is the result of freeze damage to small saguaros in the past, I think. And to now have more frost damage on plants on the south-facing slope seems hard to explain. Can we, in the future, expect to see the saguaro numbers become more nearly the same on the two slopes, and all because of catastrophic freezes?

By the way, we have been remapping and measuring the several thousand saguaros on the Tumamoc Hill plots and have seen no evidence of frost damage on small plants on the north and west slopes. Yesterday, we started working on the south slope and found that many small saguaros (and there are many) have red discoloring on the tops of the east-facing ridges (unless that side of the plant is shaded by some nurse plant). This, we think is damage from too-fast thawing as the sun rose the morning after the deep freeze. We expect to see the same on the east slope. This damage is probably not lethal. At any rate, this is an example of south slope showing more frost damage than a north slope.

Ray



dswann@email.arizona.edu

04/07/2011 08:28 PM

To Don_Swann@nps.gov

cc

bcc

Subject Fw: BGWG Wildland Weed Mapping Training Supplement

----- Forwarded message from Dana_Backer@nps.gov -----

Date: Wed, 6 Apr 2011 14:02:15 -0700

From: Dana_Backer@nps.gov

Reply-To: Dana_Backer@nps.gov

Subject: Fw: BGWG Wildland Weed Mapping Training Supplement

To: bethany_hontz@nps.gov, dswann@email.arizona.edu

Is this something we want to consider incorporating into the work we are already doing on higher elevation saguar-buffel plots?

Dana Backer, Restoration Ecologist

Saguaro National Park

3693 S. Old Spanish Trail

Tucson, AZ 85730

Phone: 520-733-5179

----- Forwarded by Dana Backer/SAGU/NPS on 04/06/2011 02:01 PM -----

Tom Van Devender

and Ana Lilia

Reina

<yecora4@comcast.net>

Sent by:

owner-bgworkinggroup@buffelgrass.org

04/05/2011 05:49 AM

Julio L Betancourt

<jlbetanc@usgs.gov>, Aaryn Olsson

<aaryno@gmail.com>

bgworkinggroup@buffelgrass.org,
owner-bgworkinggroup@buffelgrass.org,
travis bean
<trav.bean@gmail.com>

Subject
Re: BGWG Wildland Weed Mapping
Training Supplement

Good ideas. This makes me think that in normal years, BG has two very different life forms --- 1. a chamaephytic 'subshrub' at lower, more tropical elevations (flowers and grows new blades from stem nodes; reverts to bunchgrass after fire) and 2. A higher elevation bunchgrass that is regularly frozen at the nodes and regrows each year from the perennial root base. The reproductive potentials would be quite different.

Tom

At 12:27 PM 4/5/2011, Julio L Betancourt wrote:

good ideas, Aaryn. I'm not sure who will take the lead, but will discuss with others.

Julio

Julio L. Betancourt
U.S. Geological Survey
National Research Program
Water Resources Division
1955 E. 6th St.
Tucson, AZ 85719
tele: 520 670-6821 ext. 107
fax : 520 670-6806
jlbetanc@usgs.gov
http://www.paztcn.wr.usgs.gov/julio_cv.html
<http://www.paztcn.wr.usgs.gov/>

Related web pages-

USA-National Phenology Network: www.usanpn.org
Buffelgrass: www.buffelgrass.org

From: Aaryn Olsson <aaryno@gmail.com>
To: Julio L Betancourt <jlbetanc@usgs.gov>
Cc: Tom Van Devender and Ana Lilia Reina <yecora4@comcast.net>, bgworkinggroup@buffelgrass.org, owner-bgworkinggroup@buffelgrass.org, travis.beam@gmail.com
Date: 04/05/2011 12:25 PM
Subject: Re: BGWG Wildland Weed Mapping Training Supplement

I suggest a systematic approach that samples buffelgrass at different elevations and in different topographic positions across southern Arizona that seeks to address a few questions in order to generate a predictive model for buffelgrass mortality (or survival):

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I can help with a proposal and/or data development.

Aaryn

On Tue, Apr 5, 2011 at 9:08 AM, Julio L Betancourt <jlbetanc@usgs.gov> wrote:

We've been wondering what the frost did for buffelgrass in the Catalinas. If the living nodes were killed, you're suggesting that it will regrow back from the roots. Sounds like we should do some monitoring ahead of time at ~4000' and higher.

Julio

Julio L. Betancourt
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Related web pages-
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From: Tom Van Devender and Ana Lilia Reina < yecora4@comcast.net >
To: travis bean < trav.bean@gmail.com >,
bgworkinggroup@buffelgrass.org
Date: 04/05/2011 08:17 AM
Subject: Re: BGWG Wildland Weed Mapping Training Supplement
Sent by: owner-bgworkinggroup@buffelgrass.org

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You should look to see if the living nodes of buffelgrass were killed by the frost. If so, it will revert to a bunchgrass life form and regrow just from the roots.

Tom

At 01:08 PM 3/30/2011, travis bean wrote:

-

Hi All,
Stephanie Christiansen from Utah State University sent me the link below which contains a great reference for mapping invasive plant populations.

<ftp://ftp.usace.army.mil/pub/nae/NRM%20Conference/Utah%20State%20University%20Wildland%20Weed%20Training%20Supplement.pdf>

I hope you find it useful- IMO it contains very good comparisons of the benefits and drawbacks of several methodologies. The point-buffered method of mapping seems like it would be of particular interest to some in our group. Best, Travis

Travis M. Bean
Principal Research Specialist
School of Natural Resources and the Environment
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p: 520.621.8589
f: 520.621.3816
bean@email.arizona.edu
<http://snr.arizona.edu/people/bean>
<http://snre.arizona.edu/sabcc>

-

----- End forwarded message -----

Sue Rutman/ORPI/NPS
04/13/2011 08:38 AM

To "duraznomemo@juno.com" <duraznomemo@juno.com>
cc cactusworld@msn.com, Don_Swann@nps.gov,
rayturner@cox.net
bcc
Subject Re: Tucson Mtn. Freeze damage 📎

The freeze DID affect some shrubs--notably *Jatropha cuneata*, *Acalypha californica*, and *Bursera microphylla*. Probably *Jatropha cinerea*, too, but I haven't laid eyes on any yet.
Sue

"duraznomemo@juno.com" <duraznomemo@juno.com>



"duraznomemo@juno.com"
<duraznomemo@juno.com>
04/11/2011 09:02 PM

To Sue_Rutman@nps.gov, Don_Swann@nps.gov,
rayturner@cox.net, cactusworld@msn.com
cc
Subject Re: Tucson Mtn. Freeze damage

Sue et al:

Yes, I would agree. That's what I had thought when I was there....

By the way, early yesterday AM I was waaaay east in the "thermal belt" on the east side of the Little Rincon Mountains cruising through the Saguaro "forest" I found there a number of years ago -

it has to be, currently, the eastern most such concentration - and found nothing that I could definitely

attribute to the February freezes. I did find a couple of what look to be good pack rat midden sites, which is why I was up there!

----- Bill

----- Original Message -----

From: Sue_Rutman@nps.gov
To: Don_Swann@nps.gov
Cc: cactusworld@msn.com, "duraznomemo@juno.com" <duraznomemo@juno.com>,
rayturner@cox.net
Subject: Re: Tucson Mtn. Freeze damage
Date: Mon, 11 Apr 2011 08:30:30 -0700

Bill's photo of freeze damaged saguaros in Gates Pass looked like a cold-air drainage pattern to me. ?Que no?

I've been looking for freeze damaged columnar cacti here but haven't seen any yet. I thought I had some damage in the nursery, but the organ pipes look OK now. No freeze damage on the senitas that I've seen (limited number); these have been far more affected by drought than freezing.

The smaller cacti have regained their turgor with these past two rains.

Sue Rutman
Plant Ecologist
Organ Pipe Cactus National Monument
10 Organ Pipe Drive, Ajo, AZ 85321
Tel: 520/387-6849 ext. 7115, Fax: 520/387-7144

Don
Swann/SAGU/NPS

To
04/09/2011 08:20 "duraznomemo@juno.com"
AM <duraznomemo@juno.com>
cc

cactusworld@msn.com,
rayturner@cox.net,
Sue_Rutman@nps.gov

Subject
Re: Tucson Mtn. Freeze damage
(Document link: Sue Rutman)

Bill,

Sorry for the delay in responding, but I have also made that trip over Gate's Pass lately, and I agree that many larger saguaros there and elsewhere in the Tucson Mountains don't look very healthy.

Bill Thornton and I were out on the west side of the Tucson Mountains the other day, and we observed that many of the tallest saguaros are bending at the tips. I don't recall seeing this in the past, but I think I remember

you mentioning it. Are you also seeing this?

Don

Don Swann
Biologist, Saguaro National Park
(520) 733-5177

"duraznomemo@juno
.com"
<duraznomemo@juno
.com> cactusworld@msn.com, To
Sue_Rutman@nps.gov,
04/03/2011 06:31 rayturner@cox.net,
PM Don_Swann@nps.gov
cc

Subject
Tucson Mtn. Freeze damage

Hola!

If you haven't made the trip over Gates pass lately, it is worth it to see these and more....starting at the last houses going up the canyon to the W.and proceeding looking at the north(right) side of the canyon as you drive.

Also, there are numbers of these to the west and north of the Starr Pass Resort buildings(the Bowen Trail over to its connection with the Yetman Trail etc) at the SE end of the Tucson Mtns. In my estimation the Tucson Mountains Saguaro were affected more than any other area I have seen.

The NE end of the Roskrige Mountains, SW across Avra Valley from the

Az.-Son. Desert Museum,
appeared to be entirely free of freeze damage!

----- Bill

[attachment "IMG_1194.jpg" deleted by Don Swann/SAGU/NPS]



Dana Backer/SAGU/NPS

04/15/2011 01:30 PM

To Don Swann/SAGU/NPS@NPS

cc Becky MacEwen/SAGU/NPS@NPS, Bethany Hontz/SAGU/NPS@NPS, Natasha Kline/SAGU/NPS@NPS, Perry Grissom/SAGU/NPS@NPS

bcc

Subject Re: freezing buffelgrass and saguaros 📎

Julio and I briefly discussed it on Wed at the CC workshop. He said the easiest and least cost would be to "drive" around and look at some patches (obviously driving to 4000-5000ft is not an option here). I really liked some of the variables that Aaryn thought out but that would take more time and some \$\$\$. As I mentioned earlier, I think we would have to do this before we have summer rains, at least for the buffelgrass component.

I also have been thinking about a few things...

thermal insulation that buffelgrass may offer itself and saguaros

mature plants often have new tillers that start inside of a mature plant so that would have to be teased out

freeze detection on buffelgrass may not be as easy as it is for saguaros...don't really know

teasing out buffelgrass mortality from drought vs hard freeze.

I've done some off trail hiking the past two weeks and have come across small patches (5x5m) of dead (very dead) buffelgrass. It looks very much like buffelgrass that was sprayed a year or two ago. Not sure what that actually means to this discussion but just that there is natural mortality happening.

One suggestion I would have on how to proceed would be to set up a conference call (based on a doodle calendar) and see how we want to collectively proceed.

Just my thoughts.

Dana

Dana Backer, Restoration Ecologist

Saguaro National Park

3693 S. Old Spanish Trail

Tucson, AZ 85730

Phone: 520-733-5179

Don Swann/SAGU/NPS

Don Swann/SAGU/NPS

04/15/2011 11:20 AM

To Natasha Kline/SAGU/NPS@NPS

cc Becky MacEwen/SAGU/NPS@NPS, Bethany Hontz/SAGU/NPS@NPS, Dana Backer/SAGU/NPS@NPS, Perry Grissom/SAGU/NPS@NPS

Subject Re: freezing buffelgrass and saguaros 📎

I think we all agree that this is good, but none of us are exactly jumping forward to take the first step. I guess I could email Julio and Aaryn and tell them what we are thinking - that we would welcome the opportunity to participate, but need them to take the lead (sounds like Julio is not sure he wants to take the lead either). Dana, are you OK with that approach?

Don Swann

Biologist, Saguaro National Park

(520) 733-5177

Natasha Kline/SAGU/NPS



Natasha Kline/SAGU/NPS

04/15/2011 09:30 AM

To Don Swann/SAGU/NPS@NPS

cc Becky MacEwen/SAGU/NPS@NPS, Bethany Hontz/SAGU/NPS@NPS, Dana Backer/SAGU/NPS@NPS, Perry Grissom/SAGU/NPS@NPS

Subject Re: freezing buffelgrass and saguaros 📎

I agree this is a unique, timely and neat opportunity. Perhaps we should talk to Julio and Aaron to see what they are thinking of exactly, share what we are doing, and explore ways the park can contribute. However, unless our commitment can be pretty minimal (ie, facilitating access for others to do field work), I think, in the interest of self preservation, we should give it a miss.

Natasha C. Kline
Biologist
Saguaro National Park
3693 S. Old Spanish Trail
Tucson, AZ 85730
ph: 520.733.5171
fax: 520.733.5183
Don Swann/SAGU/NPS

Don Swann/SAGU/NPS

04/09/2011 10:03 AM

To Dana Backer/SAGU/NPS@NPS, Bethany Hontz/SAGU/NPS@NPS, Becky MacEwen/SAGU/NPS@NPS, Natasha Kline/SAGU/NPS@NPS, Perry Grissom/SAGU/NPS@NPS
cc

Subject freezing buffelgrass and saguaros

Dana and others,

Would it be appropriate to approach Aaryn, Julio, etc. about working together on a project such as proposed below, to determine how the freeze impacted buffelgrass?

We've been informally tracking saguaros, and I now think we may end up with a lot of freeze-related mortality (especially of older individuals, especially at TMD). If so, at some point we'll be asked to quantify it. I agree that it will make sense to look at both saguaros and buffelgrass.

Because of the Census and the ecotone plots we do have a pretty incredible opportunity (but not time or resources) to quantify the effects of the freeze on saguaros, buffelgrass, and other plants.

Don

Don Swann
Biologist, Saguaro National Park
(520) 733-5177

----- Forwarded by Don Swann/SAGU/NPS on 04/09/2011 09:51 AM -----



dswann@email.arizona.edu



04/07/2011 08:28 PM

To Don_Swann@nps.gov

cc

Subject Fw: BGWG Wildland Weed Mapping Training Supplement

----- Forwarded message from Dana_Backer@nps.gov -----

Date: Wed, 6 Apr 2011 14:02:15 -0700

From: Dana_Backer@nps.gov

Reply-To: Dana_Backer@nps.gov

Subject: Fw: BGWG Wildland Weed Mapping Training Supplement

To: bethany_hontz@nps.gov, dswann@email.arizona.edu

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Saguaro National Park
3693 S. Old Spanish Trail
Tucson, AZ 85730
Phone: 520-733-5179

----- Forwarded by Dana Backer/SAGU/NPS on 04/06/2011 02:01 PM -----

Tom Van Devender
and Ana Lilia
Reina
<yecora4@comcast.net>
Sent by:
owner-bgworkinggroup@buffelgrass.org

04/05/2011 05:49
AM

Julio L Betancourt
<jlbetanc@usgs.gov>, Aaryn Olsson
<aaryno@gmail.com>

To

cc

bgworkinggroup@buffelgrass.org,
owner-bgworkinggroup@buffelgrass.org,
travis bean
<trav.bean@gmail.com>

Subject

Re: BGWG Wildland Weed Mapping
Training Supplement

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Julio

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To: travis bean <trav.bean@gmail.com >,
bgworkinggroup@buffelgrass.org
Date: 04/05/2011 08:17 AM
Subject: Re: BGWG Wildland Weed Mapping Training Supplement
Sent by: owner-bgworkinggroup@buffelgrass.org

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Travis M. Bean
Principal Research Specialist
School of Natural Resources and the Environment
University of Arizona
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f: 520.621.3816
bean@email.arizona.edu
<http://snr.arizona.edu/people/bean>
<http://snre.arizona.edu/sabcc>

-

----- End forwarded message -----

Don Swann/SAGU/NPS
04/29/2011 11:24 AM

To "duraznomemo@juno.com" <duraznomemo@juno.com>
cc cactusworld@msn.com
bcc
Subject Re: Fw: Re: later RHSP Sag. damage 

Hi Bill,

So, I did a small amount of digging, and I have found some information on this in the Steenbergh-Lowe reports. They DID study fruiting following the 1971 freeze (they did a lot of work following the 1971 freeze, and some more following the 1978 freeze). A summary of their work can be found in Ecology of the Saguaro II, pages 38-40...if I am reading this right, they saw a reduction of 80% after the freeze in 1971!

I am now looking for buds and flowers, and can confirm your observations - yes, there seem to be a lot fewer saguaros with buds or flowers this year! Both in the Tucson and Rincon Mountains.

Still not seeing much mortality of young saguaros, although we are seeing some at higher elevations. It looks to me that the larger ones are starting to die in greater numbers than we would expect naturally, although we haven't tried to quantify it yet. This is occurring in patches in both districts.

Don

Don Swann
Biologist, Saguaro National Park
(520) 733-5177
"duraznomemo@juno.com" <duraznomemo@juno.com>



"duraznomemo@juno.com"
<duraznomemo@juno.com>
04/26/2011 08:44 PM

To Don_Swann@nps.gov
cc
Subject Fw: Re: later RHSP Sag. damage

Don:

You're welcome to check these comments out....

----- Bill P.

----- Forwarded Message -----

From: "duraznomemo@juno.com" <duraznomemo@juno.com>
To: cactusworld@msn.com
Subject: Re: later RHSP Sag. damage
Date: Wed, 27 Apr 2011 03:04:32 GMT

Bill:

I don't know of any studies following that 1978 freeze, or any other year for that matter. As far as I know, no one has ever made a record of Saguaro blooming that is in any way as detailed as that which I initiated out at RHSP! - which is one of the major reasons why I did it. But, one of my major frustrations with the RHSP plot data is that it has been one data point "hanging in 3-dimensional space as there is no other study with which to compare it. A lot of what I can definitely say is on the order of: "it is in the range of possibility that this or that can take place - nothing that says the general/ "normal" Saguaro will do this or that".

I will forward to you the "Word doc." that explains how I fell into doing the detailed study out at RHSP.

I think that you will find it to be of interest.....

Other than counting the numbers of seeds/ fruit to get much more realistic numbers for Saguaro fruit production, I've not done much with the fruits because I found that it is "impossible" to be accurate about their real numbers as so many get grabbed by various "critters" that you can't get even close to the real number that are successfully scattering seeds. I think that you would have to have 24 hour image recording to do that!!!

In addition there can be a huge amount of "abortion", depending upon unknown factors, that can & does significantly affect the ultimate seed output of Saguaros and there is absolutely nothing in the literature about that there is even a 4th "stage" in the reproduction of Saguaros when " a lot" of abortion occurs, that I've identified and that the physical structure of which has never been described.....

I do have minimal numbers of what the nectar-feeding bats are depositing about the country side and what the "germination rate" can be for seeds that pass through their gut.... but, I've never found the proper venue to publish.....although I have given a number of papers on that subject at international and national conferences. In fact, I've conclusively proved through studying(which, by the way I discovered) the largest maternity bat roost known for the nectar-feeding Lesser long-nosed bat in Sonora, that this bat not only pollinates Saguaros but it is also a major vector for the dispersal of their seeds(that took a number of years of field work to do!).

I too am wondering about the duration of the effects of this freeze event....specifically, wondering if it is going to affect the next couple of years of bloom production too. I, also, have noticed that the numbers of citrus flowers and their fruit "set" is down this year. Also, I've documented that a lot of palo verdes did not produce as many flowers this year and that their bloom season has been "shorter". I've tallied low bloom years for the Saguaro bloom on the RHSP plot before but nothing yet that would carry over for for than one year.....this one may be a real benchmark of a year!

More to Follow, Best Regards, ----- *Bill*

----- Original Message -----

From: "WILLIAM C THORNTON" <cactusworld@msn.com>
To: <duraznomemo@juno.com>
Subject: Re: later RHSP Sag. damage
Date: Tue, 26 Apr 2011 17:29:02 -0700

Howdy Bill: Is there any record of saguaro flower and seed production following the 1978 freeze? Ray Turner would probably be the most likely source. For what it's worth my grapefruit tree produced a lot of healthy looking new leaves but few blooms. Aren't expecting much fruit next year. Perhaps low flower and seed production is a common response of semi tropical plants that have survived a hard freeze.

Cheers! Bill T

----- Original Message -----

From: duraznomemo@juno.com

To: Don_Swann@nps.gov ; rayturner@cox.net ; Sue_Rutman@nps.gov ; cactusworld@msn.com

Sent: Tuesday, April 26, 2011 12:46 PM

Subject: later RHSP Sag. damage

Hola!

Well, I can tell you things have really changed on the RHSP plot. NONE of the effects represented in four of the attached images were evident when I reported on the state of this plot following the early February freezes.

I received a real shock when I surveyed the plot this past Friday - **22 April 2011**.

Of the **147** Saguaro reproducing in 2010, 5 have been lost(**3.4%**). Of the **379** stems reproducing in 2010, 18(15 from the 5 lost cacti) have been lost(**4.7%**). Several more cacti and, therefore, stems may be following suit over the next few months. ALL of the lost Saguaro had exhibited "senescence" for a number of years prior to this event! They were exactly those cacti that you would expect to "not make it". Of the presently remaining 361 stems, 74(**20.5%**) can be seen to have stem tips that have been profoundly damaged(damaged to the point that budding/flowering will be inhibited).

However, what is of much greater import for this seasons bloom, is that only 7(**4.9%**) of the extant reproducing cacti and only 8(**2.2%**) of the extant reproducing stems have viable **buds**, at this time!

For this Plot and at this time those figures should be much much greater! There now remains

just over a two week period for buds to appear & mature before blooming "needs" to begin in order to have ripened(open) fruits before monsoon moisture "usually" arrives at this location. The time needed for newly erupted Saguaro buds to reach maturity is known to shorten in the face of this constraint, somewhat, but, I find myself becoming more skeptical following each day that elapses now that there will be much bloom production from Saguaros this year!

Everywhere in the Tucson area/ upper Sonoran Desert terrain that I now look, I see a few Saguaros with buds and blooms surrounded by many times their numbers of Saguaros that have NO buds!

I now think that the possibility that the Saguaro Bloom this year is essentially going to be a bust for the higher elevation populations is real and probable !

----- *Memo Durazno*

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"duraznomemo@juno.com"
<duraznomemo@juno.com>
09/02/2011 04:12 PM

To Don_Swann@nps.gov, annhollis@usa.net,
stevenlsmith@usa.net, mnarog@fs.fed.us,
mattsmy@gmail.com, helloimustbegoing@q.com,
cc

bcc

Subject Wrap up....2011 Bloom season

Thank you
Bill Peahy!

The **2010** Bloom season at RHSP produced **7014** blooms. The percentage of those blooms that produced successfully opened fruits is not known...

Over the last several years the RHSP Bloom season has averaged 58 days. At **87 days**(04 May through 29 July), the **2011** season was 50% longer than the average yet, it only produced **552** blooms. This was a reduction in blooming of 92.1% from the **2010** season(a nearly average yearly bloom number). Although the figures for the fruits produced during the **2011** season have not been finalized, I can confidently relate at this time that the percentage of blooms that failed to successfully produce ripened fruits looks to have been well in excess of 75% of that 552 blooms number!

92%
reduction
in
blooms!

So, the combination of the **2011** reduction in blooms at the RHSP with the very low percentage of them that successfully produced ripened fruit must have resulted in a total reduction in fruits that is significantly greater than the "**80%**" reduction("estimate"?) in fruit figure following a freeze in **1971** that was reported in Ecology of the Saguaro: II(Steenburgh and Lowe, 1977). [THANK YOU, once again, **Don Swann** for digging that information up!]

At the culmination of the **2010** Bloom season RHSP had **147** reproducing Saguaro & **379** reproducing stems. For the **2011** season, as percentages of the **2010** ending totals,:

49 cacti(**33%**) and **128** stems(**33.8%**) showed visible signs of freeze damage on stem tips.

And, of those, **10** cacti(**6.8%**) and **35** stems(**9.2%**) died.

The RHSP ended the bloom season with totals of **137** reproducing cacti & **344** reproducing stems.

I am fairly sure that these figures are the "worst" case observed/ guestimated by anyone in the SE Arizona region as a result of the February 2011 freeze events. Yes? No?

More to Follow,

----- *Bill*

Saguaro Cactus (*Carnegiea gigantea*)

Bloom Rate/ Day

Daily Bloom Production - 2010

Reproducing Cacti

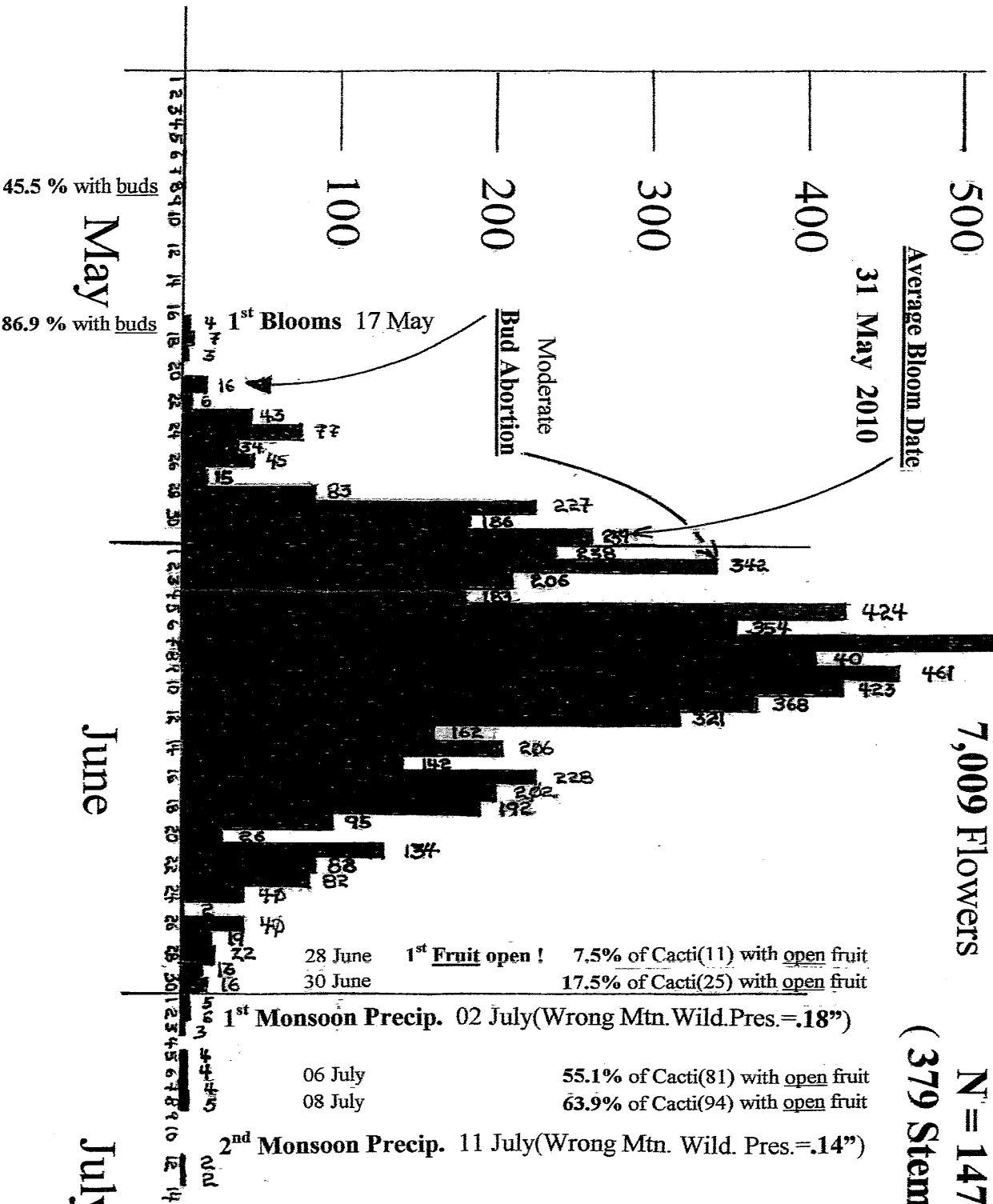
7,009 Flowers

N = 147

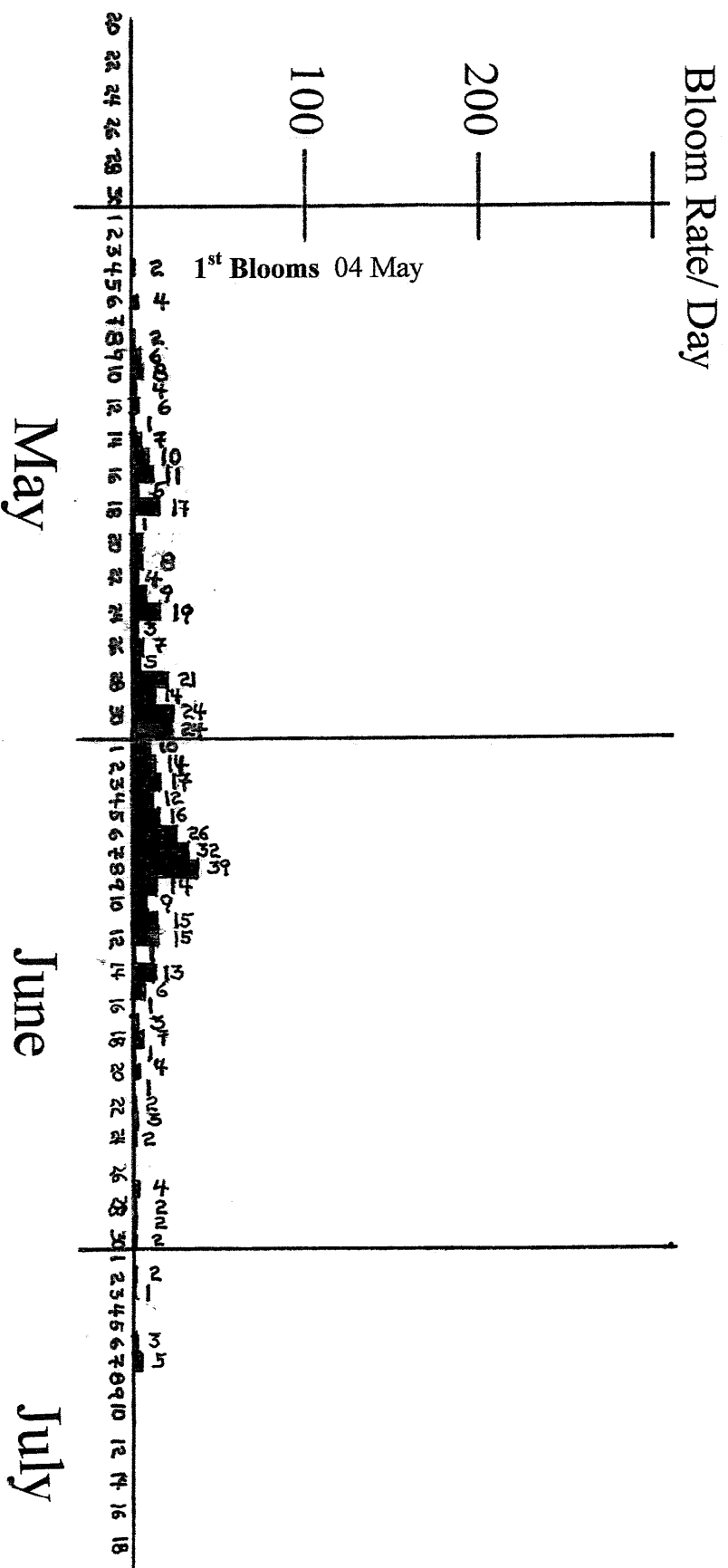
(379 Stems)

Average Bloom Date:

31 May 2010



Saguaro Cactus (*Carnegiea gigantea*) Daily Bloom Production - 2011



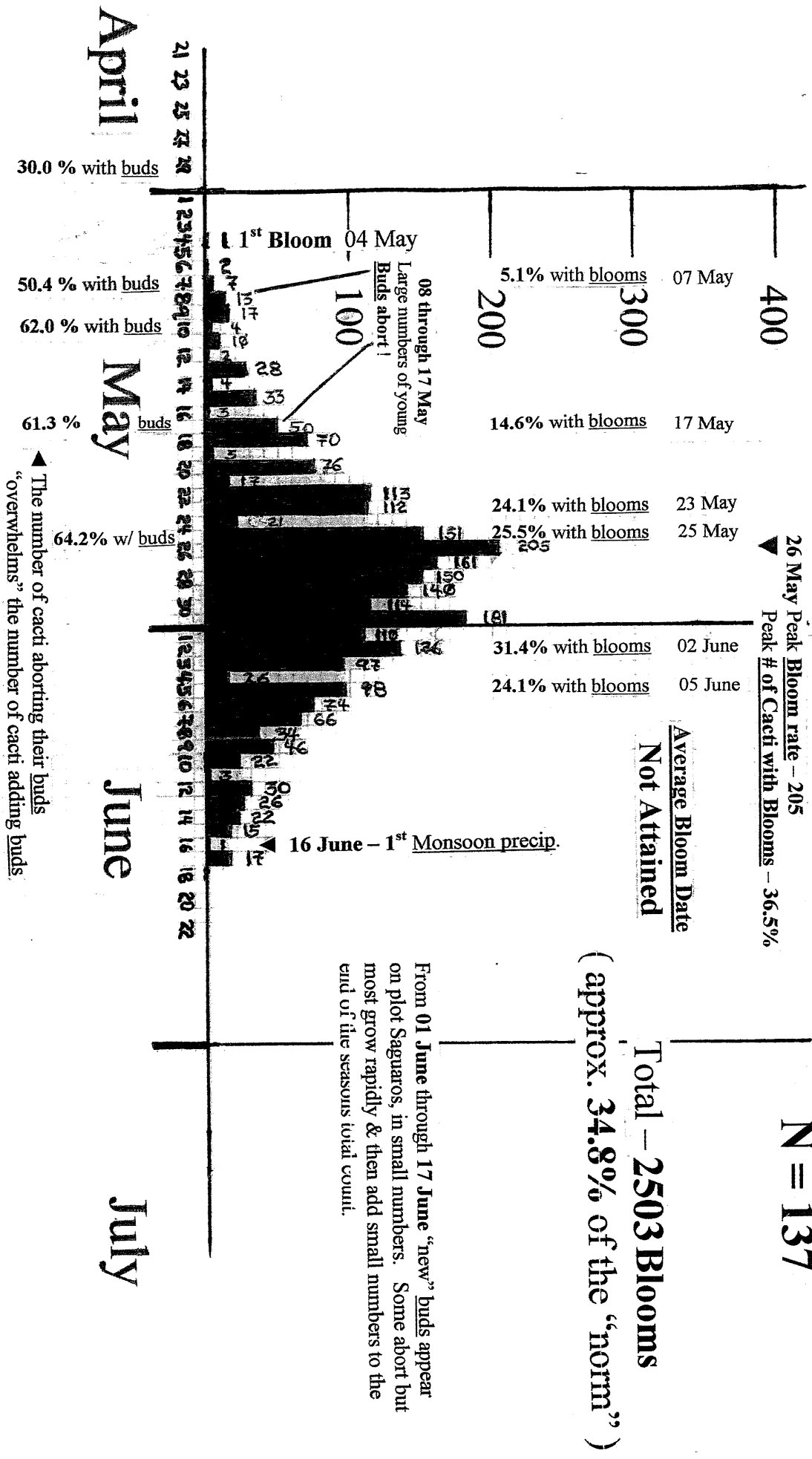
Saguaro Cactus (*Carnegiea gigantea*)

R.H.S.P. * Daily Bloom Production - 2012

Bloom Rate/ Day

Reproducing Cacti

N = 137



▲ The number of cacti aborting their buds "overwhelms" the number of cacti adding buds

* R.H.S.P. = the "Red Hills Saguaro Plot" - Rincon Valley, E. Pima Co., Ariz.

William D. Peachey 2012

R.H.S.P. Bloom Season – 2012

25 May 2012

Tucson, Arizona



Hola from the Saguaro “patch”! This season following the freezes of 2011 has been living up to expectations as you will be seeing when you take a detailed look at the enclosed graphs!

A few comments to enrich your visual travels follow:

- At this date of **25 May**, 22 days or almost **38%** of the “normal” R.H.S.P. bloom season of **58** days has elapsed.
- Starting in 1997, over the last 16 years, this season is the first time that the beginning bloom date has occurred on the same date for consecutive seasons.
- Thus far, 6 or **27.3%** of the Daily Production totals of the elapsed 22 days have exceeded the **2011** maximum daily bloom rate of **39 blooms** – that of **08 June 2011** when but **31%** of the cacti had buds and only **16.8%** of the cacti bloomed.
- The **2012** graph shows a great amount of variation between the daily bloom rates. This is much greater than has been the “norm”.
- While the **2012** data indicates that **64.2%** of the cacti had buds on **25 May**, on the same date only **25.5%** of these cacti bloomed. This makes one wonder if an “Average Bloom Date” will not happen, again, this year.
- At least initially, there doesn’t “seem” to be any mass aborting of fruit taking place.
- The elapsed **22** days of activity shown are not quite **40% of the normal 58 day bloom season**. If 40% of the bloom was represented by **740 blooms** then, a **linear extrapolation** of that number could yield a **2012** total of **1,850 blooms**. And, an “optimistic” extrapolation might yield a season total of as many as **2,200 blooms**! This range of blooms would then represent from somewhat over **25.5%** to just over **30.5%** of the “normal” bloom total of **7,200**. Or, put the other way, the **2012** season “may” end up “down” by **74.5%** to, optimistically, as little as **69.5%**.....
- The **2012** graph does not indicate the number of reproducing **stems**. That will only be known following the last day of blooming on the plot. However, so far, several reproducing Saguaros have had “new” stems added onto the Tally Sheets under their designations as some of their stems have produced buds & blooms for the first time. This, alone, is a heartening indication that “recovery” from the **2011** freezes IS taking place.

-----Bill



Darla Sidles/SAGU/NPS

12/20/2011 10:32 AM

To Don_Swann@nps.gov

cc

bcc

Subject Fw: Dying saguaros

Hi Don-

FYI, from Gabe Zimmerman's dad.

What information have you received, either directly or thru others, about the impact of last year's freeze on saguaros? Is the Section 17 census the only real data we're collecting within the park to determine percentage of die-off? I suspect you're getting these questions as often as I am, so might be good for park staff to get an update if there is one.

Thanks!

----- Forwarded by Darla Sidles/SAGU/NPS on 12/20/2011 10:30 AM -----

Ross Zimmerman
<ross.zimmerman@gmail.com>

12/20/2011 10:14 AM

To bruce gungle <bgungle@gmail.com>
cc Gene Joseph <gjoseph@gainbroadband.com>, Pamela Golden
<pg.mesquite@gmail.com>, Darla Sidles <Darla_Sidles@nps.gov>
Subj Re: Dying saguaros
ect

Bruce,

Pam was really puzzled over the brown stripes. Here's the shot I took specifically to show the striping--

https://picasaweb.google.com/110662191413265788752/Hope_Quilter?authkey=Gv1sRgCOSOrbPBrIeI2AE#5687691524517672418

We decided where we were, the stripes were on the southeast-facing side of the plant. We were trying to figure out what caused it. That stripe would make sense if there was a flow of cold air coming into that basin from the east, freezing that side of the plant. At our house, I was expecting temperatures down near 10, but it never got below about 18 because of the airflow. However, it was below freezing for around 36 hours. And our gas was shut off. I've never seen so many saguaros that had either died recently or were under stress and likely to die.

Also you'll see some photos of Coursetia that froze back pretty dramatically--
https://picasaweb.google.com/110662191413265788752/Hope_Quilter?authkey=Gv1sRgCOSOrbPBrIeI2AE#5687680961552349138

It appears to me last winter's freeze will measurably change local saguaro populations in some places. I wonder if anyone is doing counts.

I've also heard that there's some thinking that the lose of arctic ice will actually make it easier for more blobs of cold air to come down and envelope the continent. Saguaro NP might have to change its name in a few years.

Ross Z

On Dec 20, 2011, at 9:35 AM, bruce gungle wrote:

```
> Interesting about the saguaros. Jerry, Chris F. and I ran in the
> Tortolitas on Saturday and noticed the same--an entire stand (dozens)
> of mature, multi-armed saguaros that appeared to be beginning to die,
> with a few plants already gone. Of interest, the plants were on an
> east- or perhaps southeast-facing hill, and it seemed that one side of
> the plants (east or northeast side) had browned on the outer ridges
> somewhat similar to what happens to them when a fire runs up the
> needles. All of the Tortolitas are above 3,000' and I would say we
> were at least at 3,500', so it may well have been in the low-to-mid
> teens up there. As I recall, last Feb's cold wave dropped down through
> New Mexico and from there spread west (out of the east, i.e.) into our
> area, but I do not remember specifically if the winds that first night
> were out of the east. Chris also noticed a few saguaros with the same
> browning pattern in the Tucsons when we ran there on Sunday.
>
> On 12/19/11, Ross Zimmerman <ross.zimmerman@gmail.com> wrote:
>> Explorers,
>>
>> You'll get a note from Chase regarding last Sunday's run. In the meantime,
>> here are some photos. Heavy on botany. Lots of dead and sick saguaros,
>> probably from last winter's hard freeze. Pam and I are impressed with the
>> vegetation on the south flank of the Rincons. Some things we've never
>> seen
>> in those mountains before, not to mention an amazing saguaro. And not to
>> mention a baby visit bonus at the finish.
>>
>>
>> https://picasaweb.google.com/110662191413265788752/Hope\_Quilter?authkey=GvlsRgCOSOrbPBrIeI2AE#
>>
>> Great day, good people.
>>
>> Ross Z
>>
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>> http://groups.google.com/group/ttr\_az?hl=en?hl=en
>> 2011-12 Schedule:
>>
>> https://docs.google.com/Doc?docid=0AVq4Y7favhs5ZGdmbml0eDdfMTIxZGlxNmt4ZHE&authkey=CN68v9AC&hl=en\_US
>> See the Tucson Trail Runs website at http://ttraz.net
>> Member blogs:
>> Renee - http://www.pinkcorker.blogspot.com/
```



Darla Sidles/SAGU/NPS

01/12/2012 02:29 PM

To "Don Swann" <Don_Swann@nps.gov>

cc Scott Stonum/SAGU/NPS

bcc

Subject Fw: Saguaros

History:

✉ This message has been replied to.

Don, Scott- have you or any other staff recently seen this area along the Quilter Trail to which Ross Z refers? Sounds like a fieldtrip. I'd be interested in seeing them, so we should pick a date and get out of the office. I talked with Bruce and Ross at the Gabe Z trailhead dedication, and they both said its by far worse there than any other place in the park they've seen to date.

We were planning an L T hike to do the new Quilter trail and loop back down Madrona anyhow, so this fits in perfectly to check out the saguaros simul.

----- Original Message -----

From: Ross Zimmerman [ross.zimmerman@gmail.com]

Sent: 01/12/2012 02:19 PM MST

To: Doug Kreutz <dkreutz@azstarnet.com>

Cc: "gjoseph@gainbroadband.com Joseph" <gjoseph@gainbroadband.com>; bruce gungle <bgungle@gmail.com>; Darla Sidles

Subject: Saguaros

Doug,

Gee, you're working on all the hot topics. Gene Joseph, Bruce Gungle, Darla Sidles, and I were discussing the Saguaro damage. If you go to the top of Camino Loma Alta and take the trail to the east you'll see massive saguaro damage and die-off.

https://picasaweb.google.com/110662191413265788752/Hope_Quilter?authkey=Gv1sRgCOSOrbPBrIeI2AE#

In particular, we found dozens, maybe hundreds of saguaros with a stripe on the southeast aspect--

https://picasaweb.google.com/110662191413265788752/Hope_Quilter?authkey=Gv1sRgCOSOrbPBrIeI2AE#5687691524517672418

Up in the Tortolitos, our USGS hydrologist friend Bruce Gungle encountered something similar--

Interesting about the saguaros. Jerry, Chris F. and I ran in the Tortolitas on Saturday and noticed the same--an entire stand (dozens) of mature, multi-armed saguaros that appeared to be beginning to die, with a few plants already gone. Of interest, the plants were on an east- or perhaps southeast-facing hill, and it seemed that one side of the plants (east or northeast side) had browned on the outer ridges somewhat similar to what happens to them when a fire runs up the needles. All of the Tortolitas are above 3,000' and I would say we were at least at 3,500', so it may well have been in the low-to-mid

teens up there. As I recall, last Feb's cold wave dropped down through New Mexico and from there spread west (out of the east, i.e.) into our area, but I do not remember specifically if the winds that first night were out of the east. Chris also noticed a few saguaros with the same browning pattern in the Tucsons when we ran there on Sunday.

You mentioned the cold on the nights in February. However, it wasn't the normal pattern of a cold front from the west coast with some cold nights afterwards. In that case, the cold air behind the storm chills further in the clear, still nights after the storm when heat is lost to the cold night sky. The coldest I've seen at our house under those conditions has been 13 degrees Fahrenheit several years ago. It didn't cause the damage we saw this year. Instead, the mass of very cold air came down from the north, then flowed east across the Tucson Basin. Ever though it wasn't as cold where I live (I only got down to 18), the frost cloth we use didn't do us much good because the air was moving, not trapped under the frost cloth. Also it was below freezing for more than 36 hours, with a short time in the day when it briefly got into the 30s.

It looks to us like the cold air came around the mountains and froze tissues on the windward side of the saguaros. Up in the Tortolitos that was the northeast aspect of the plant, while down south below Tanque Verde ridge, the cold air came from the southeast. In more protected areas, like the Cactus Forest trail system against the west flank of the Rincons, we don't see the brown stripes. I also couldn't find that damage in the part of the Tucson Mountains I saw at our trail run on Jan. 1.

Thanks for the piece. Very timely. You know warming and the loss of ice in the Arctic is making it more likely that cold air masses will come down here in the winter (<http://www.wunderground.com/blog/JeffMasters/comment.html?entrynum=1710>). I suggested to people at Saguaro that they may need to change the name of their park in a few years. I've also told Gene he needs to sell a lot of plants to replace the frost-killed ones before people wise up that this will happen again and again.

Feel free to pass this on to the biologists you quoted if they're interested. I'd be curious to know if they think our theory makes sense.

Ross Z

USA TODAY FRIDAY, JANUARY 13, 2012

Arizona: Tucson — A brutal freeze last February killed some of Arizona's older saguaros. Don Swann, a biologist at Saguaro National Park, said the park has seen an increase in the deaths of older saguaros in the past year. The saguaro population isn't facing a large-scale die-off, but the immediate future of many saguaros might be affected by the cold snap's apparent effect on blooming and fruit production.



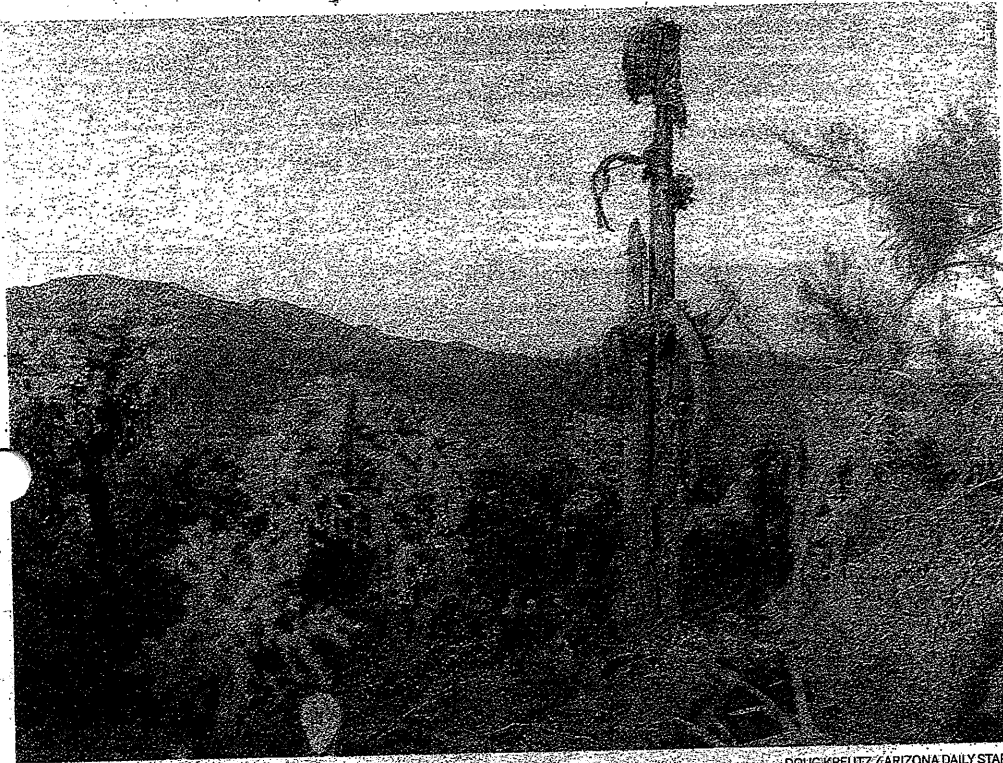
Arizona Daily Star

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DOUG KREUTZ/ARIZONA DAILY STAR

This saguaro might have been killed by other causes, but it shows signs of having been done in by last February's brutal freeze. The cold had a "horrific" effect on last year's saguaro bloom, too, says saguaro expert Bill Peachey.

Older saguaros are still paying a price after great freeze of 2011

By Doug Kreutz
ARIZONA DAILY STAR

Saguaros, especially older ones, have died as a result of a brutal freeze last February — and researchers say the cold had a "horrific" effect on last year's saguaro bloom.

"We've seen an increase in the deaths of large, older saguaros at the park in the past year as compared to previous years," said Don Swann, a biologist at Saguaro National Park.

"Many of the middle-aged saguaros seemed to show little or no effect" from prolonged freezing weather in early February, Swann said. "Some of the

DID YOU KNOW?

A saguaro census conducted in 2010 estimated that there are 1,836,039 saguaros in Saguaro National Park.

smaller ones seem to have done fine, but there was some damage to other smaller saguaros — especially at higher elevations."

Last year started with extreme cold in the Tucson area, down to 21 degrees on Jan. 1. A month later, the Tucson area had 18-degree readings on Feb. 3 and Feb. 4. Swann said he couldn't estimate the

number of saguaros that fell victim to the freeze until follow-up studies can be done. And he emphasized that it's not possible to say for certain whether a particular saguaro died from the freeze — or whether the death stemmed from other causes, or a combination.

By no means is the saguaro population facing a large-scale die-off as a result of the freeze.

Still, the immediate future of many saguaros might be impacted by the cold snap's apparent effect on blooming and fruit production.

See SAGUAROS, A4

"It was horrific, what happened after the freeze. I had five saguaros that just died

SAGUAROS

Continued from Page A1

Swann noted that "flowering was definitely down last year after the freeze, but it varied in different parts of the park."

He cited the work of Tucson-area geologist and longtime saguaro researcher Bill Peachey, who recorded a drastic drop in saguaro blooms last year.

"I have a detail plot in the Rincon Valley — about 2½ acres in size — where I've been studying saguaro blooming since 1997," Peachey said. "I literally count every flower that's out there."

"It was horrific, what happened after the freeze," he said. "I had five saguaros that just died outright on the plot, ... and then the 2011 bloom was vastly reduced. In 2010, I had 7,009 blooms out there. In 2011, I had 552 blooms."

Peachey said he attributes the sudden decline in the bloom count to the extremely cold weather.

"It must be the freeze. There was no other phenomenon that occurred. Nobody sprayed Agent Orange out there," he said.

Contact reporter Doug Kreutz at dkreutz@azstarnet.com or at 573-4192.



On StarNet: Read more environment-related articles at azstarnet.com/news/science/environment



Darla Sidles/SAGU/NPS
02/08/2012 01:50 PM

To Adam Springer/SAGU/NPS@NPS, Andy L
Fisher/SAGU/NPS@NPS, Ann Johnson/SAGU/NPS@NPS,
Anna Barney/SAGU/NPS@NPS, Anna
cc

bcc

Subject Fw: February e-News from Friends of Saguaro National Park

FYI- Our Friends' monthly newsletter, highlighting last year's freeze and the NPS Summit in which Estee participated in two weeks ago!~

----- Forwarded by Darla Sidles/SAGU/NPS on 02/08/2012 01:49 PM -----



"RSVP Friends of Saguaro
National Park"
<fosnp@friendsofsaguaro.org
>

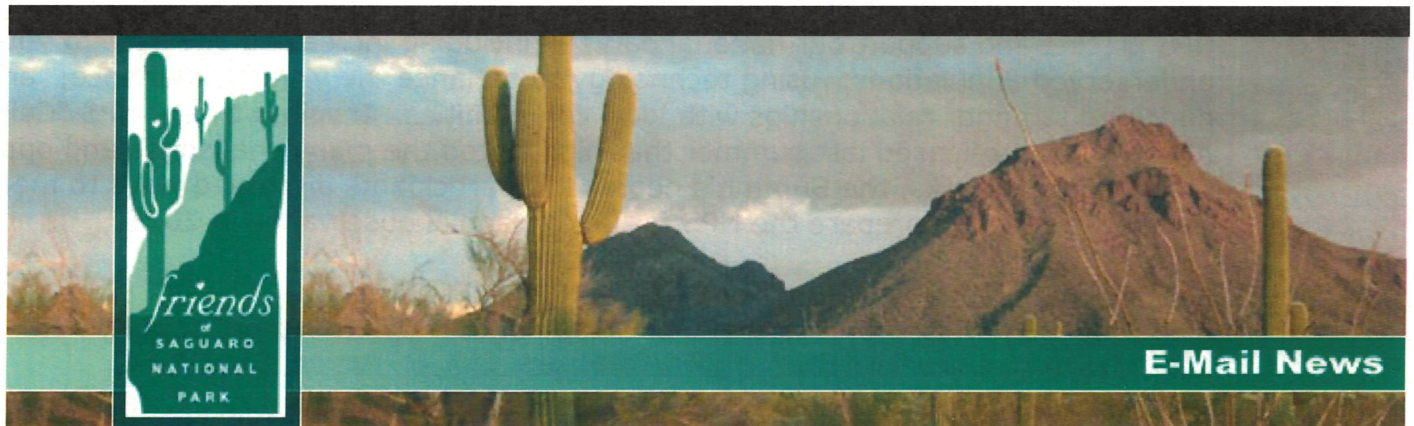
To Darla_Sidles@nps.gov
cc

02/08/2012 11:52 AM

Subject February e-News from Friends of Saguaro National Park

If you're having trouble viewing this email, you may [see it online](#).

Share This:



February, 2012

2011 Winter Freeze Impacted Park's Saguaros

Researchers at Saguaro National Park are assessing the negative impacts of last year's near-record low temperatures on saguaro cacti throughout both districts. Overnight low temperatures were below freezing from February 2 through February 5, 2011 -- dropping to near-record lows of just 17 degrees on February 3rd and 4th. While saguaros can tolerate below-freezing temperatures for relatively brief periods of time, sustained low temperatures over several days are known to damage or kill very young, and very old, saguaros. While the 2011 freeze's impacts on these slow-growing plants are still being

assessed, some experts fear that the damage could be the worst experienced in more than 30 years. NPS rangers have seen an increase in the deaths of large, older saguaros in the park over the past year, as well as visible damage to many small saguaros (especially at higher elevations). Saguaro flowering and fruit production was dramatically down in 2011 -- but the numbers varied in different areas throughout the park.

Friends of Saguaro continues to support this important ongoing monitoring and assessment research at the park; if you'd like to help out with a special donation, you can do so online at <http://www.friendsofsaguaro.org>.

FOSNP & Saguaro N. P. Participate in National Park Summit

Saguaro National Park's Community Outreach Representative Estee Rivera traveled to Washington, DC last month to participate in "**America's Summit on National Parks.**" Ms. Rivera was nominated to represent both the park and **FOSNP** by Supt. Darla Sidles and Friends Executive Director Bob Newton; the FOSNP board paid her travel expenses for the 3-day Summit. Estee was one of only 44 NPS participants -- having been personally selected by NPS Director Jon Jarvis -- as other Summit attendees included prominent members of Congress, Interior Secretary Ken Salazar, park advocates, and top conservation, tourism, and communications leaders.

Hosted by the National Parks Conservation Association, the National Park Foundation, and the National Park Hospitality Association, the Summit outlined new directives to help the NPS protect and support our national parks -- including increasing outreach to youth and underserved populations; using technology to enhance the visitor experience; and nurturing stronger relationships with local communities. Inspired by the NPS "Call to Action" report released last summer that highlighted the many challenges and opportunities facing national parks, the Summit's nearly 400 participants discussed ways to meet those demands, and help prepare the NPS for its centennial observance in 2016.

For information on the Summit and to view highlights visit <http://www.2016parksummit.org>. For a copy of the "Call to Action" report, visit http://www.nps.gov/calltoaction/PDF/Directors_Call_to_Action_Report.pdf.

2700 North Kinney Road | Tucson, AZ 85743 US

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Full effect of Jan. deep freeze on saguaros, others unknown

By Doug Kreutz
ARIZONA DAILY STAR

Deep-freezing weather in mid-January affected some native and non-native plants — but only time will tell if any saguaros or other desert dwellers will die from cold damage.

"The more tropical introductions such as Indian fig (similar to prickly pear cacti) were shattering all over town" as a result of the freeze, said **Mark Dimmitt**, a plant expert and former director of natural history at the Arizona-Sonora Desert Museum.

Overnight lows dropped well below freezing for several days in Tucson — including a record low of 17 degrees Jan. 15.

"I had 11 degrees in my carport, and 7 in the drainage at the bottom of my

property" at one point during the cold snap, Dimmitt said. "That's 6 degrees colder than ever before in the 33 years I've been here. There may be increased saguaro mortality after this freeze."

Don Swann, a biologist at Saguaro National Park, said there was no immediate sign of freeze damage, but he added that "some saguaro mortality or damage" could show up.

NATURE OF THE FREEZE

Plant experts say this year's big chill, while severe for a desert region, might prove to be less deadly to plants than another period of severe freezing in February 2011.

Swann reported last year that the 2011 freeze killed some saguaros — especially older, more vulnerable

SAVE YOUR PLANTS

The Tucson Botanical Gardens website offers advice for care of plants affected by freezing weather. Go to tucsonbotanical.org and look under the "Gardening" heading for "Guidelines for Care of Frost-Damaged Plants."

plants. Other researchers found that the saguaro bloom was vastly reduced after the freeze.

This year, biologists say, was different.

"The difference is that we had one day in February 2011 that did not rise above freezing in many parts of Tucson during the day," Swann said. During this

See DEEP FREEZE, A3

ARIZONA DAILY STAR / Tuesday, January 29, 2013

DEEP FREEZE

Continued from Page A2

month's freeze, "the daytime temperatures, while cool, seem to have been generally above freezing."

Swann said research has shown that the greatest damage to saguaros comes when there is a prolonged period — 15 to 20 hours — below freezing.

"This would typically be when there is a freezing night, followed by a freezing day and then another freezing night, as we had in 2011, but not in 2013," he said.

That doesn't mean that

saguaros are out of the woods, or the desert, in terms of freeze damage this year.

"We had some very low nighttime temperatures, and several cool days, so it seems possible that in some areas of the saguaro's range in the Tucson area — for example, at higher elevations or in localized shaded areas — there might have been some saguaro mortality or damage as a result," Swann said.

ABOUT YOUR PLANTS

Michael Chamberland, director of horticulture at the Tucson Botanical Gardens, had an encouraging word for people

concerned about plants in their yards or gardens.

"Any plants that survived for you in 2011 will probably get through this recent freeze as well," Chamberland said.

He said that's because this month's conditions were "comparable but not quite as severe" as those in 2011.

"We had very strong winds with that freeze in 2011, and those winds had a devastating effect. We did not have the winds this year, and the daytimes rose well above freezing."

Contact reporter Doug Kreutz at dkreutz@azstarnet.com or at 573-4192. On Twitter: @DouglasKreutz

