McDowell Sonoran Conservancy

McDowell Sonoran Conservancy Field Institute Update May 2017

Melanie Tluczek
Steward Class 33

Assistant Director
Field Institute

Our program today

Welcome & CS Leadership – Melanie Tluczek

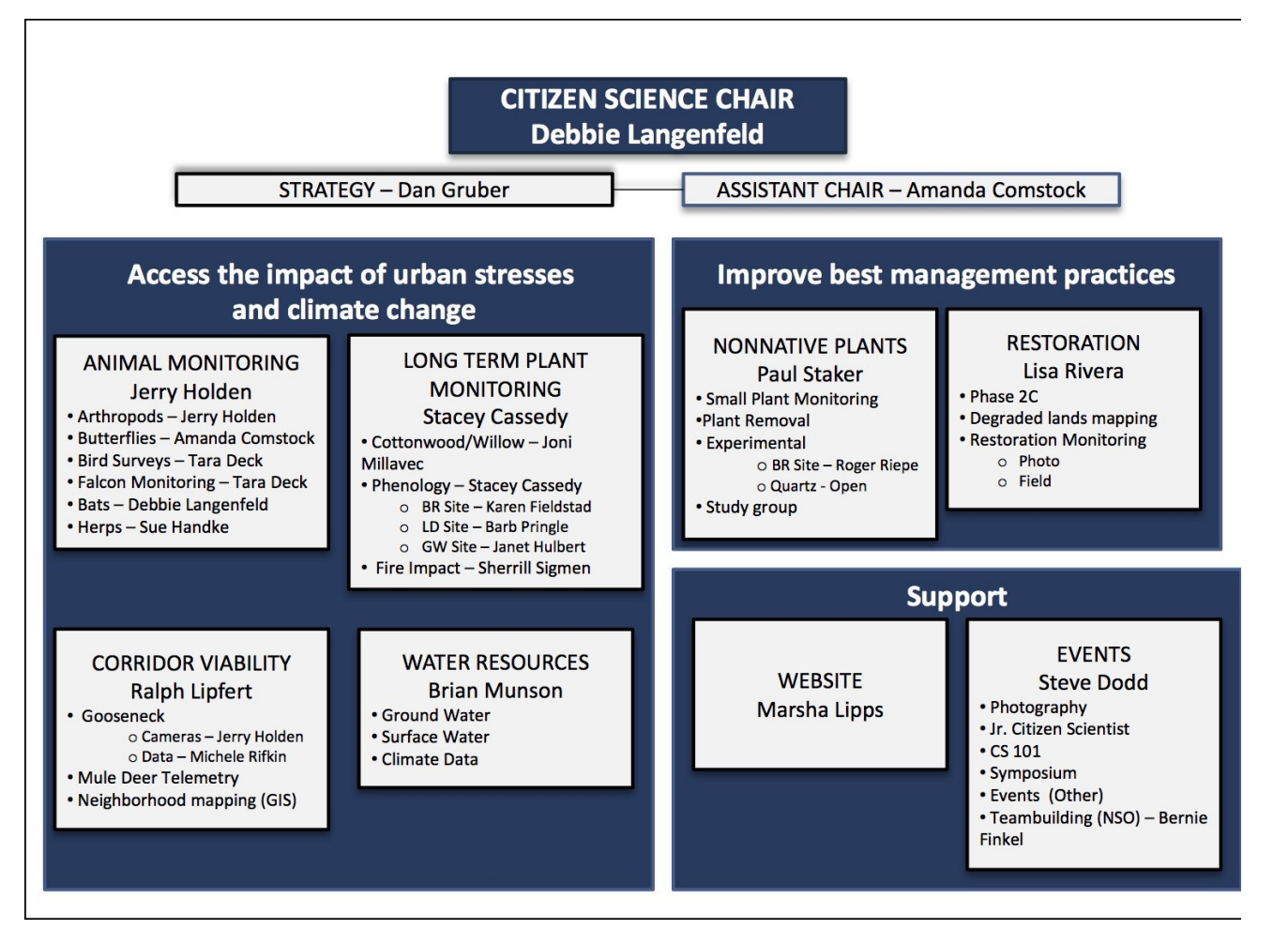
2016-17 Recap – Debbie Langenfeld

On-going projects update – Team Leads

A Look Ahead – Dr. Helen Rowe

Closing Remarks – Melanie Tluczek

Citizen Science Leadership



McDowell Sonoran Conservancy Field Institute Update May 2017

So let’s get started with a recap of the past 12 months…

A recap…

Debbie Langenfeld

Program Chair

Steward, Class 50

Certified

Citizen Scientist

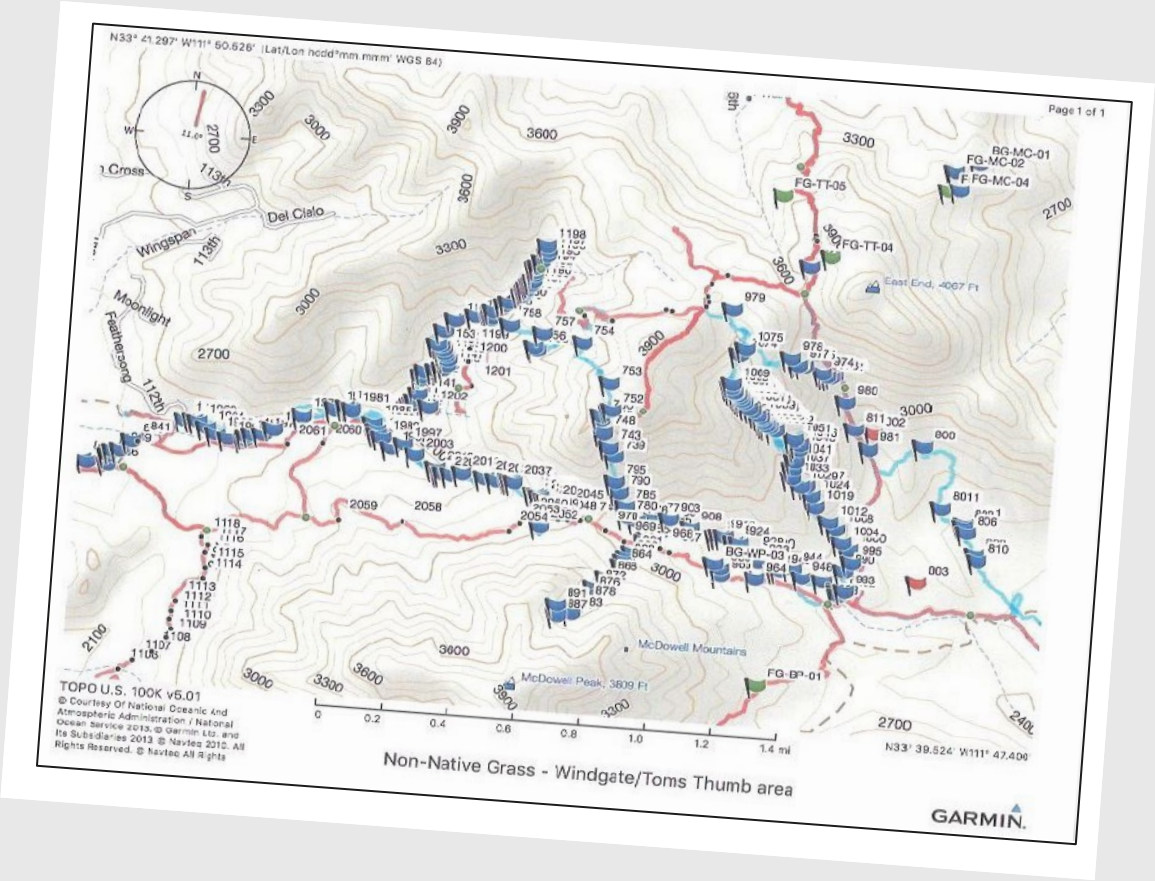
Nonnative Plants

Study group

Fountain & Buffel Grasses

Sahara Mustard

Tamarisk @ Dixie Mine



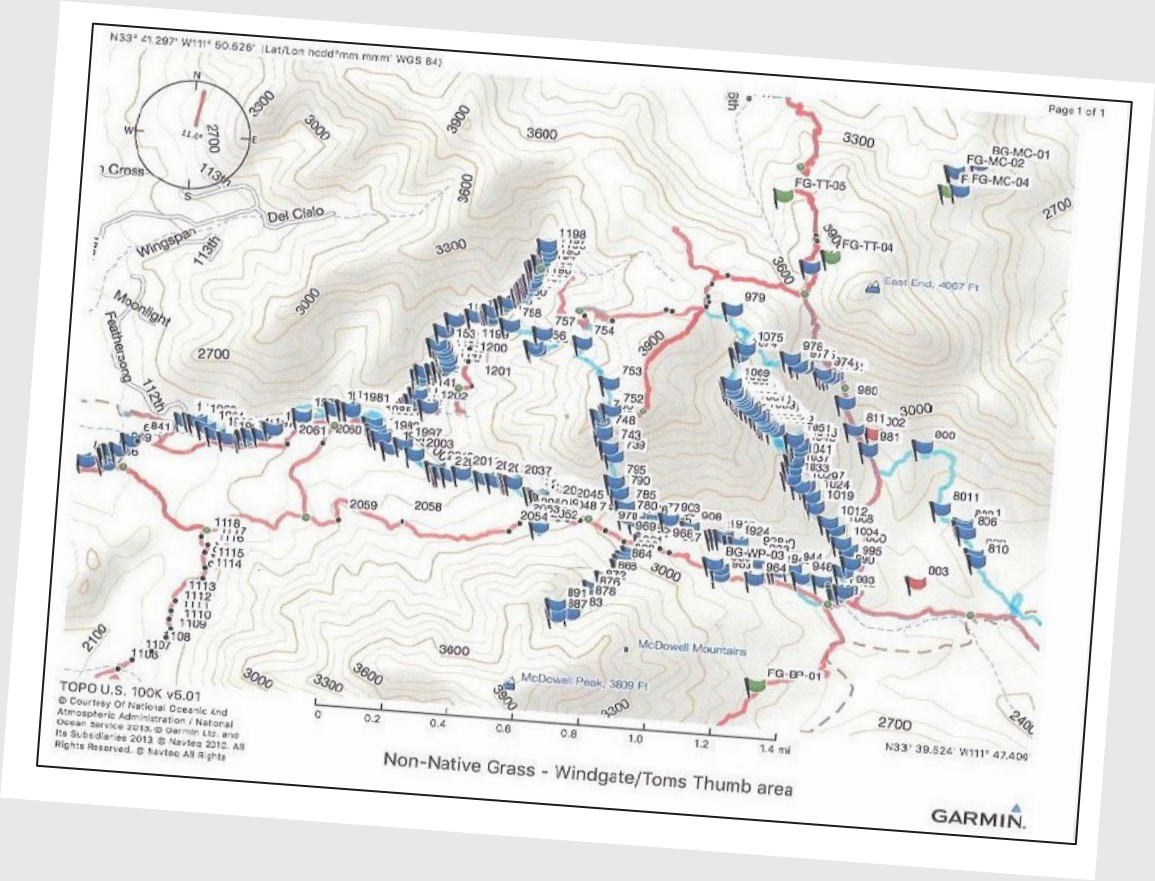
Nonnative Plants

Training & certification

Removed ~= 20,000

Treatments – delayed

Mapping – 100 acres



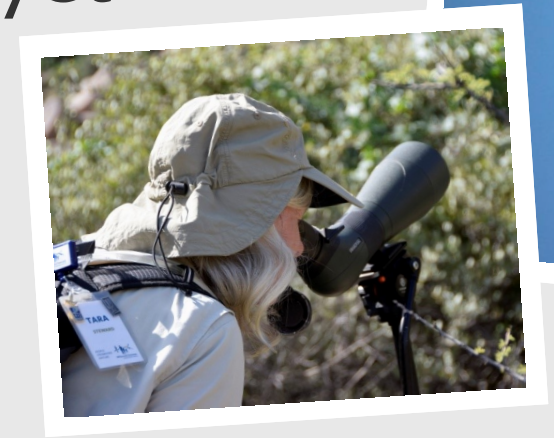
Prairie Falcons

2 training sessions

Patrol, pathfinders, nature guides, COS

Chicks heard – 5/8!

No nestlings – yet



Stats

16 classes

252 field days

516 stewards

97 non-stewards

~= 2500 hours

TOTAL FIELD DAYS				
MONTH	TYPE	FIELD DAYS	STEWARDS	NON-STEWARDS
APRIL	NON-NATIVE PLANT	10	18	
	Arthropods	8	29	
	PHENOLOGY	10	34	1
	DIXIE MINE	2	5	2
	RAPTOR MONITORING	12	10	2
	BIRD WALKS	2	15	
	BUTTERFLY	1	14	15
MARCH	RESTORATION	4	15	4
	FIRE IMPACT	6	25	2
	NORTH PRESERVE BIRD SURVEY	1	3	
	RAPTOR MONITORING	4	8	
	PEREGRINE SURVEY	1	1	2
	WEEKLY PHENOLOGY	24		
	NON-NATIVE PLANT			

New Species

12 Birds – 152 species

3 Butterflies – 44 Species

New Species

1 Amphibian

4 Grasses




3 Flowers



381 species

Student Involvement

ASU School of Life Sciences – Kara Barron

- Fire impact study

SCC – Dr. Nagy class – 4 research projects

- Phenology
- Nonnative grasses
- Herps
- Butterflies

SCC – CNUW – Natalie Case

- Fairy shrimp study

Jr. Citizen Science Festival

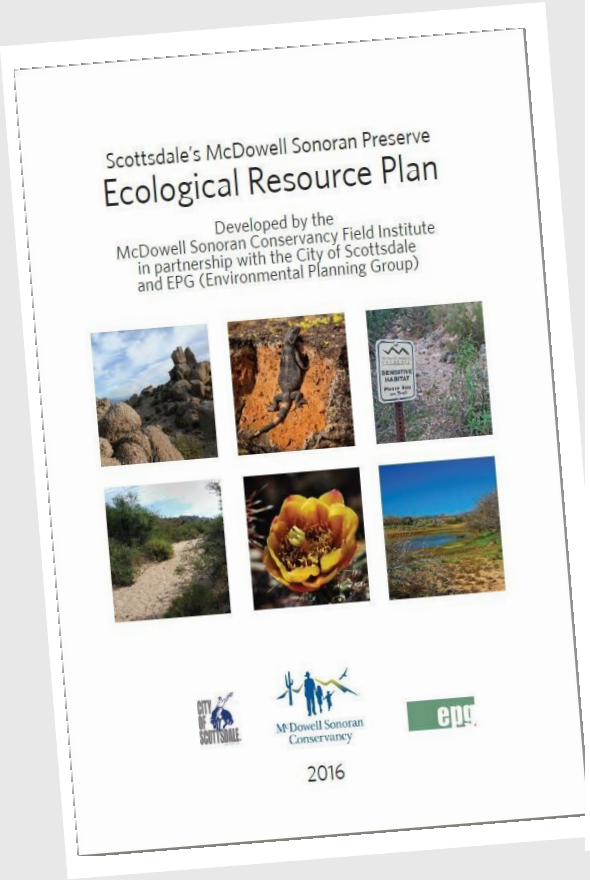
3 sponsors

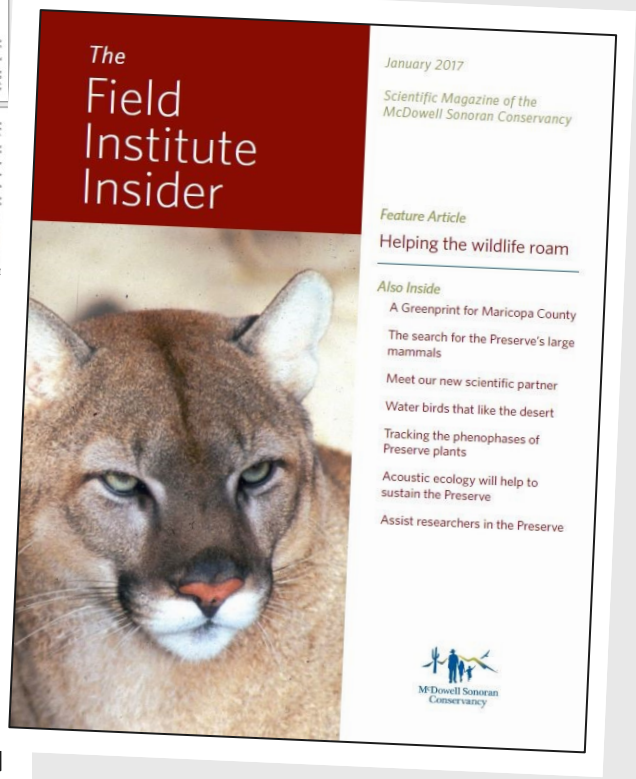
18 exhibits

210 students

100+ volunteers

Presentations & Publications





McDowell Sonoran Conservancy Field Institute Update May 2017

And now, some project status reports

First Up, Phenology

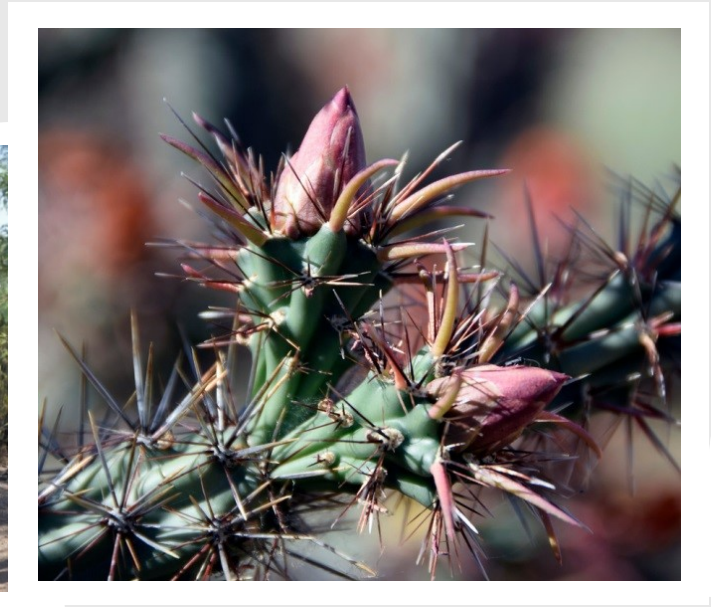
Melanie Tluczek
Steward Class 33

Assistant Director
Field Institute

McDowell Sonoran Conservancy Phenology Report Highlights

What is phenology?

The study of the timing of plant and animal seasonal and cyclical changes, such as migration, germination, flowering and fruiting.



Why phenology?

Provides information about environmental changes due to climate or other factors

Provides early warning signs of mismatches between animals and their resources

Science for everyone!

Field Institute phenology goals

Track phenology of species:

Iconic Sonoran Desert species

Used by numerous wildlife species

Pollinator plants

Symbiotic relationship with other species

Being studied in other areas of the southwest

Species studied

Buckhorn Cholla

Saguaro

Jojoba

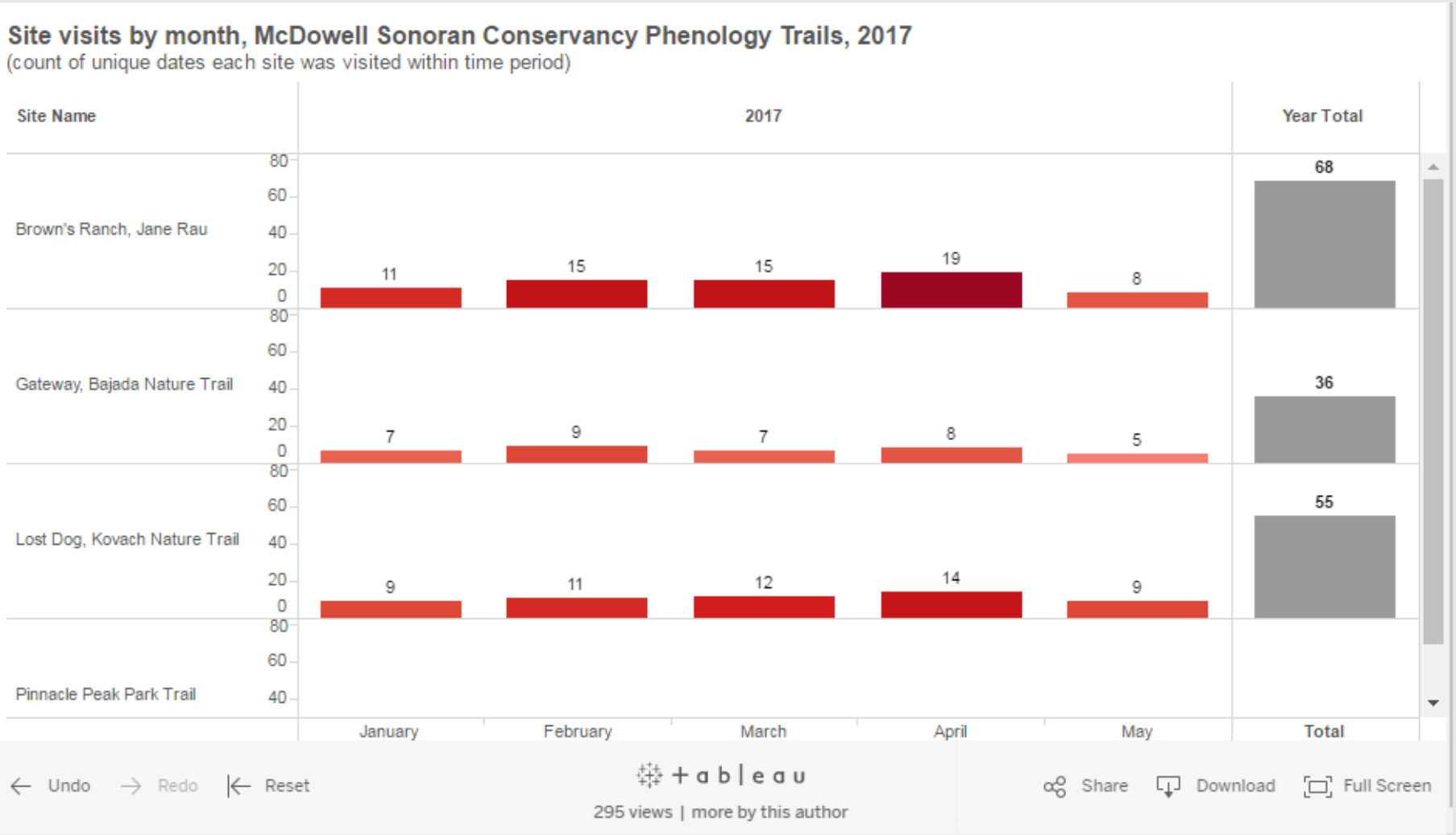
Species studied

Desert Senna

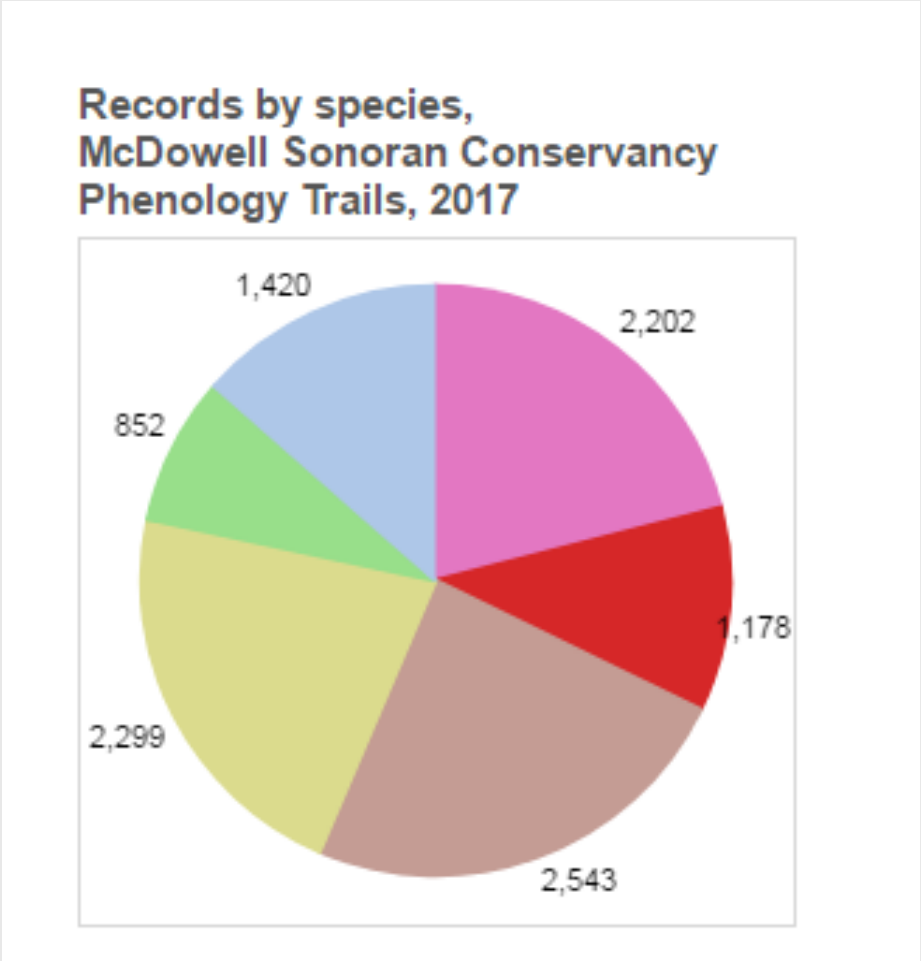
Soap Tree Yucca

Velvet Mesquite

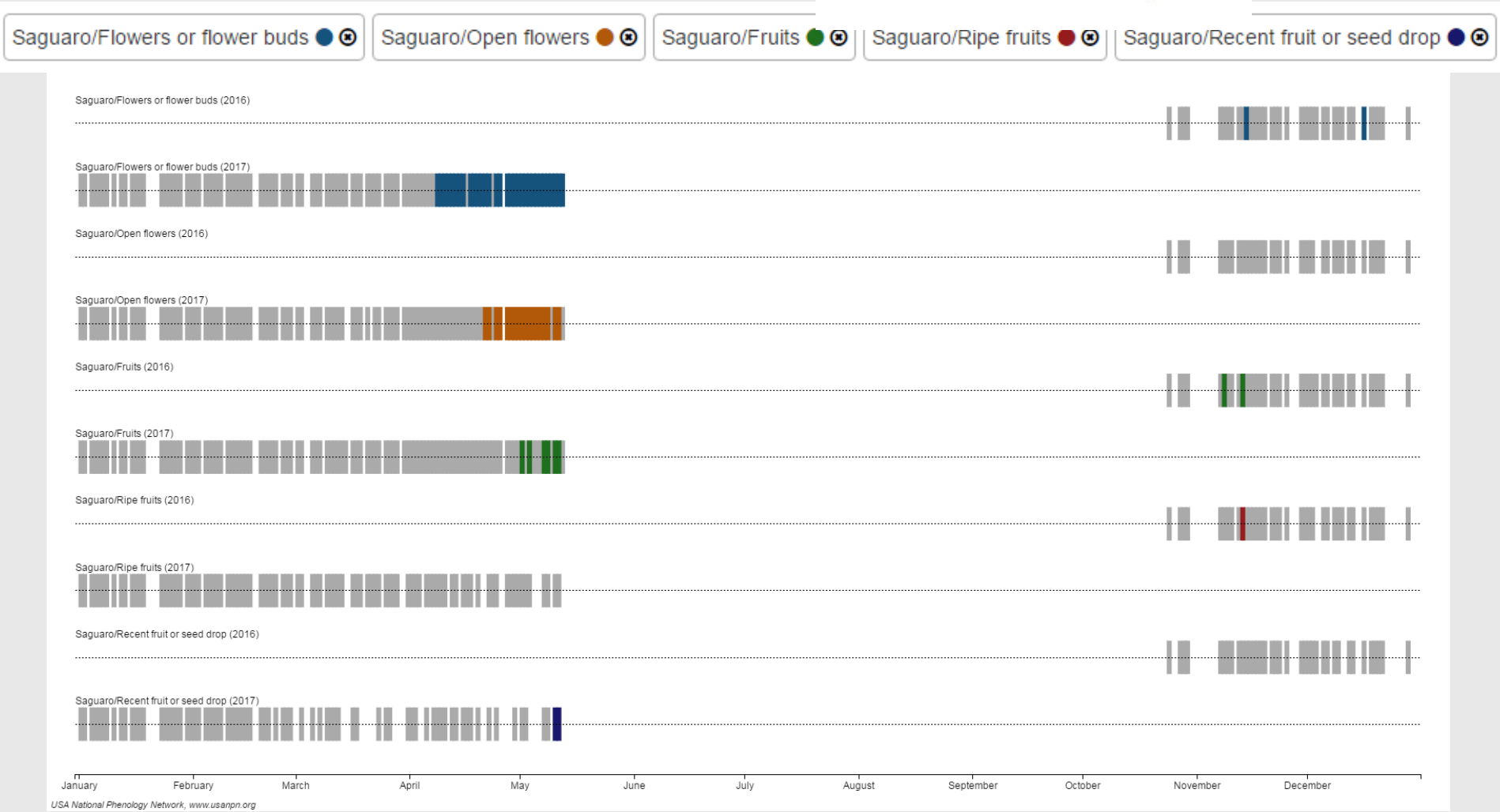
Site Visits by month 2017



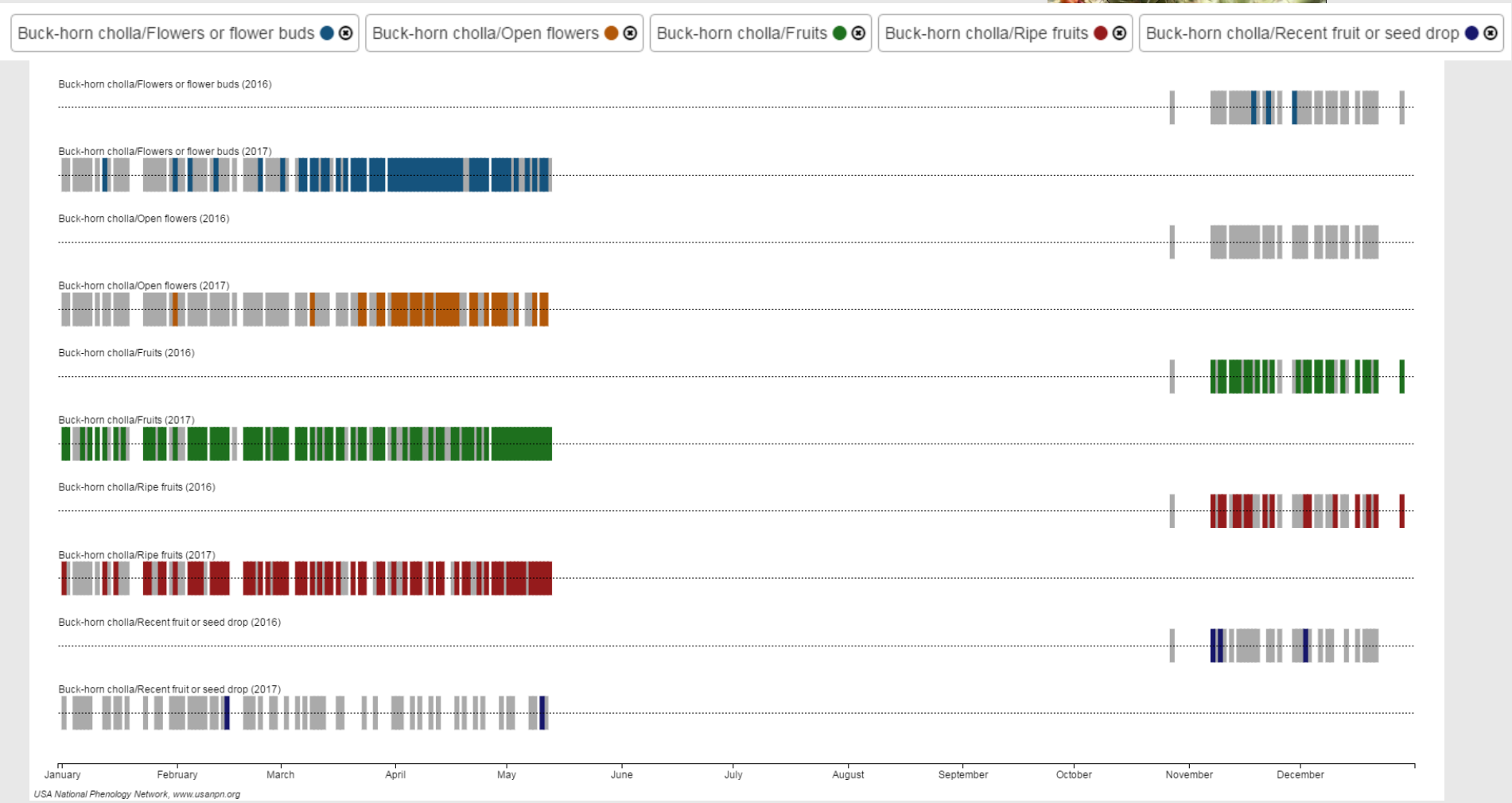
Phenology records



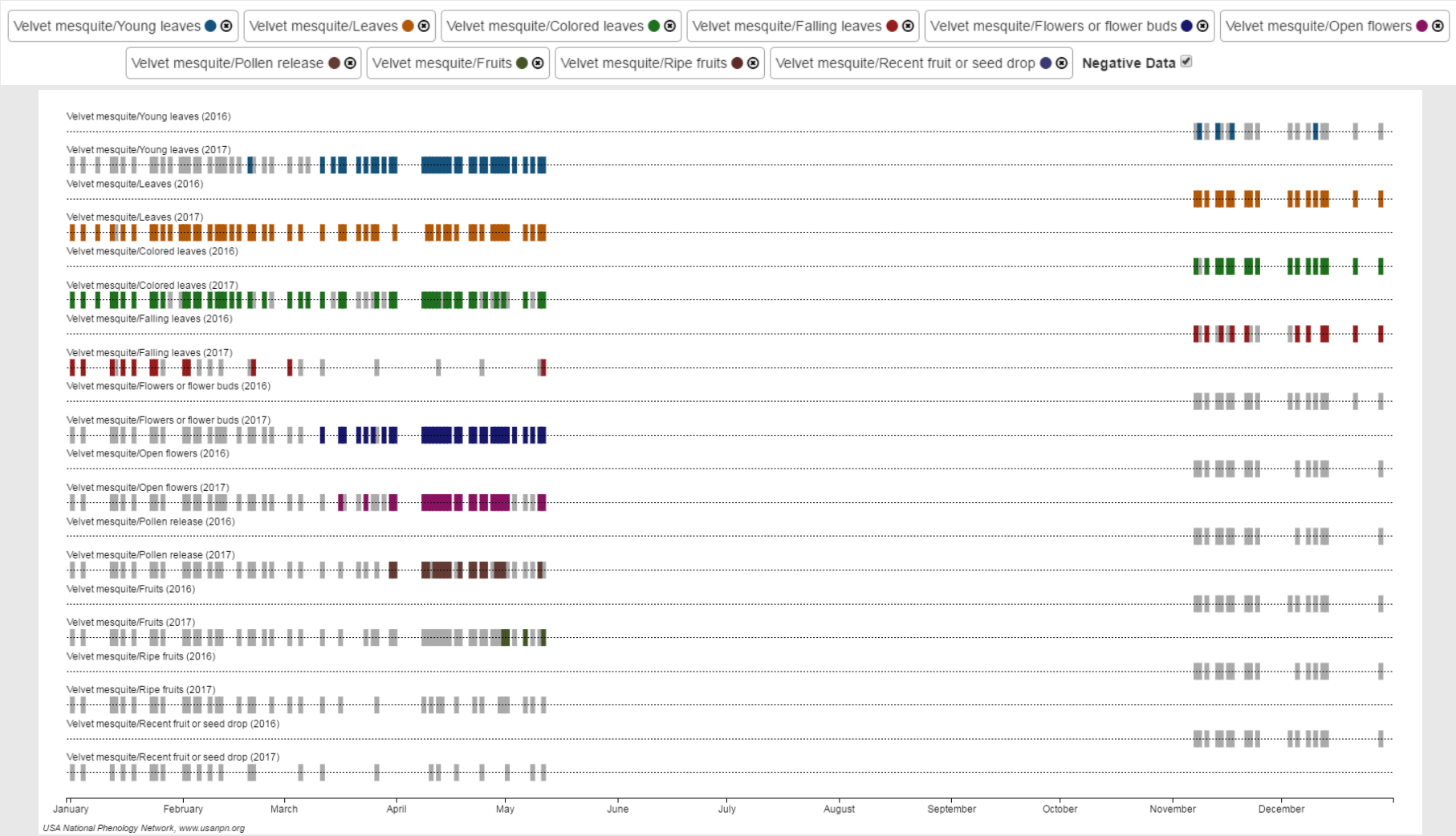
Saguaro



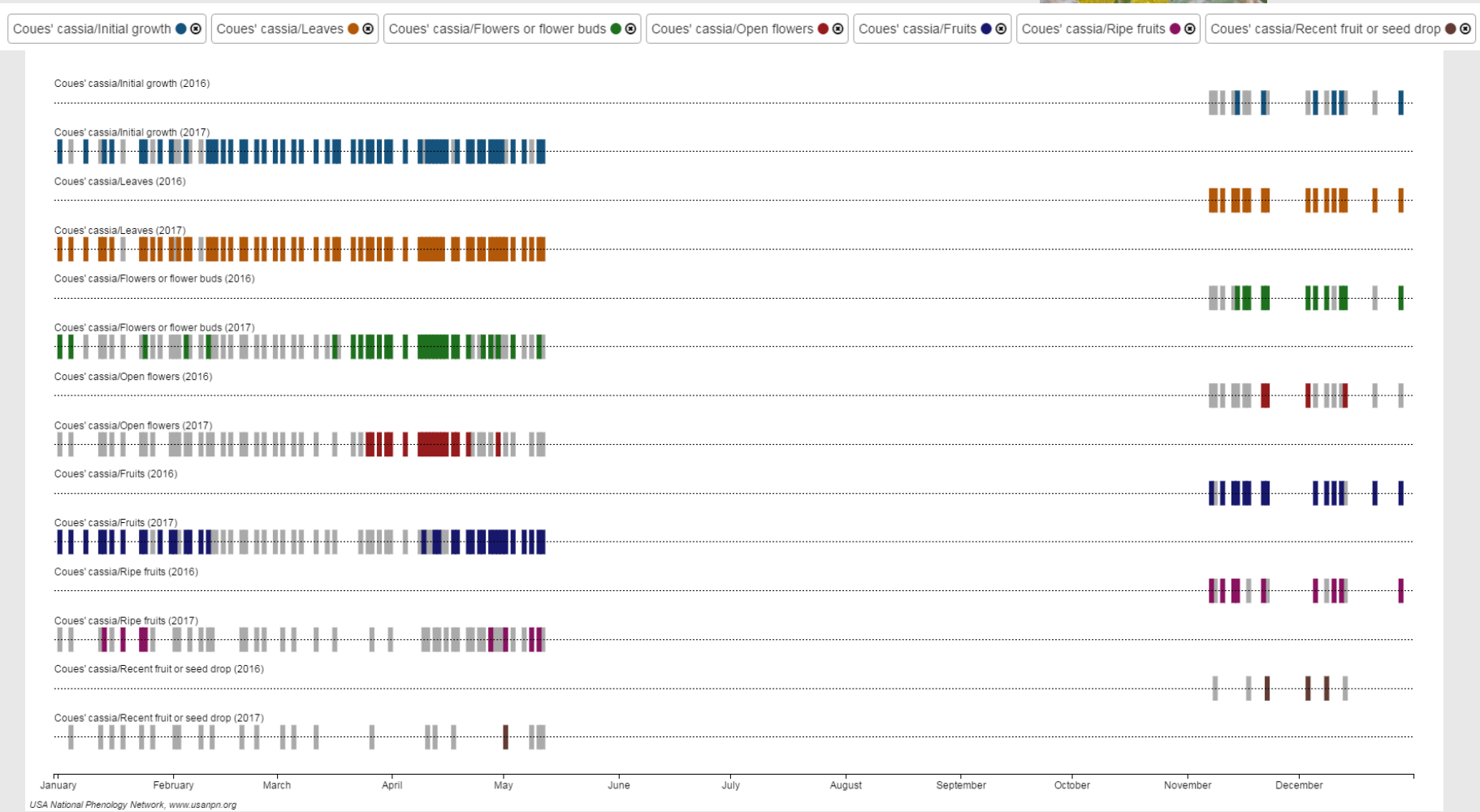
Buckhorn Cholla



Velvet Mesquite

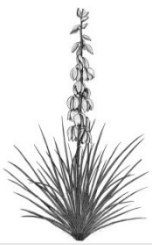


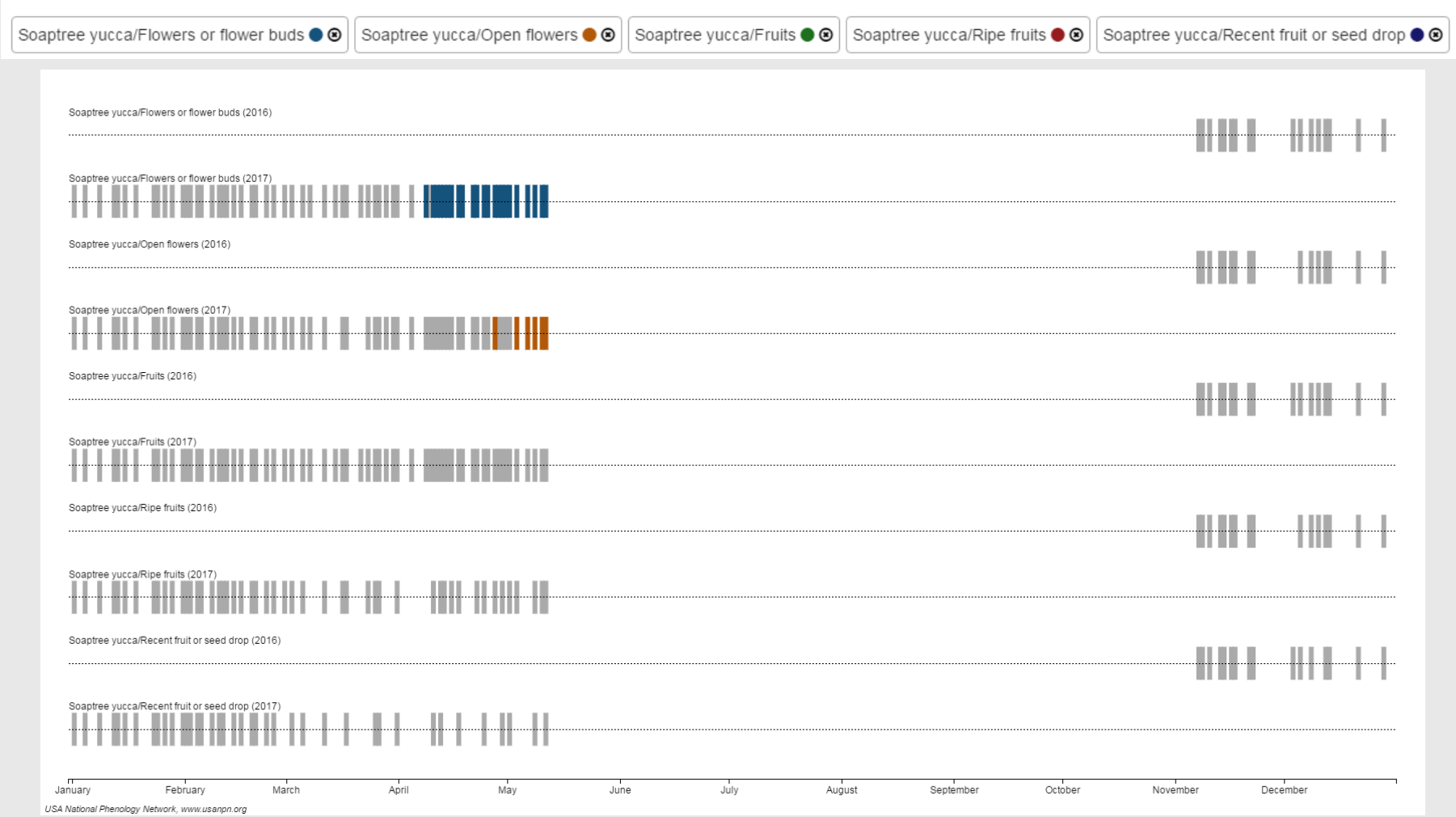
Desert Senna



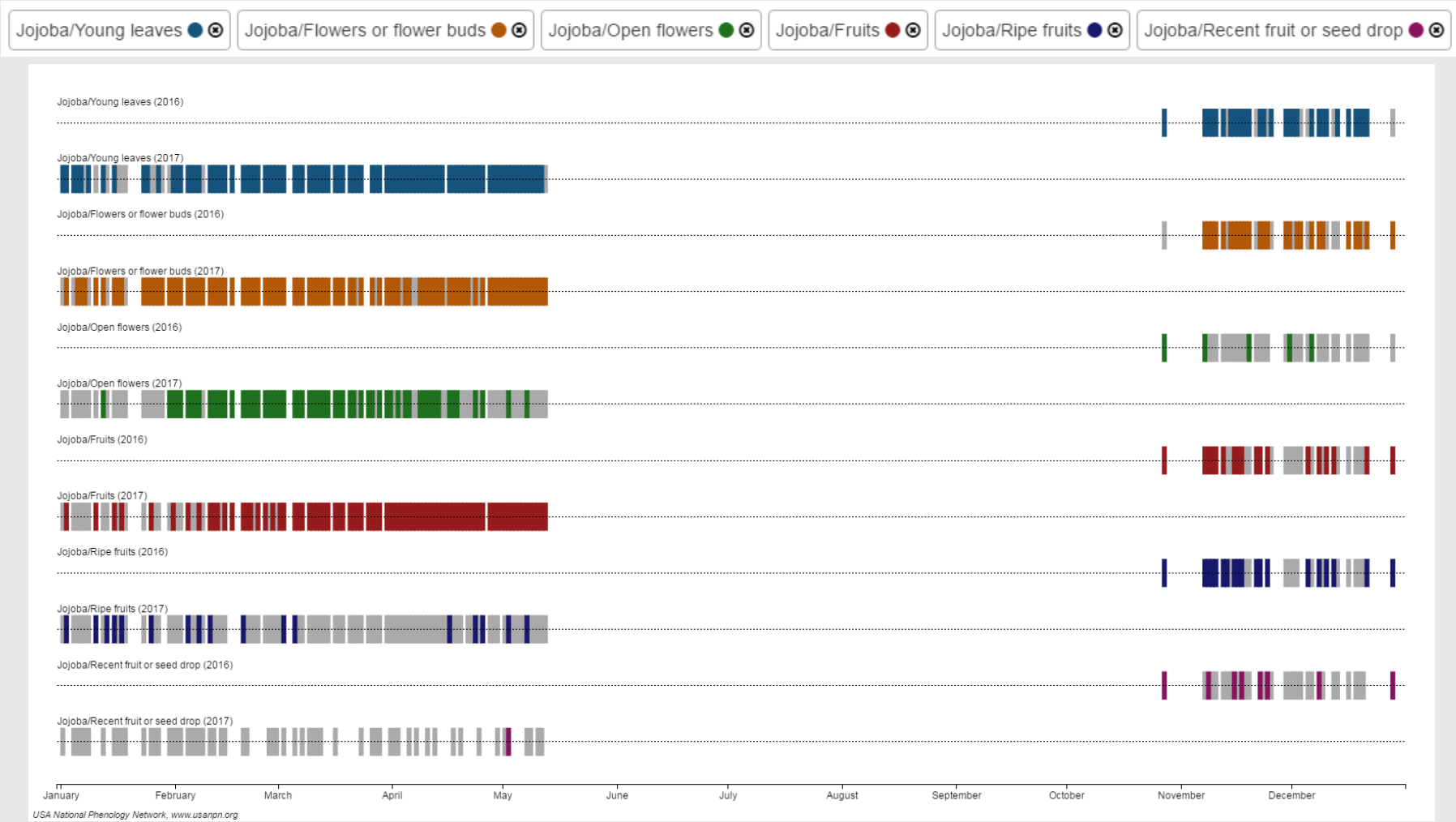
McDowell Sonoran Conservancy

Soap Tree Yucca





Jojoba



The even bigger picture

Spring is advancing in three of every 4 national parks

Early springs, late season freezes may become new normal

Nature's Notebook Observations help to manage invasive Buffelgrass

Future springs may arrive three weeks early across the US

Increasing winter temperatures and rainfall cause shifts in phenology in four California species

Mckenzie Meeker
Levi Wittrock

Scottsdale Community College

School of Life Sciences

Urbanization's effects on jojoba (*Simmondsia chinensis*) phenology

Mckenzie Meeker[1], Niousha Aramimehr[1], Shiva Senemar[1], and Levi Wittrock[1]

[1]Department of Life Sciences, Scottsdale Community College, Scottsdale, AZ 85256-2626, USA

Goals

1. To understand how plants react to changes in their local environment
2. To compare phenology of jojoba plants in urbanized and non-urbanized environments
3. To understand if urbanization can predict a shift of plant phenology

Methods

Phenology record were extracted for jojoba plants in **non-urbanized** settings in the McDowell Mountain Preserve and **urbanized** settings in Tucson

Scottsdale, AZ

McDowell Sonoran Preserve (MSP) and vicinity

- Brown's Ranch, Jane Rau Nature Trail
- Pinnacle Peak Park Nature Trail
- Lost Dog Kovach Nature Trail
- Gateway, Bajada Nature Trail

MSP and vicinity sites are all located in **non-urbanized** environments meaning they do not receive manual water and/ or nutrients.

Geographic Comparison – MSP Sites

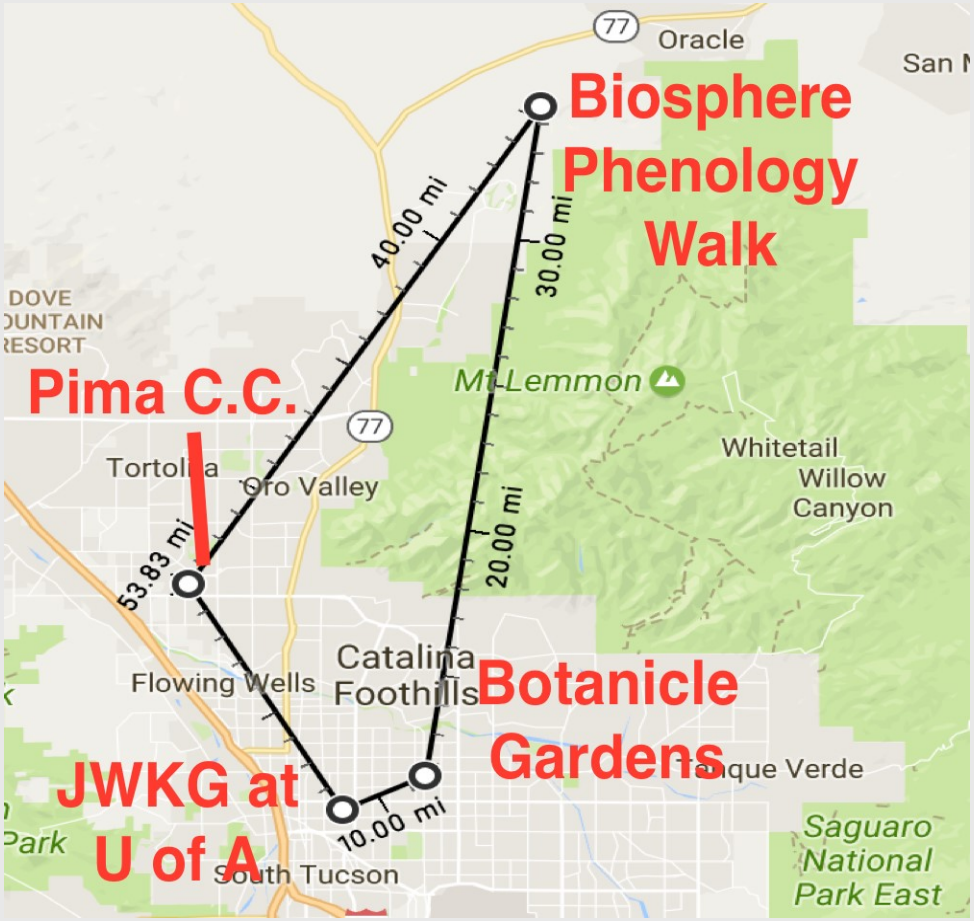
Tucson, AZ

Tucson

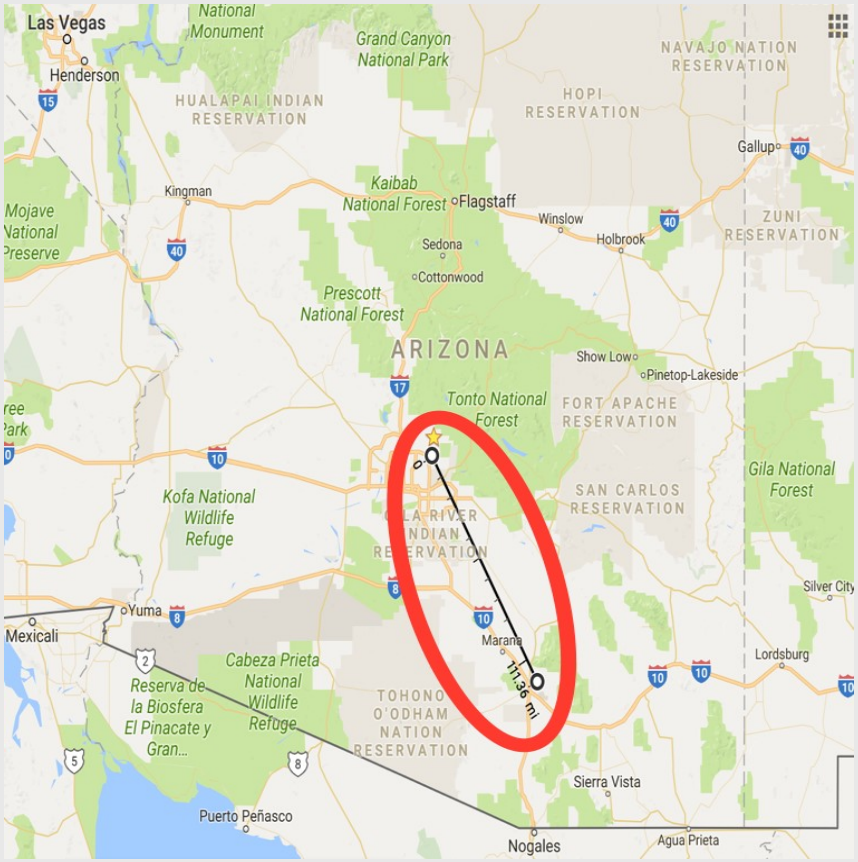
- Desert Botanical Garden
- Tucson Biosphere Garden Phenology Walk
- Pima Community College Northwest
- Joseph Wood Krutch Garden

Tucson sites are all located in **urbanized** environments meaning they receive manual water and/ or nutrients.

Geographic Comparison – Tucson Sites



Scottsdale and Tucson Geographic Comparison



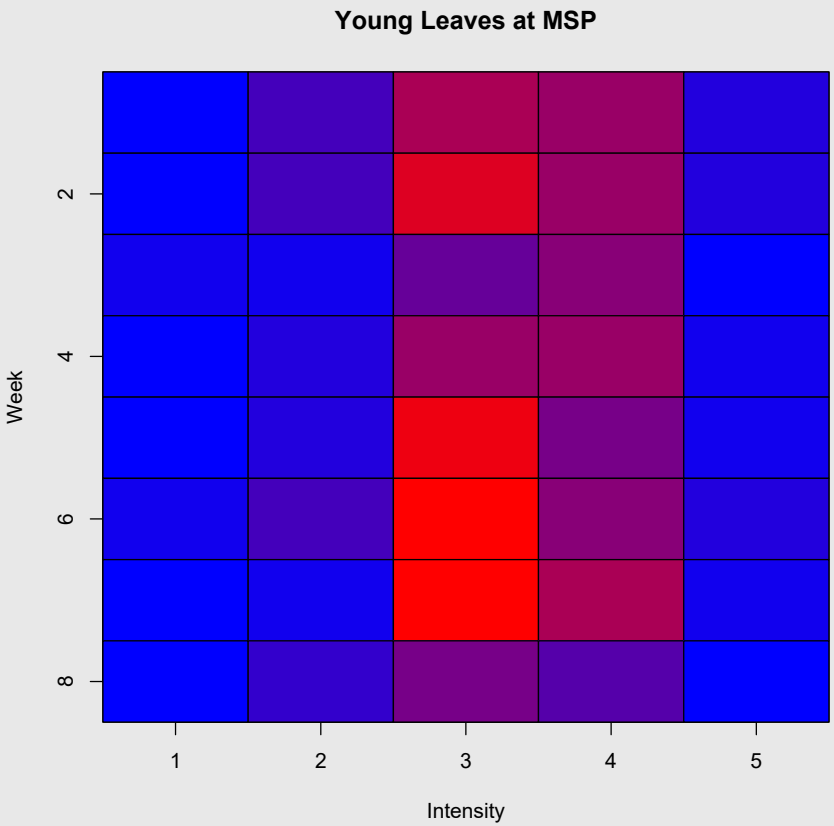
Climate – Scottsdale vs. Tucson

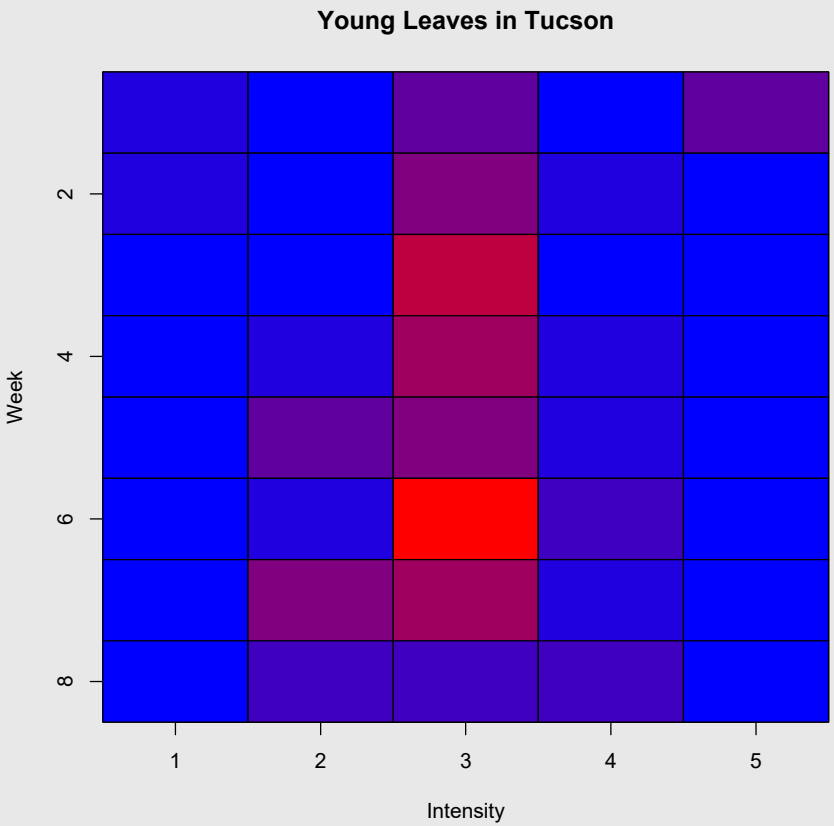
Annual Avg. 2016	Scottsdale, AZ (MSP)	Tucson, AZ
Rainfall (in.)	10.73	12.15
Avg. July High (°F)	109.4	107.6
Avg. Jan. Low (°F)	35.6	30.2
Elevation (ft.)	1,357	2,512

https://www.wunderground.com

Results – Young Leaves

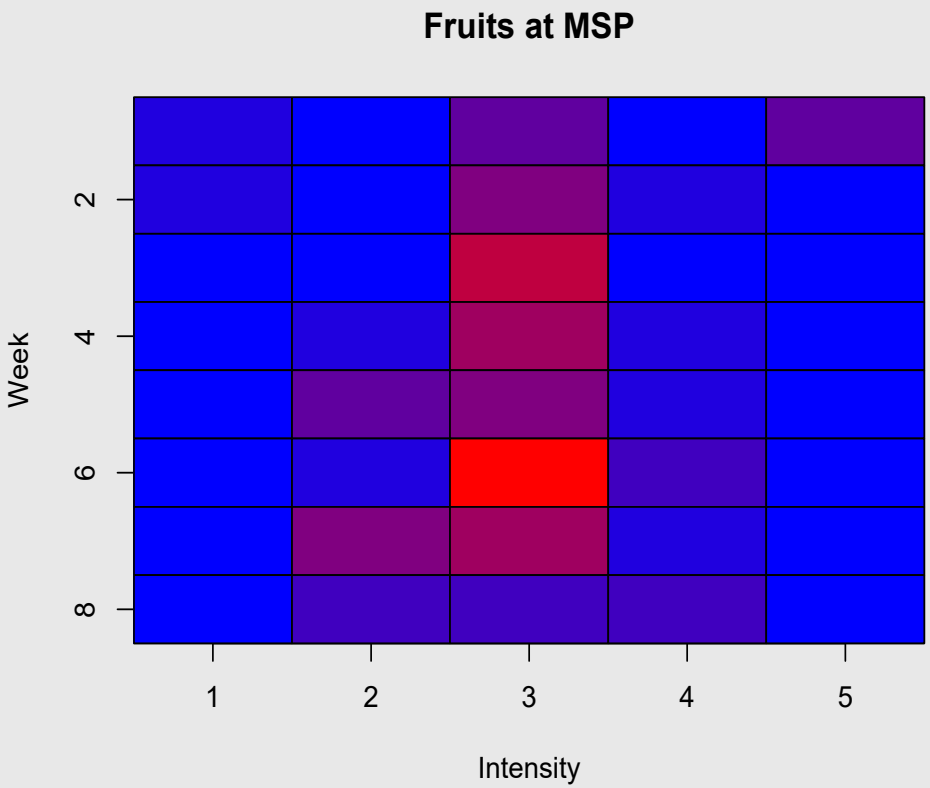
Intensity	1	2	3	4	5
Phenophase Value	3-10	11-100	101-1,000	1,001-10,000	>10,000

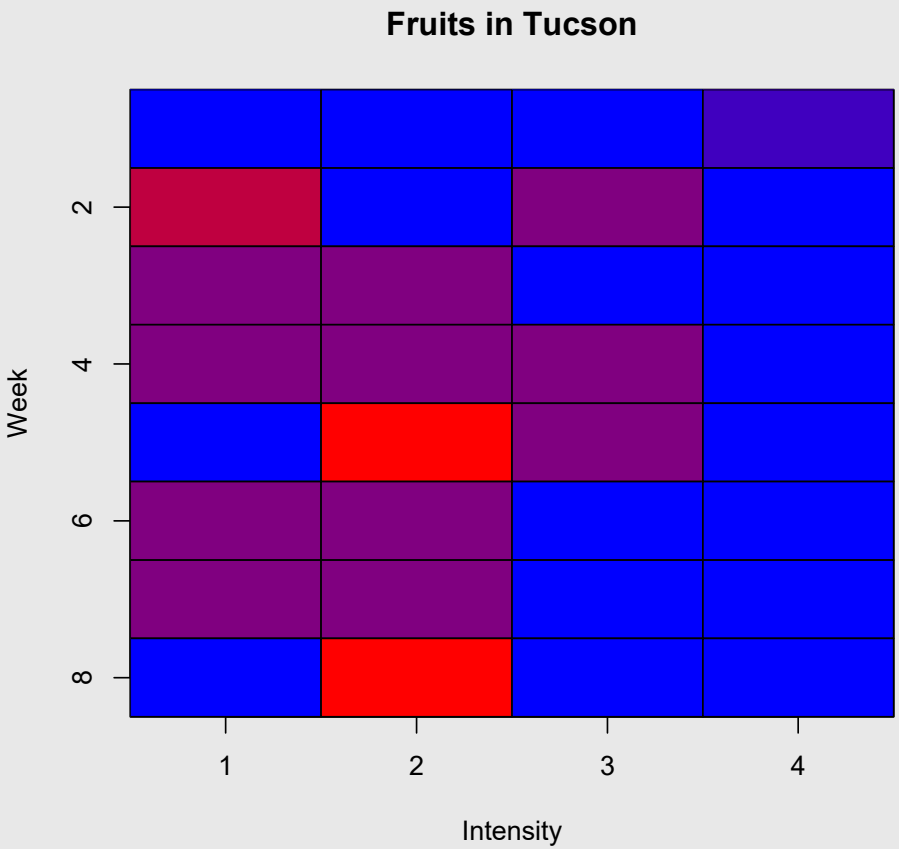




Results – Fruits

Intensity	1	2	3	4	5
Phenophase Value	3-10	11-100	101-1,000	1,001-10,000	>10,000





Discussion

Greater intensity of young leaves and fruits in non-urbanized environments

- Urbanized environments can predict a lesser intensity of young leaves and fruit

Greater variation of young leaf intensity in non-urbanized settings

- Greater prevalence of large mammals consuming foliage

Greater variation of fruit intensity in urbanized settings

- Greater prevalence of rodents like the bailey's pocket mouse consuming fruits

Acknowledgements

We would like to thank…

- Scottsdale Community College, Department of Life Sciences
- McDowell Sonoran Field Institute
- Dr. Helen Rowe
- Melanie Tluczek
- Leona Weinstein
- Sabrina Jones
- Dr. John Weser
- Dr. John Nagy

References

Benzioni, Aliza. 1997. Fruit Development and Wax Biosynthesis in Jojoba. In: Environment Complete. The New Phytologist 81(1): 105-109. In: Environment Complete. Available from <*http://ezproxy.scottsdalecc.edu:2135/ehost/detail/detail?vid=8&sid=a5f72ef3-c02b-4e34-b802-3bb9c8ba99e1%40sessionmgr4008&hid=4209&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=12347990&db=eih*>. [accessed 2017 Spring]

Bowers, Janice E. 2007. Has Climatic Warming Altered Spring Flowering Date of Sonoran Desert Shrubs. The Southwestern Naturalist 52(3): 347-355. In: Environment Complete. Available from <*http://www.jstor.org/stable/20424839*>. [accessed 2017 Spring]

Kohorn, Loraine U. 1995. Geographic variation in the occurrence and extent of sexual dimorphism in a dioecious shrub, *Simmondsia chinensi*s. Oikos 74 (1): 137-145. In: Environment Complete. Available from <*http://ezproxy.scottsdalecc.edu:2135/ehost/detail/detail?vid=2&sid=a5f72ef3-c02b-4e34-b802-3bb9c8ba99e1%40sessionmgr4008&hid=4209&bdata=JnNpdGU9ZWhvc3QtbGl2ZSZzY29wZT1zaXRl#AN=8225701&db=eih*>.[accessed 2017 Spring]

Primack, Richard B., Miller-Rushing, Abraham J. 2011. Broadening the study of phenology and climate change. The New Phytologist 191(2): 307-309. In: Environment Complete. Available from <*http://www.jstor.org/stable/20869166*>. [accessed 2017 Spring]

Niklas, Karl J., and Stephen L. Buchmann. “Aerodynamics of Wind Pollination in Simmondsia Chinensis (Link) Schneider.” *American Journal of Botany*, vol. 72, no. 4, 1985, pp. 530–539., www.jstor.org/stable/2443585.

McDowell Sonoran Conservancy Field Institute Update May 2017

Next,
Corridor Viability

Project: Corridor Viability

Ralph Lipfert

Team lead

Steward, Class 42

Certified Citizen Scientist

Project Purpose

Assemble enough data to accurately estimate the population and distribution of selected mammal species in the Gooseneck area of the Preserve

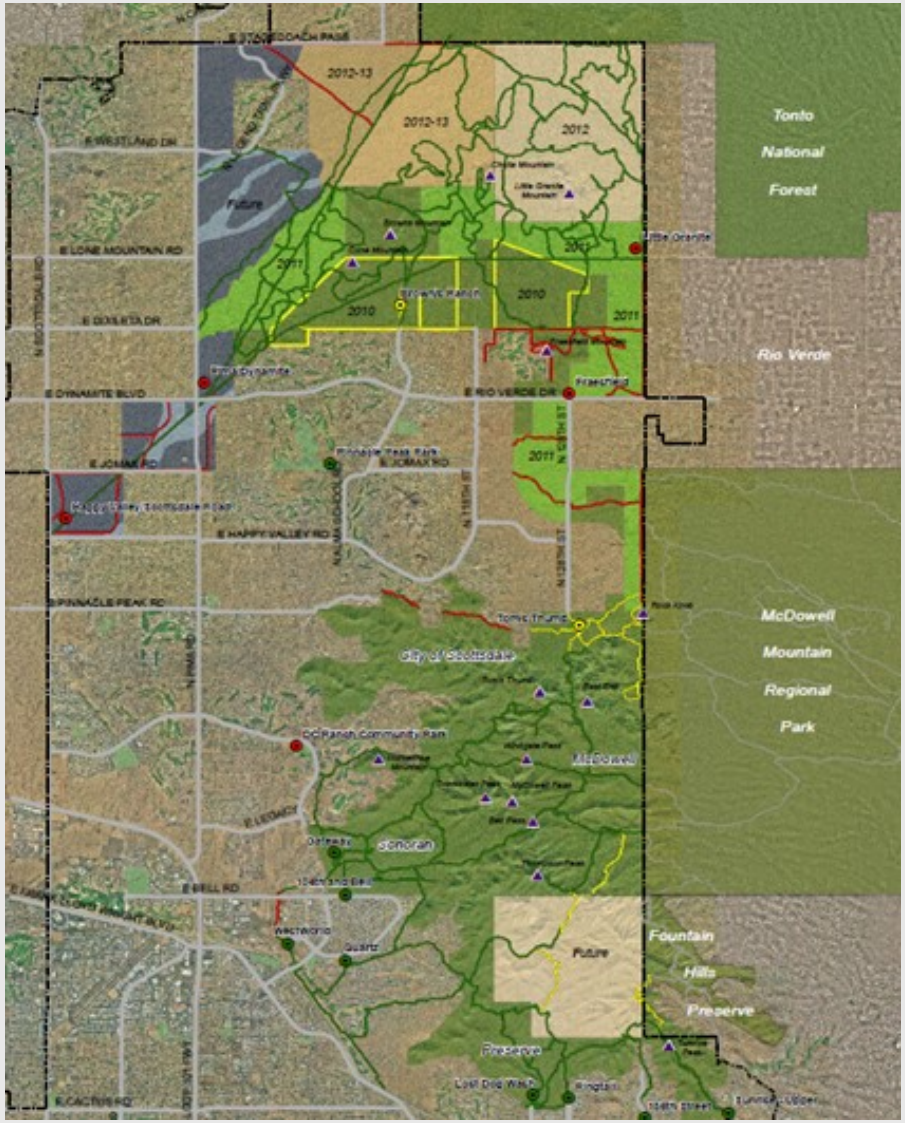
Project: Corridor Viability

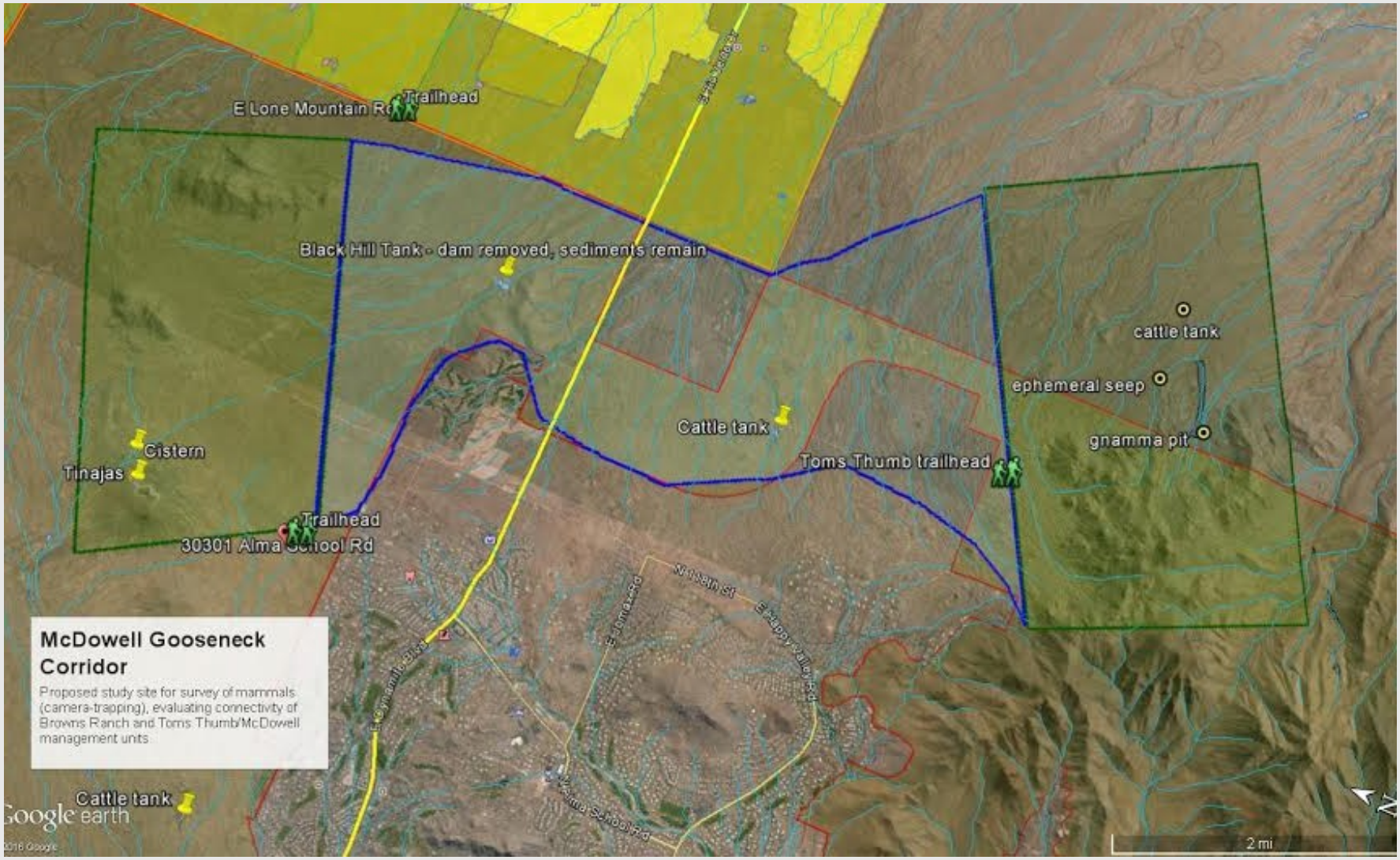
Science Advisor

Dr. Jan Schipper

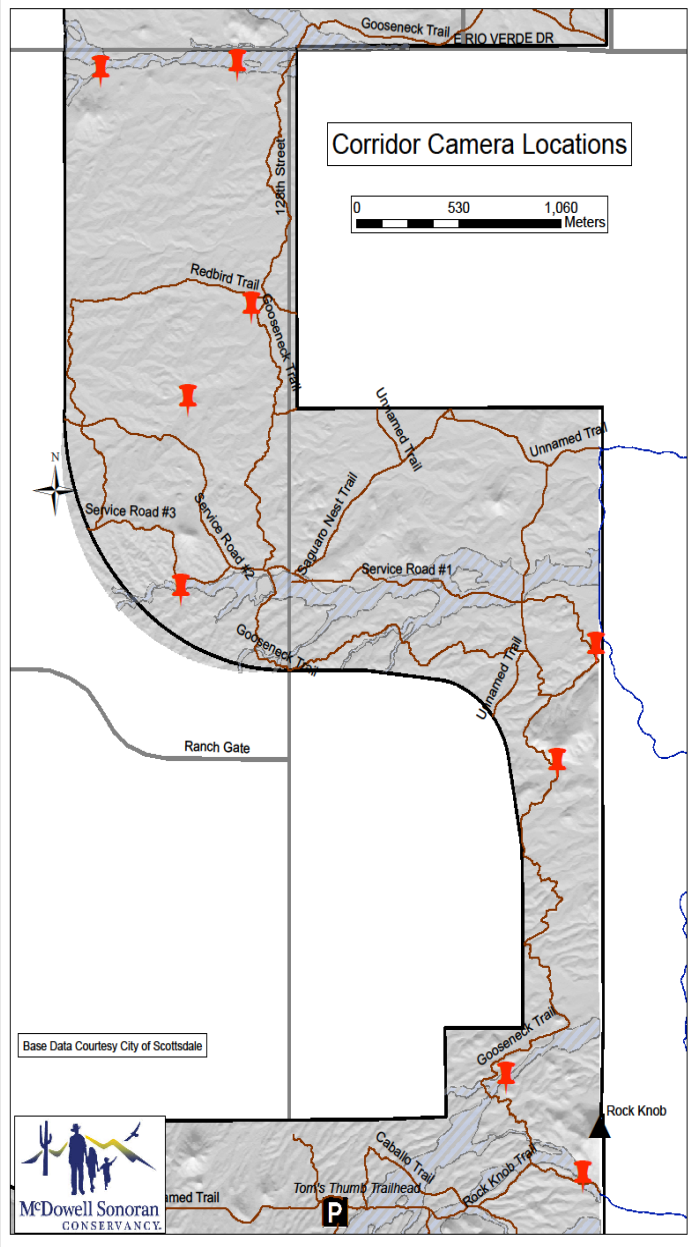
Research Fellow, ASU

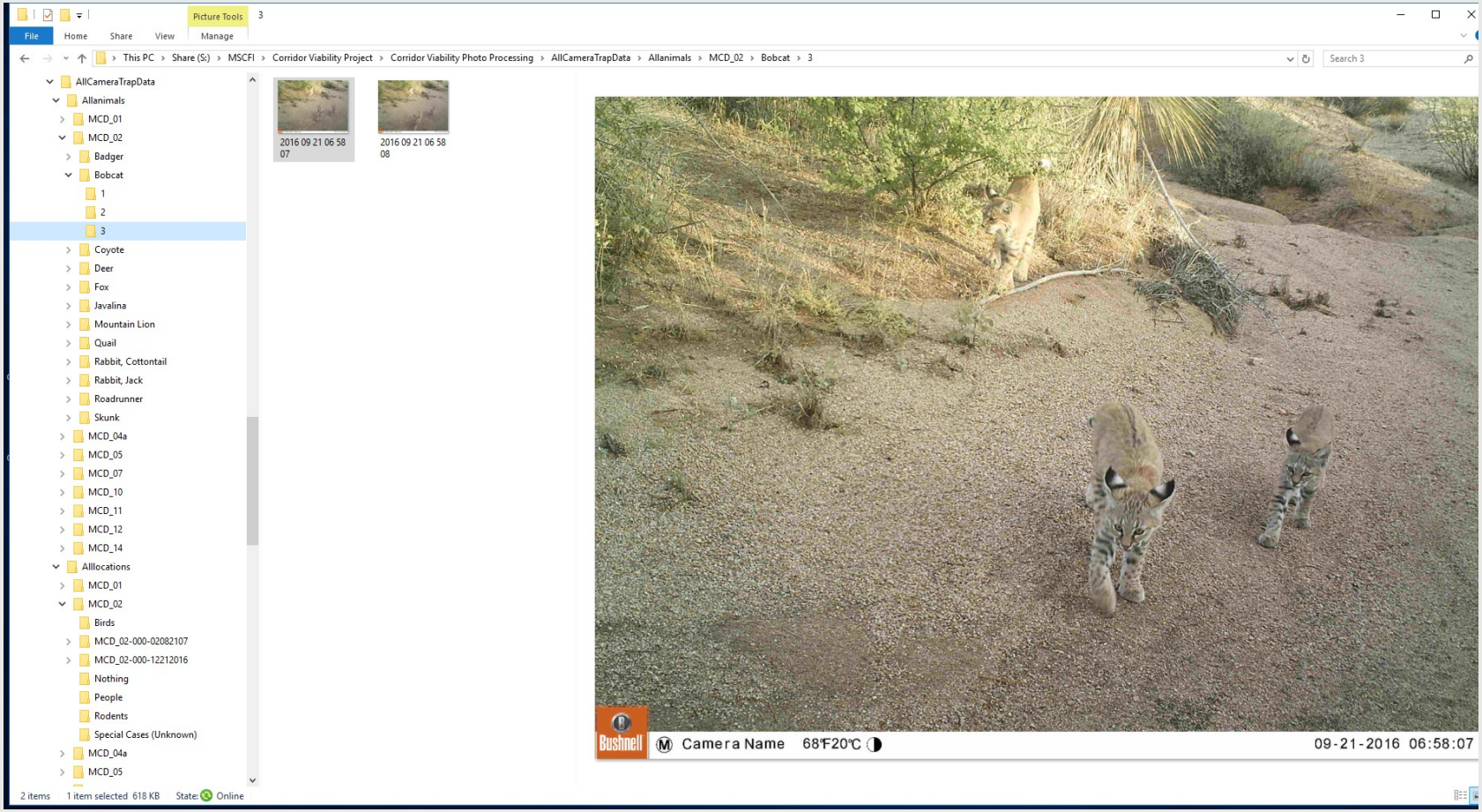
The Preserve





Current Gooseneck camera locations





DOS not dead!

Three DOS programs are used to transform the meta data on the pictures into the analysis ready data

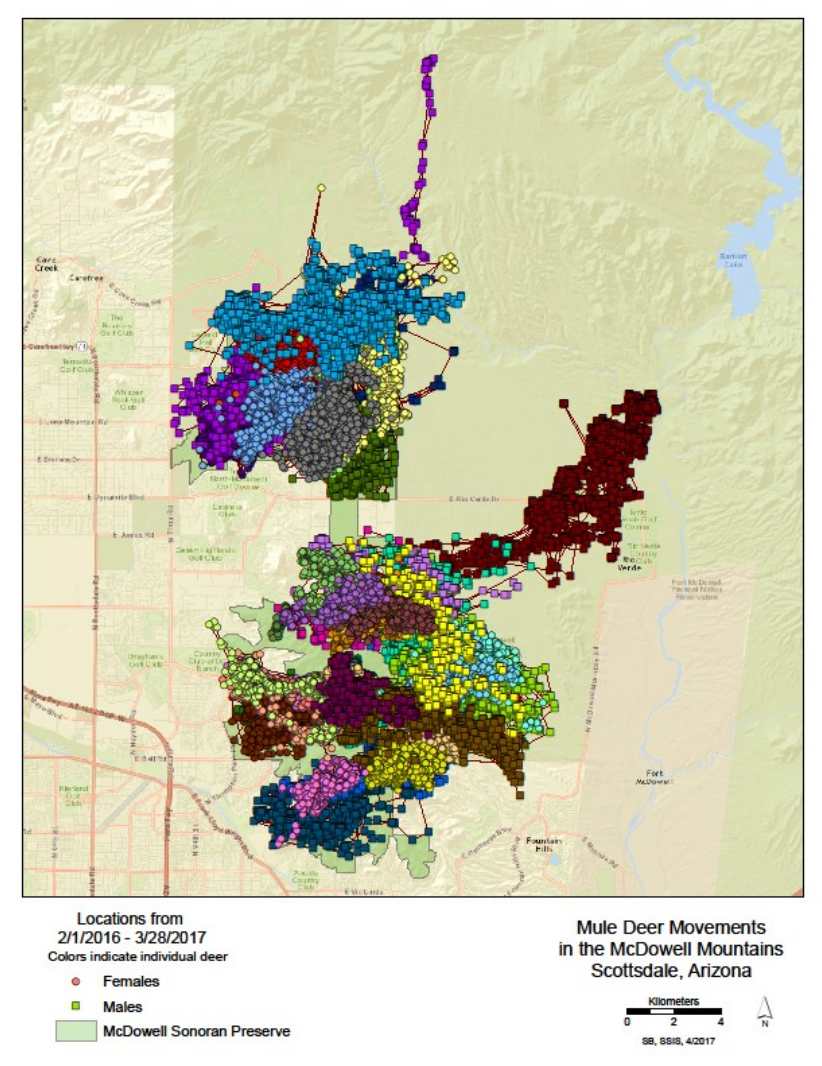
Collared Deer Movements

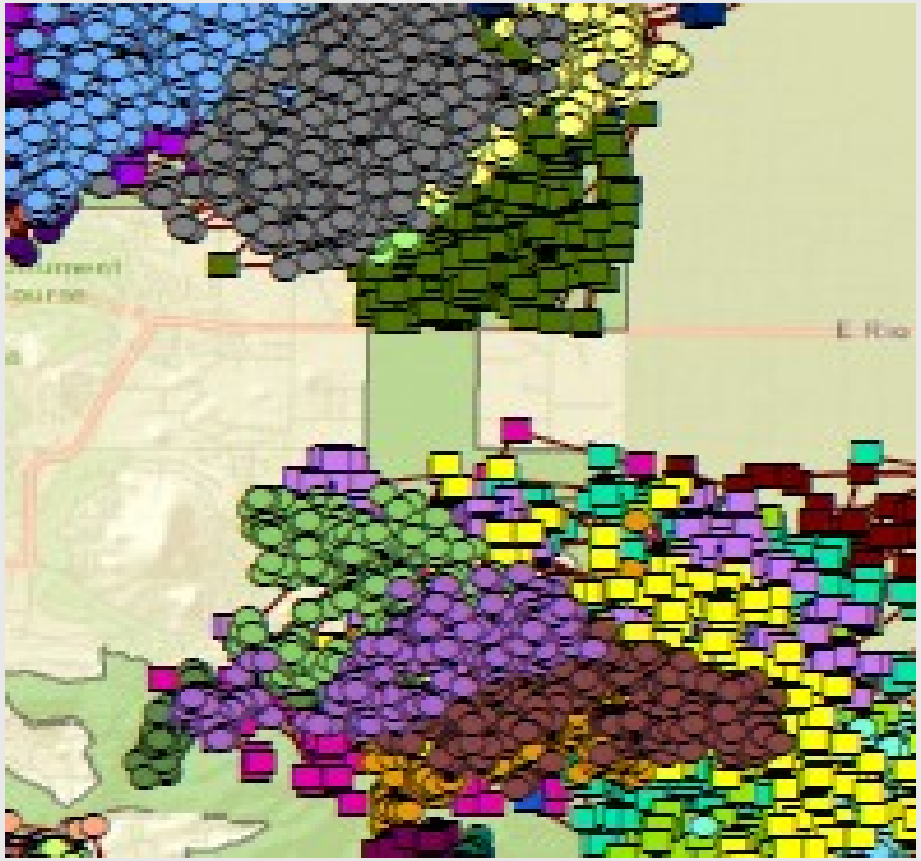
32 deer collared Feb. 2016

6 “replacements” collared in Feb 2017

Data from collars downloaded approximately every six weeks

Collars drop off in Feb 2018, will be recovered






HCO ScoutGuard
12.25.2016 15:50:41


Bushnell
Camera Name 68°F20°C
09-21-2016 06:58:07


HCO ScoutGuard
01.27.2017 23:42:21


HCO ScoutGuard
01.08.2017 20:59:35


HCO ScoutGuard
03.15.2017 18:39:57


HCO ScoutGuard
08.22.2016 08:34:45


Bushnell
TPC3 86°F30°C
08-25-2016 19:15:12


Bushnell
73°F22°C
03-16-2017 08: 44: 18


HCO ScoutGuard
08.18.2016 12:59:22


HCO ScoutGuard
03.03.2017 10:14:19


HCO ScoutGuard
02.11.2017 08:58:36


HCO ScoutGuard
08.28.2016 19:42:32


HCO ScoutGuard
02.07.2017 06:33:59

Where do we stand now?

10 more cameras arrived, installation being planned

"Practice" file containing over 3,000 useful images successfully run through process

Practice file not statistically adequate but shows that we know how to do the process

Entire project will take about two years

Now it’s time for a short break

Effects of Weather Variation on Butterfly Populations in the McDowell Sonoran Preserve

Itzel B. Claire, Helen Riahi, Evey Adkins, Destiny R. Letky, and Corey Lycopolus | Department of Life Sciences, Scottsdale Community College

Abstract

Throughout the years, environmental change has affected the diversity variation and variation in population dynamics of many species. Butterflies are known for their quick response to climate and habitat change which makes them good environmental indicators (Merckx, 2013). They are useful when trying to predict the impact that climate change can have on habitats, biodiversity and organisms in general (Merckx, 2013). Recognizing the factors that affect population dynamics amongst species is extremely important and it is of essence when trying to protect sensitive species (Curtis et al.,2015). To determine if there has been any significant increase or decline in butterfly population at the McDowell Sonoran Preserve, we compared years of butterfly count data from three different sites: Sabino Canyon, Boyce Thompson Arboretum, and the Preserve itself. We then compared our results to weather data, to try to further understand if environmental change is a potential contributor to variation in population dynamics of butterfly species at the McDowell Sonoran Preserve. Here we show that there is no evidence of a trend in the numbers of butterflies observed in any of the three sites for six families over time, except for the Papilionidae family at Sabino Canyon, for which we found weak evidence of an increase in their population over time. In addition, there is no evidence of a significant site to site variation in the total number of butterflies in families observed for the three sites, except for the Hesperiidae family for which we found strong evidence of it being more abundant at Sabino Canyon. We also conclude that there are three potential sensitive species on the Preserve; the buckeye, Sonoran blue, and monarch butterflies. We anticipate our study to be the starting point for future studies on butterfly diversity variation and variation in population dynamics at the McDowell Sonoran Preserve and in Arizona as a whole.

Methods

- Collected butterfly population data from the McDowell Sonoran Preserve Field Institute (2014-16), Sabino Canyon (2011-16), and Boyce Thompson (2007, 2010-11, and 2013-16).
- Participated in two butterfly counts: Southeastern Arizona Butterfly Association 2017 Sabino Canyon count (March 27, 2017) and Central Arizona Butterfly Association 2017 count at the McDowell Sonoran Preserve (April 8, 2017).
- Participated in the butterfly count training seminar hosted by Dr. Ron Rutowski (April 4, 2017).
- Determined potential sensitive butterfly species by analyzing rare plant species on the Preserve; afterwards it was determined if any of those plants were butterfly host plants.
- Compared butterfly population data by using regression models, bar plots, summary statistics, and ANOVA tests in R.
- Compared weather data from MSP to butterfly population data.
- Review literature on observation bias, Texas toadflax, Arizona swallow-wart, Dudleya cymosa, butterfly sensitivity to climate and environmental change.

Acknowledgments

Dr. Helen Rowe and the McDowell Sonoran Preserve Field Institute, SCC Department of Life Sciences, Dr. John Weser, SCC Department of Life Sciences, Dr. Ron Rutowski, Central Arizona Butterfly Association, Mary Klinkel, Southeast Arizona Butterfly Association, Natalie Case, M.S., Center for Native and Urban Wildlife, Steve Jones, Independent Botanist, SCC Library

Main Results

1. The Papilionidae family shows a trend of potential increase in abundance at Sabino Canyon over time (Summary Statistics, p-value of 0.00956 vs set p-value of .008333).
2. There are more butterflies from the Hesperiidae family in Sabino Canyon than there are in the other two sites (ANOVA, p-value of 0.00000295 vs set p-value of .008333).
3. Buckeye, sonoran blue, and monarch butterflies were determined to be considered sensitive on the McDowell Sonoran Preserve, due to the three uncommonly seen host plants; Texas toadflax, dudleya cymosa, and Arizona swallow-wart.

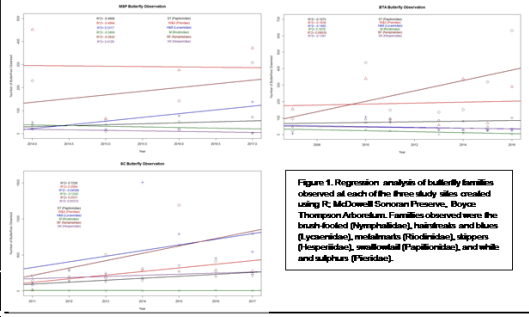


Figure 1. Regression analysis of butterfly families observed at each of the three study sites created using R; McDowell Sonoran Preserve, Boyce Thompson Arboretum. Families observed were the brush-footed (Nymphalidae), hairstreaks and blues (Lycaenidae), metalmarks (Riodinidae), skippers (Hesperiidae), swallowtail (Papilionidae), and white and sulphurs (Pieridae).

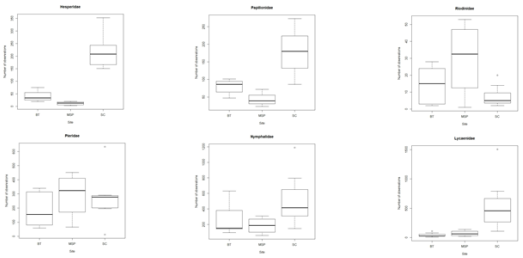


Figure 2 . Bar plots comparing total number of butterflies in each family at each study site created using R.

Results

- A regression analysis for all combinations of site and families over time, yielded no evidence of a significant trend, with the possible exception of the Papilionidae family at Sabino Canyon. The p-value for this regression slope was 0.00956, however this is of no significance after a taking a Bonferroni correction. This family should be observed closely as it has the potential to have an increasing trend over time.
- An ANOVA test between site and families yielded evidence that the Hesperiidae family is more abundant in Sabino Canyon with a p-value of 0.00000295, the Papilionidae family yielded potential evidence to be more abundant in Sabino Canyon with a p-value of 0.0009683, and that all other families showed no evidence of differences between the three sites. We are using an analysis of variance on this and using a Bonferroni correction, because we are doing six analyses of variances. We know that this is a crude approximation to a way analysis of variance, however there is not an easily available analog of the two-way analysis of variance that our data fits the assumptions of.
- Three sensitive butterfly species were determined by examining uncommon plant species on the Preserve. Non-experimental research was conducted to see which of the uncommon plant species on the MSP were host plants for butterfly species(is this a common way to establish sensitive species? Someone might as. The three uncommonly seen plants on the Preserve are the Texas toadflax (Nuttallanthus texanus), Dudleya cymosa (Dudleya), and Arizona swallow-wort (Cynanchum arizonicum). Buckeye butterflies use the Texas toadflax as their host plant; the sonoran blue butterflies are attracted to Dudleya cymosa; and monarch butterflies use the Arizona swallow-wort plant as their host plants. These three butterflies are considered sensitive species due to the lack of host plant abundance on the Preserve.

Discussion

There was not a list of endangered or threatened species provided by the Conservancy so, we focused on the host plants of certain species to determine sensitive species of butterflies located within the McDowell Sonoran Preserve (MSP). "Host plant" is a term used for larval food supply. Host plants are important to migrating butterflies because adult butterflies almost exclusively feed on nectar from specific flowering plants, limiting the resources of nitrogen and other important nutrients during the larval stage (Söderlind, 2012). The data being analyzed was collected by citizens with a wide range of experience in collecting data. To avoid observer bias, each person is required to take a course on the proper ways to identify butterflies, and how to spot them without counting the same butterfly more than once. Another form of observer bias within the data collecting process could come from false positive detections, which is detecting a species when it is not present. In correlation to observer bias is the variable of manpower, which is the number of observers available for services, as exhibited in our methods of collecting data. The butterfly species data was not corrected for manpower hours, which can be a potential cause of nondetectable species. Nondetections among the species occur when a species is present but not recorded (Farmer et al., 2012). An uncommon plant located within the Preserve is the Texas toadflax (*Nuttallanthus texanus*). It is considered a host plant to the common Buckeye butterfly (The Buckeye). Our data indicates that this butterfly was not seen consistently or in a large quantity. This evidence supports that the Buckeye butterfly can be classified as a sensitive species. The plant Dudleya cymosa (*Dudleya*) is the host to the Sonoran blue butterfly (*Philoles sonorensis*) (Dudleya cymosa). From the data, there is no indication that the sonoran blue was seen during the butterfly counts within the past few years; however, we received information from an outside source informing us that one had been recently seen at the Preserve. The sighting is significant to our study because we can use this information in classifying the Sonoran blue as a non-detectable sensitive species. The Arizona swallow-wort (*Cymanchum arizonicum*) is another uncommonly seen host plant on the Preserve and it serves host to the monarch butterfly (*Danaus plexippus*). We received a confirmed sighting of the monarch at the Preserve where Arizona swallow-wort was present (Jones, pers. Communication, unpublished data). In consideration of only one individual being seen on a different day, the monarch butterfly is classified as a non-detectable sensitive species.

Work Cited

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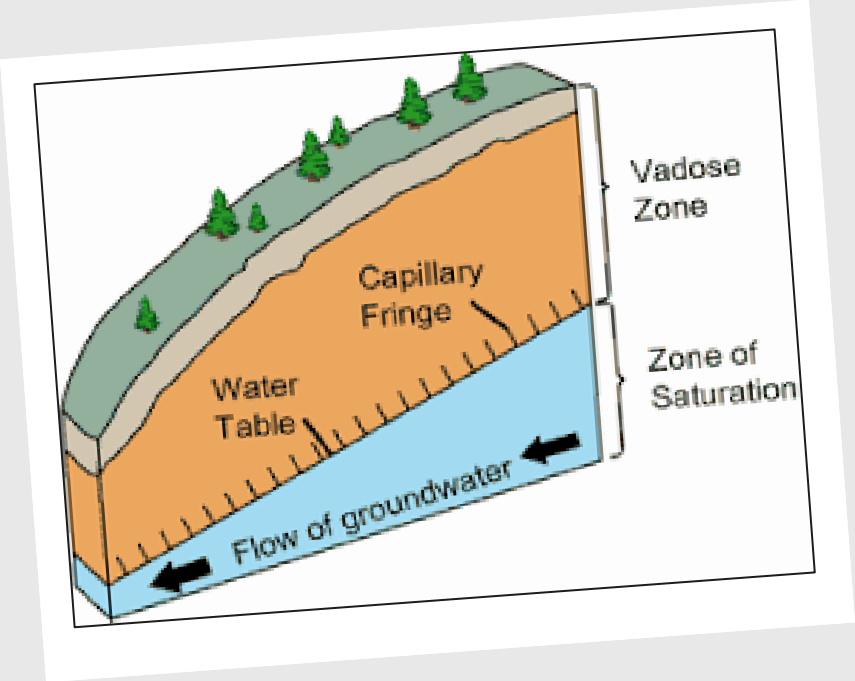
McDowell Sonoran Conservancy Field Institute Update May 2017

Next,
Water resources



Project: Water Resources

Brian E. Munson, BCES

Team lead

Steward, Class 49

Certified Citizen Scientist

McDowell Sonoran Preserve

Ground Water Investigation

Why This?

Preserve surrounded by many registered wells

Groundwater reserves have met critical levels

Population and development have increased

Prolonged drought

Concern that groundwater withdrawals in surrounding areas could impact Preserve resources

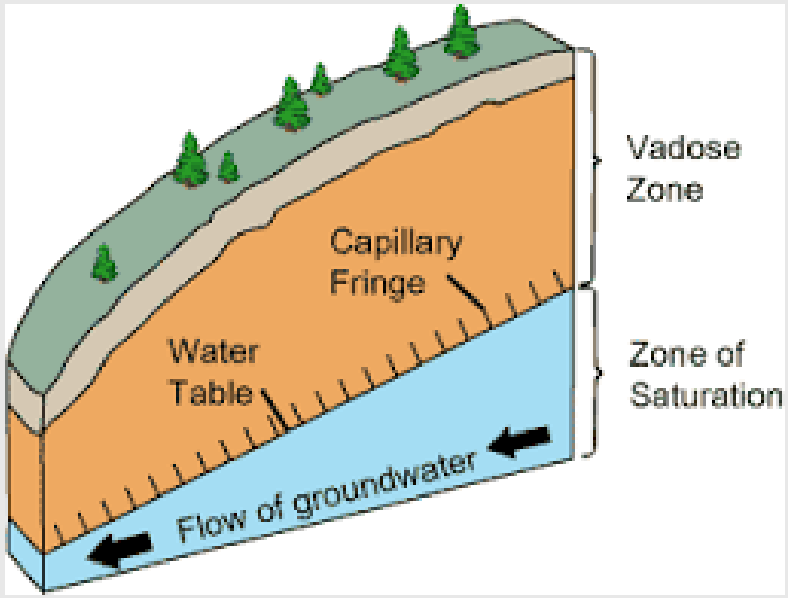
Research Goals

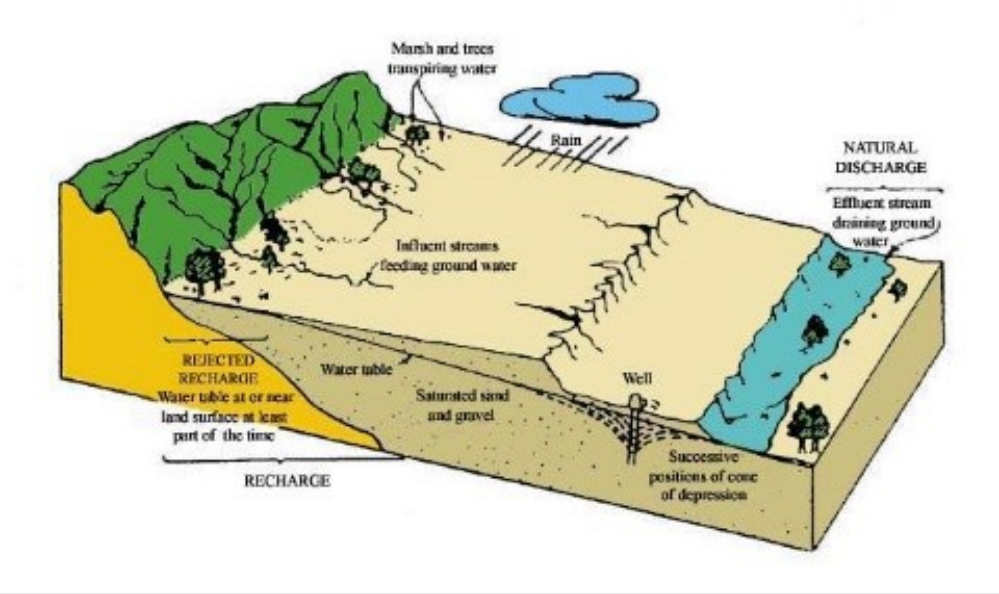
Identify relevant GWSI wells

Examine water supply trends

Assess potential impacts of withdrawals

Identify potential monitor wells on the preserve





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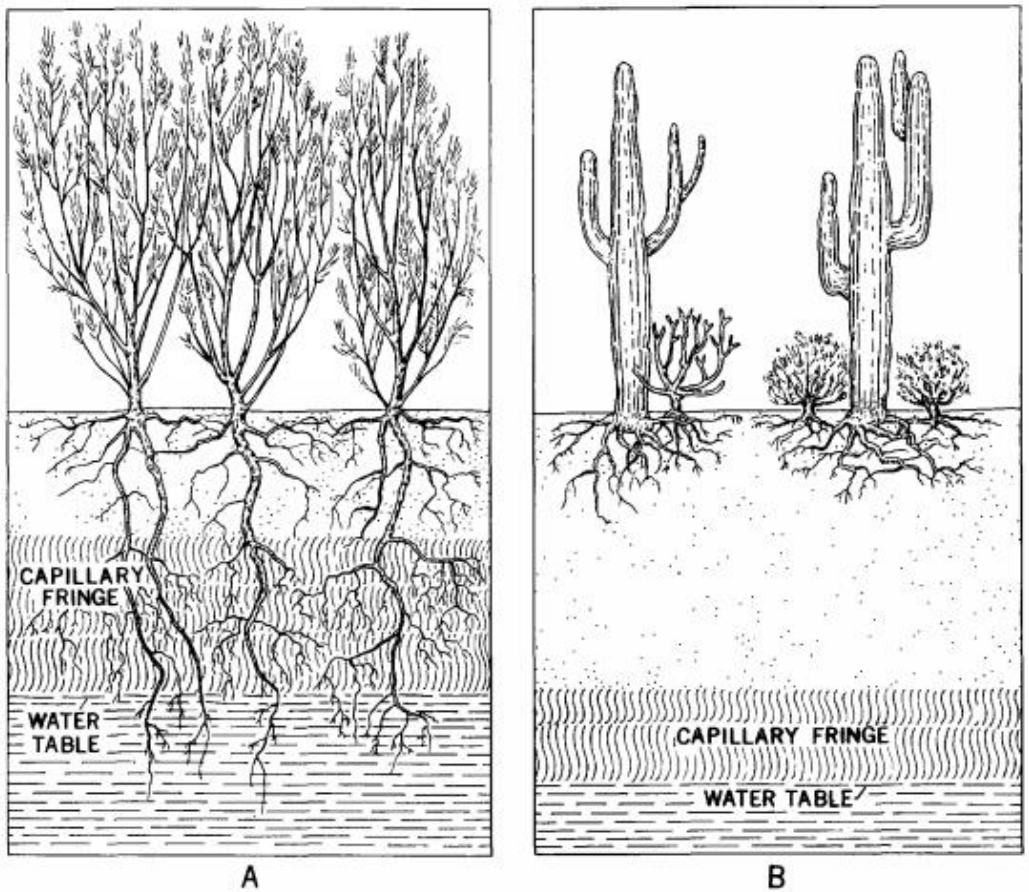


FIGURE 4.—Distinction between phreatophytes (*A*) and xerophytes (*B*) shown by their occurrence in relation to the water table.

Robinson, 1958, Phreatophytes, USGS Water Supply Paper 1423, p. 10

Scottsdale Water Supply History

1963 - Arizona v California - upheld Arizona's right to 2.8 million acre feet of Colorado River Water

1968 - Congress authorized the Central Arizona Project (CAP)

Prior to 1980, 100% Scottsdale water from groundwater wells

Scottsdale Water Supply History

Prior to 1980, US Department of Interior demanded that Arizona enact tough groundwater laws prior to funding the CAP

1980 - passage of the Groundwater Management Act - goal of safe yield by 2025

Scottsdale's Recent Success

Today - groundwater provides <10% of Scottsdale's water supply; Scottsdale achieved safe yield by 2006

Scottsdale's Recent Success

Scottsdale (since the late 1990's) actively supplements groundwater supply to create reserves in the event of CAP shortages

- Treatment and injection of treated wastewater into vadose zone
- Treatment and injection of treated CAP water into dual use production and injection wells (ASR)

https://gisweb.azwater.gov/waterresourcedata/WellRegistry.aspx

Apps | New Tab | Inbox (861) - steve@s

Director
Thomas Buschatzke

ADWR
eGovernment
Arizona Department of Water Resources

AZ.GOV
Arizona's Official Web Site

Home | Data Download | Contact Us | About ADWR GIS

- Water Resource Data
- Applications
- About ADWR GIS
- ADWR home

Use this application to find well registry numbers, owner information, associated water rights, & pumping data.

Search by registry number, owner name, cadastral (township & range), basin or subbasin.

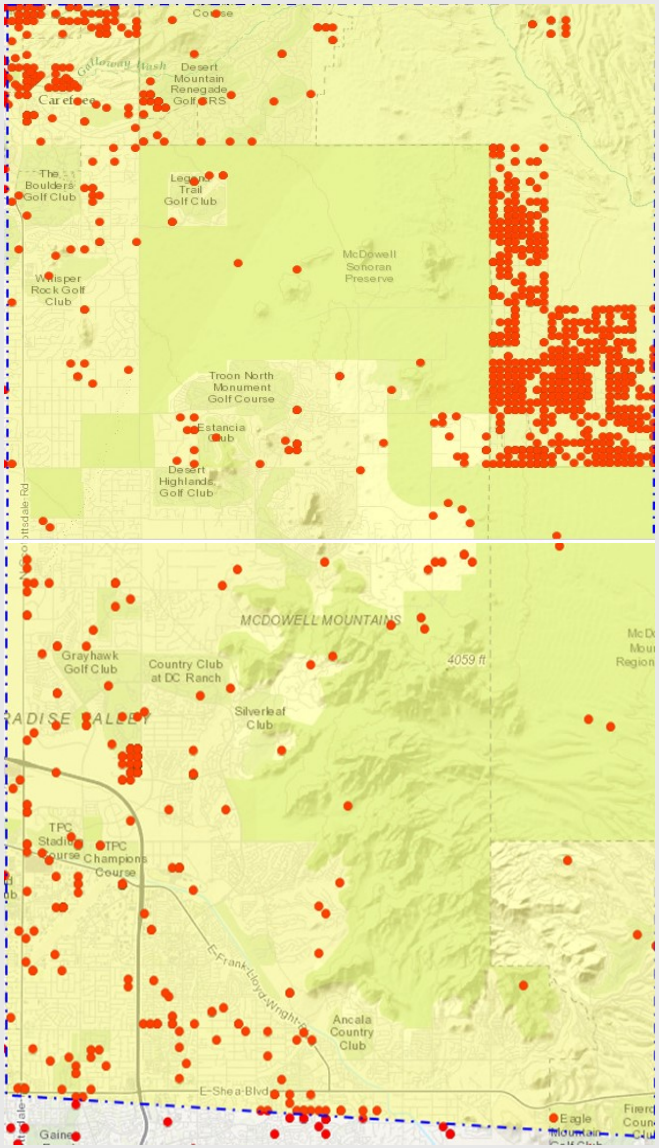
Search Wizard

Search for wells with an interactive map by address, buffer or polygon.

Map

User's Guide

Looking for water levels? Click **here**.



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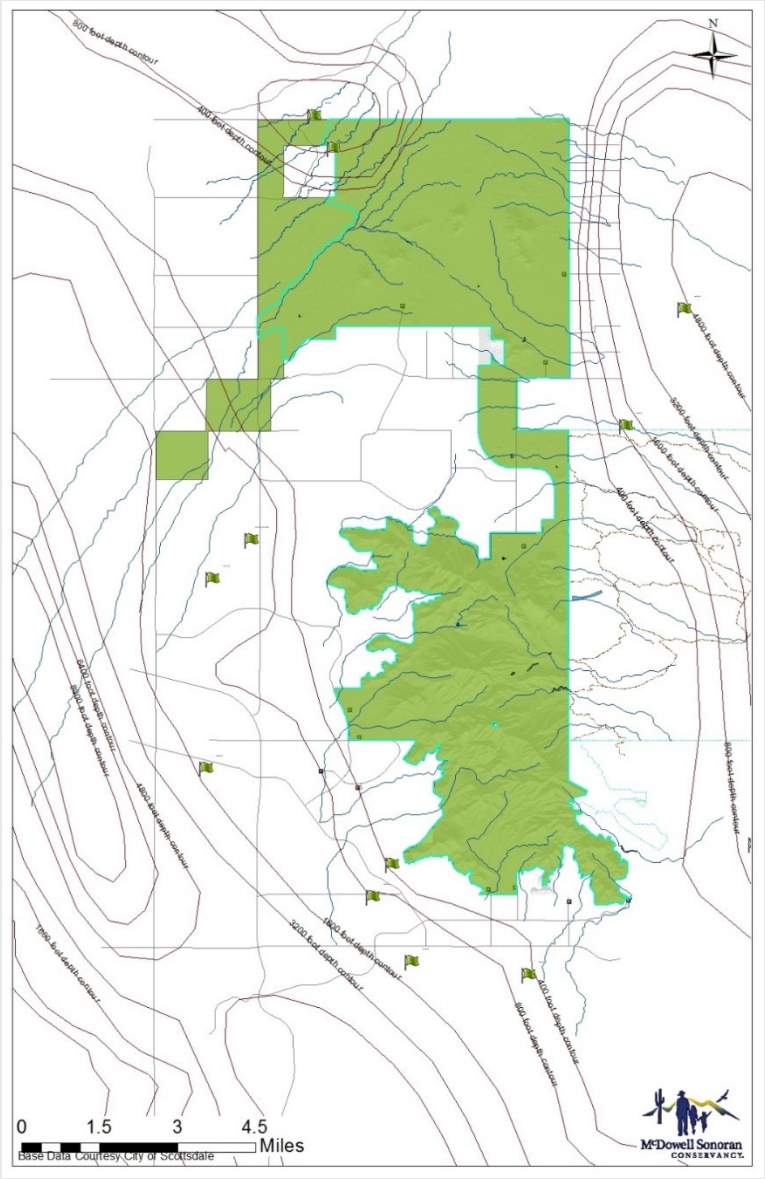
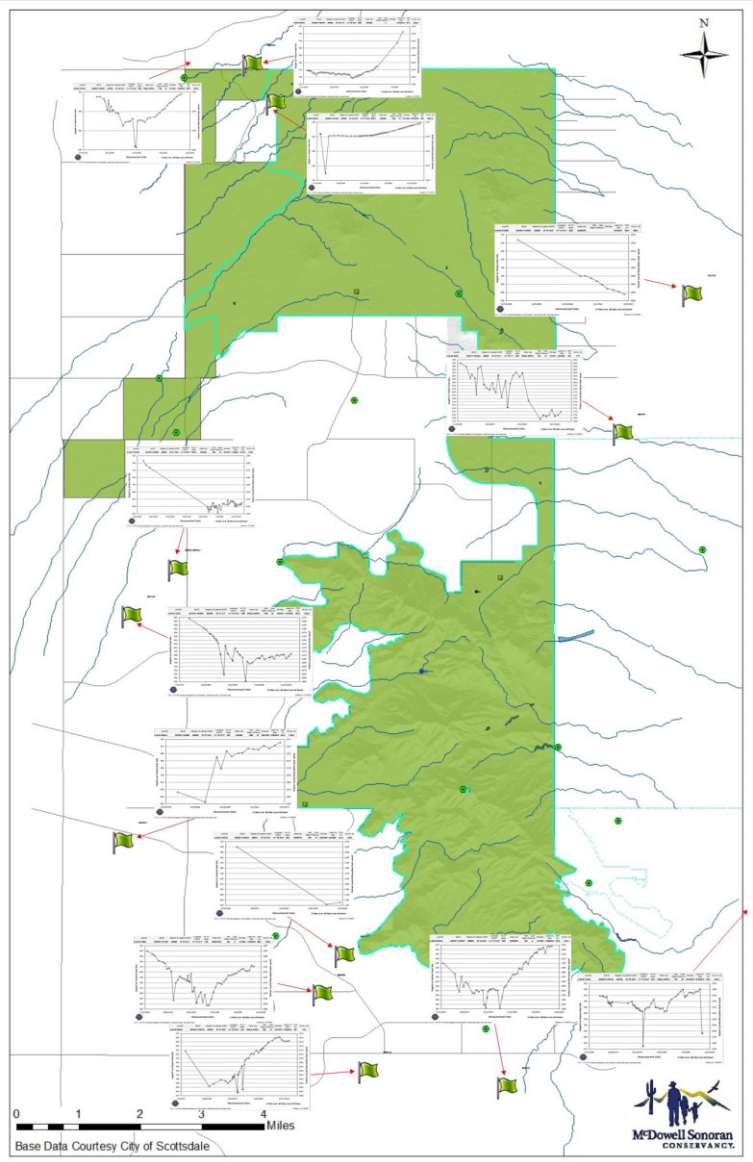
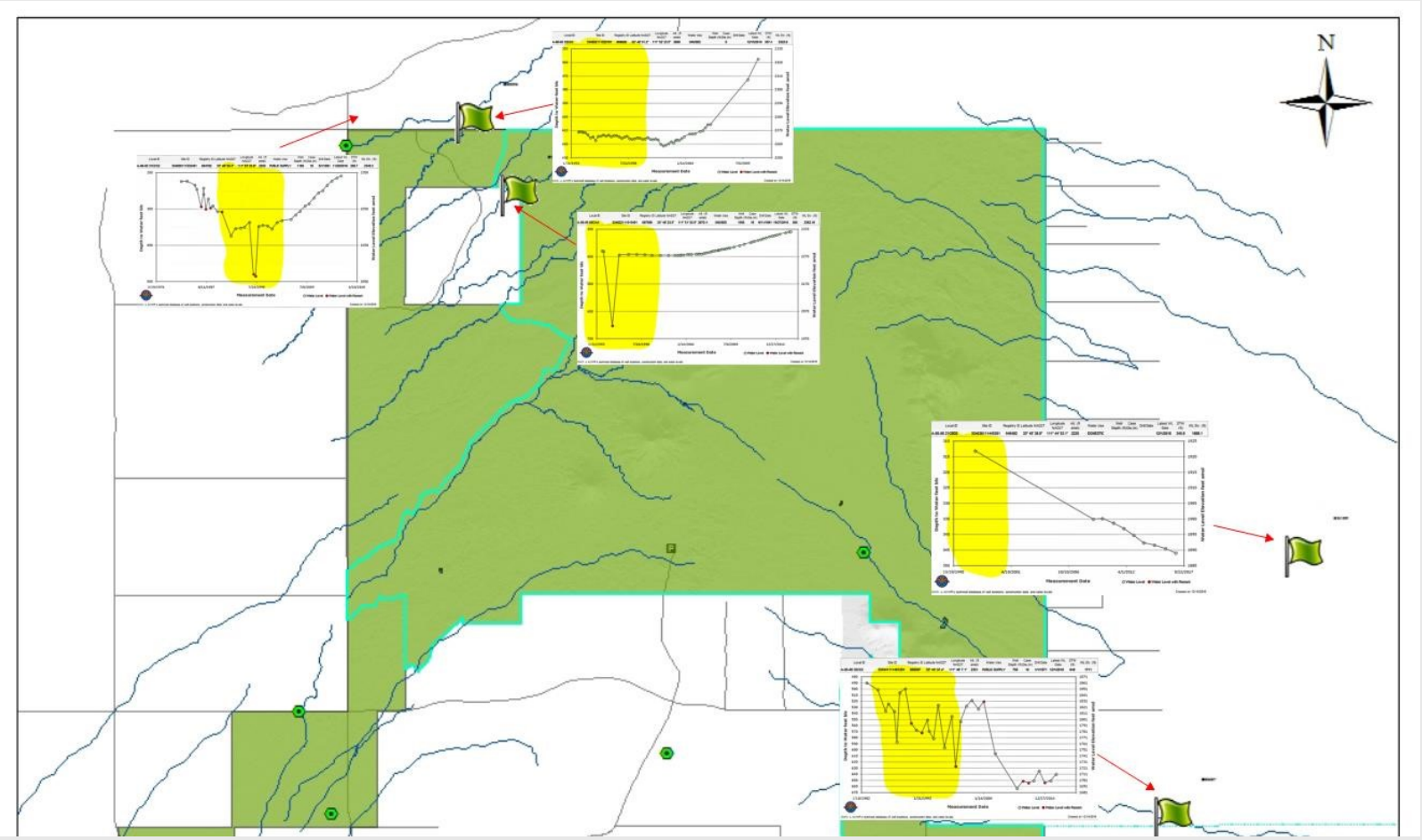
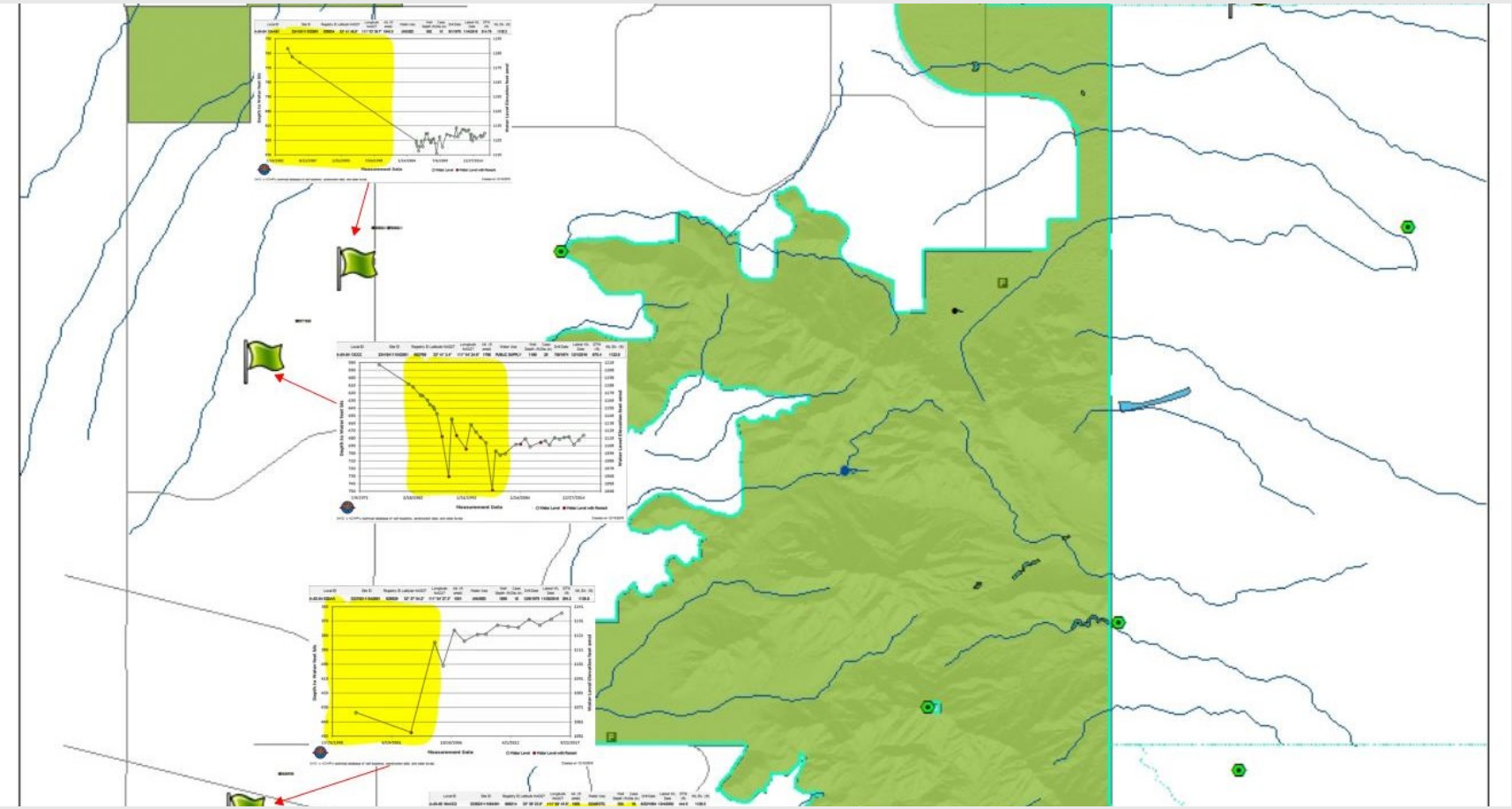
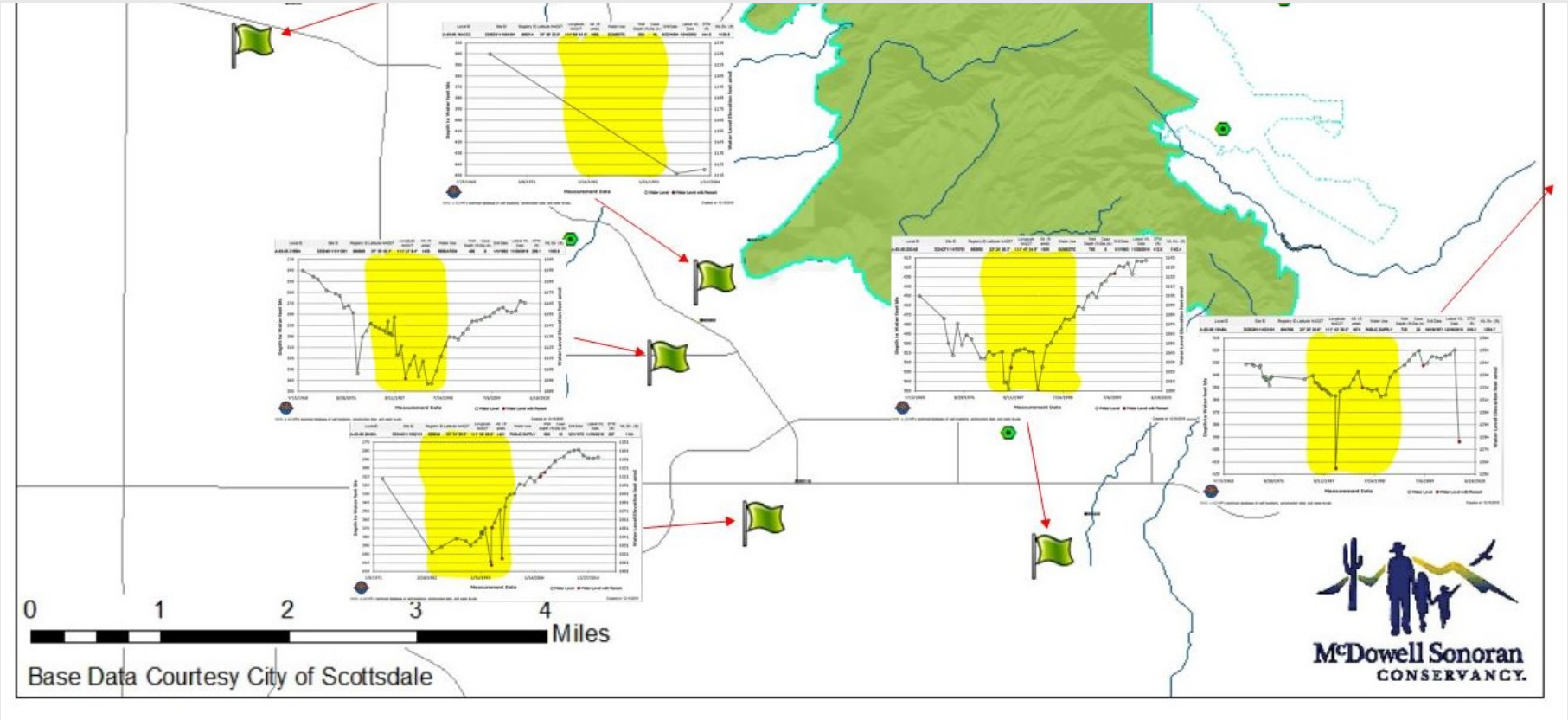


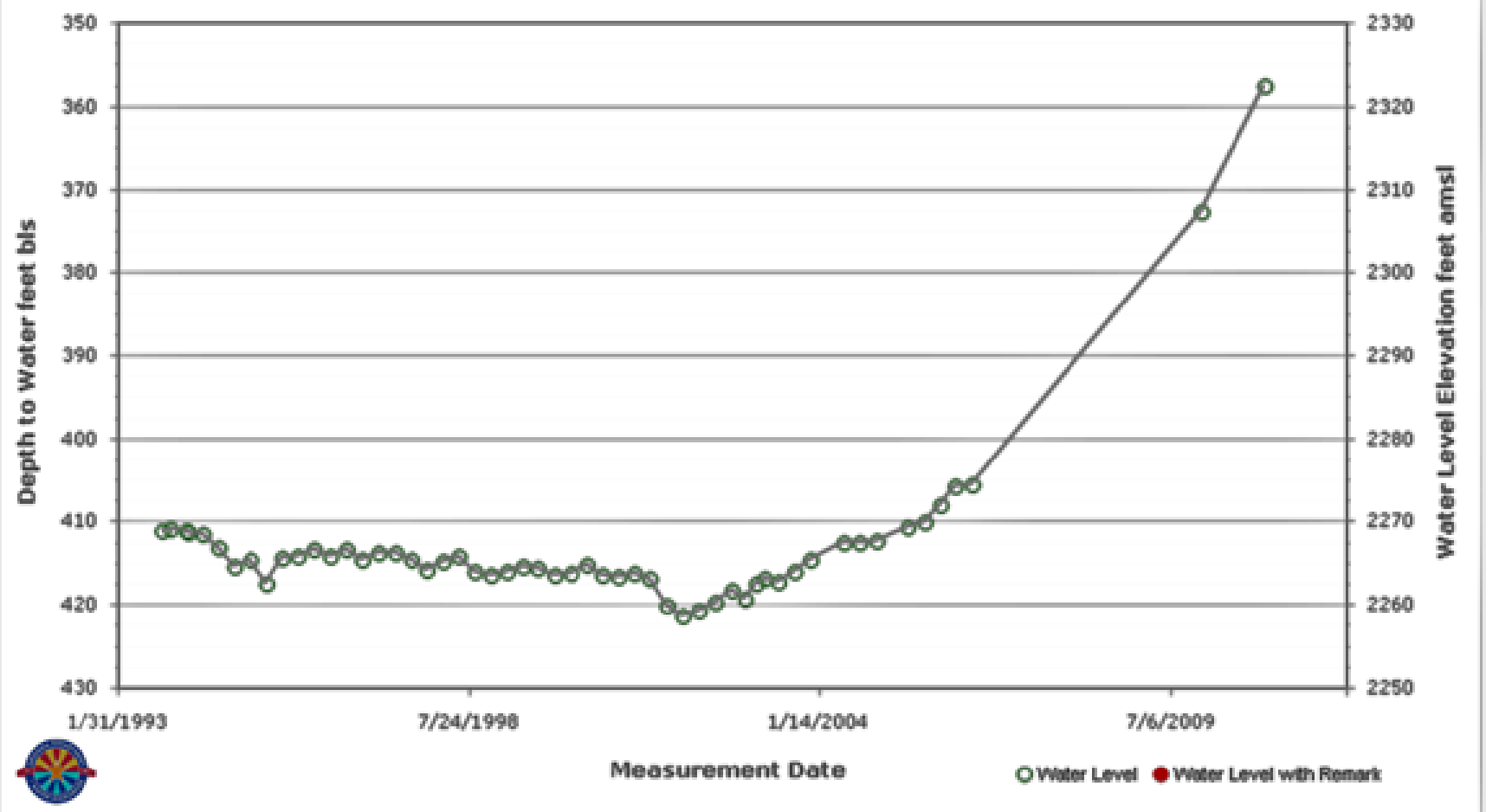








Local ID	Site ID	Registry ID	Latitude NAD27	Longitude NAD27	Alt. (ft amsl)	Water Use	Well Depth (ft)	Case Dia.(in)	Drill Date	Latest WL Date	DTW (ft)	WL Elv. (ft)
A-06-05 32CCC	334852111522101	600926	33° 48' 51.2"	111° 52' 23.5"	2680	UNUSED		8		12/15/2010	357.4	2322.6



GWSI is ADWR's technical database of well locations, construction data, and water levels.

Created on 12/15/2016

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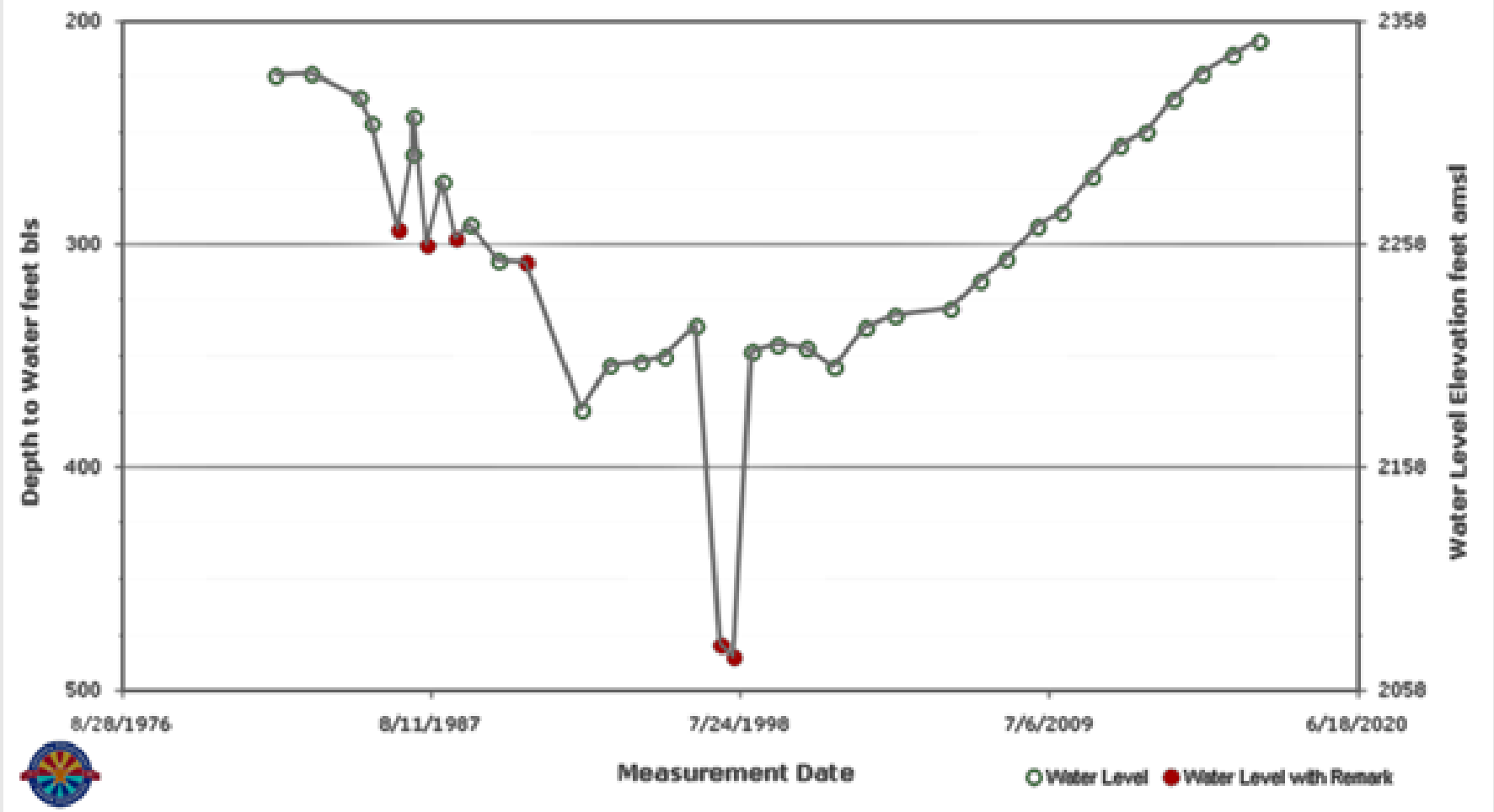
A-06-05 31CCC2	334850111532401	604782	33° 48' 50.4"	111° 53' 23.9"	2558	PUBLIC SUPPLY	1160	16	5/1/1981	11/29/2016	208.7	2349.3



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Created on 12/10/2018

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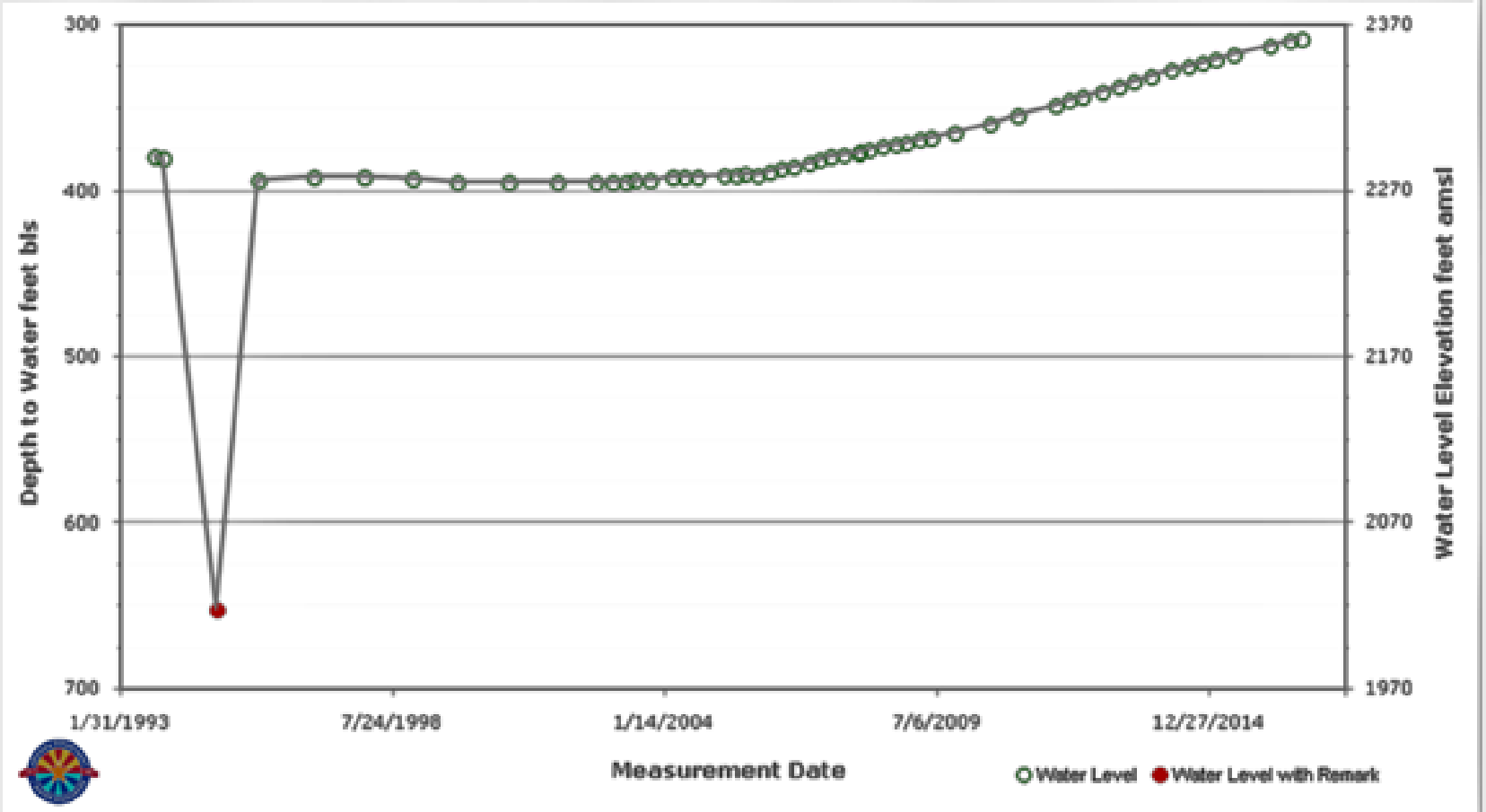
A-05-05 05CAA	334822111515401	087599	33° 48' 23.5"	111° 51' 52.0"	2670.1	UNUSED	1505	16	6/11/1981	10/27/2016	308	2362.16



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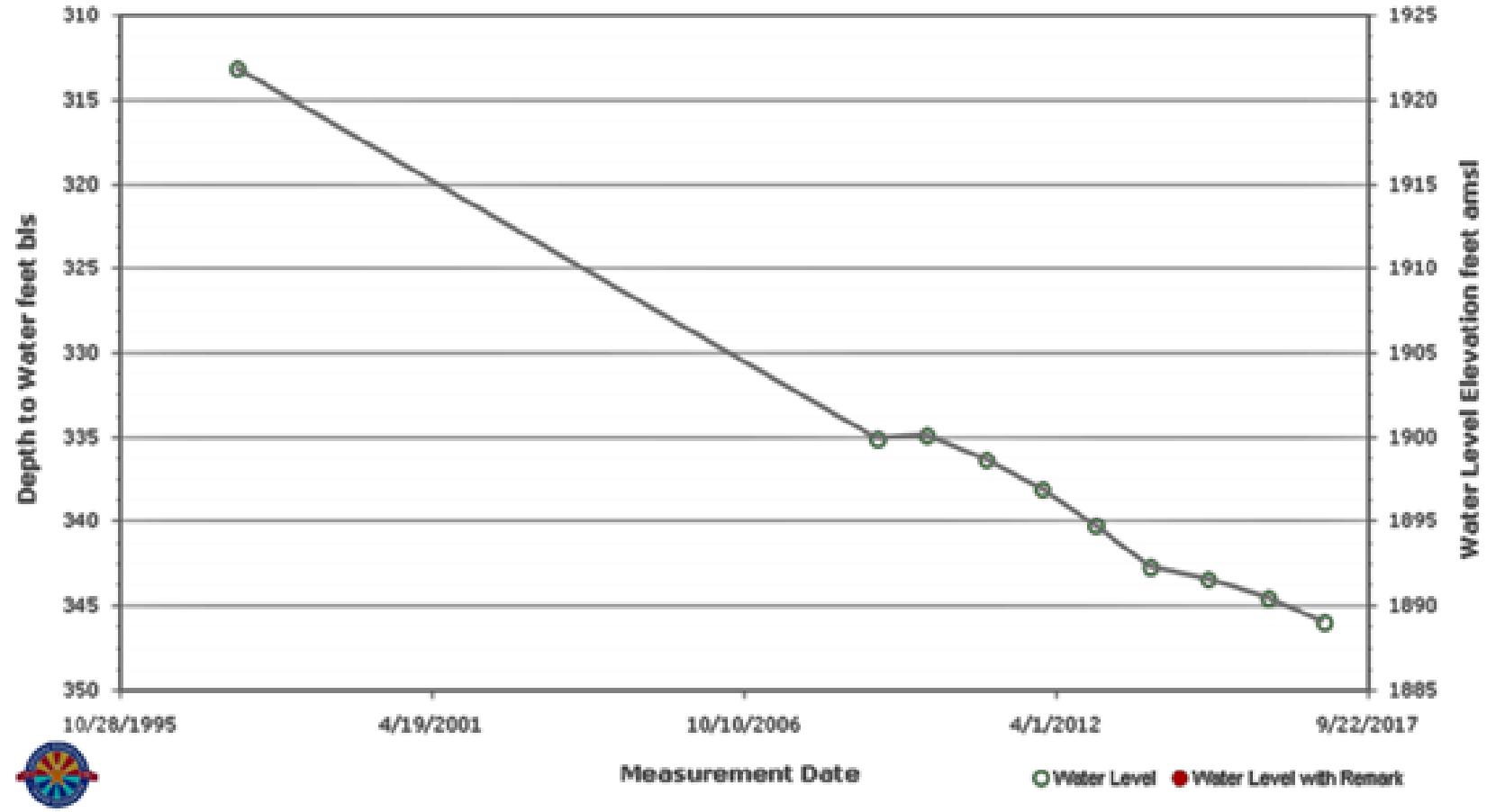
A-05-06 21CBD2	334538111445301	546482	33° 45' 38.9"	111° 44' 53.1"	2235	DOMESTIC				12/1/2016	345.9	1889.1



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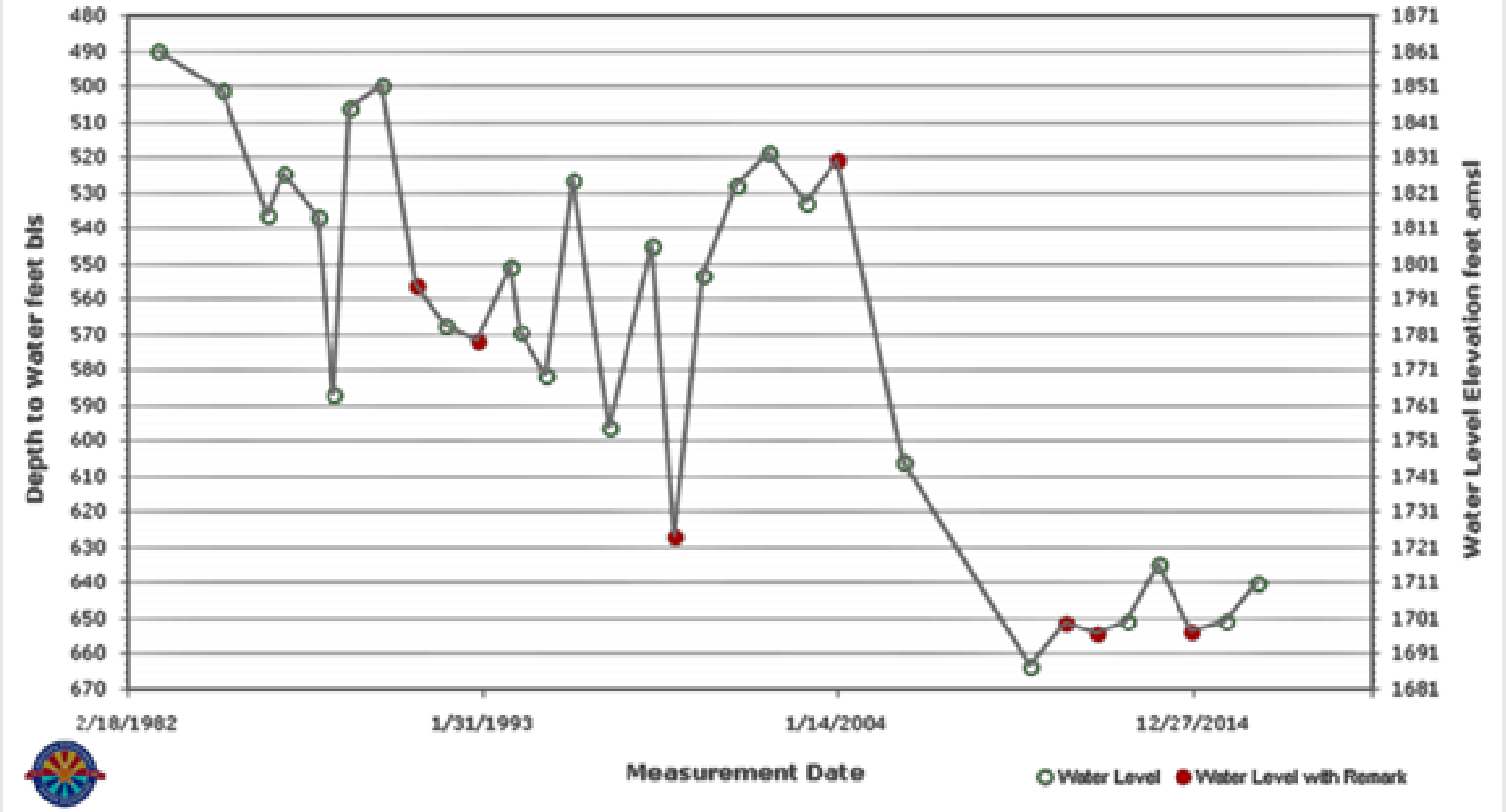
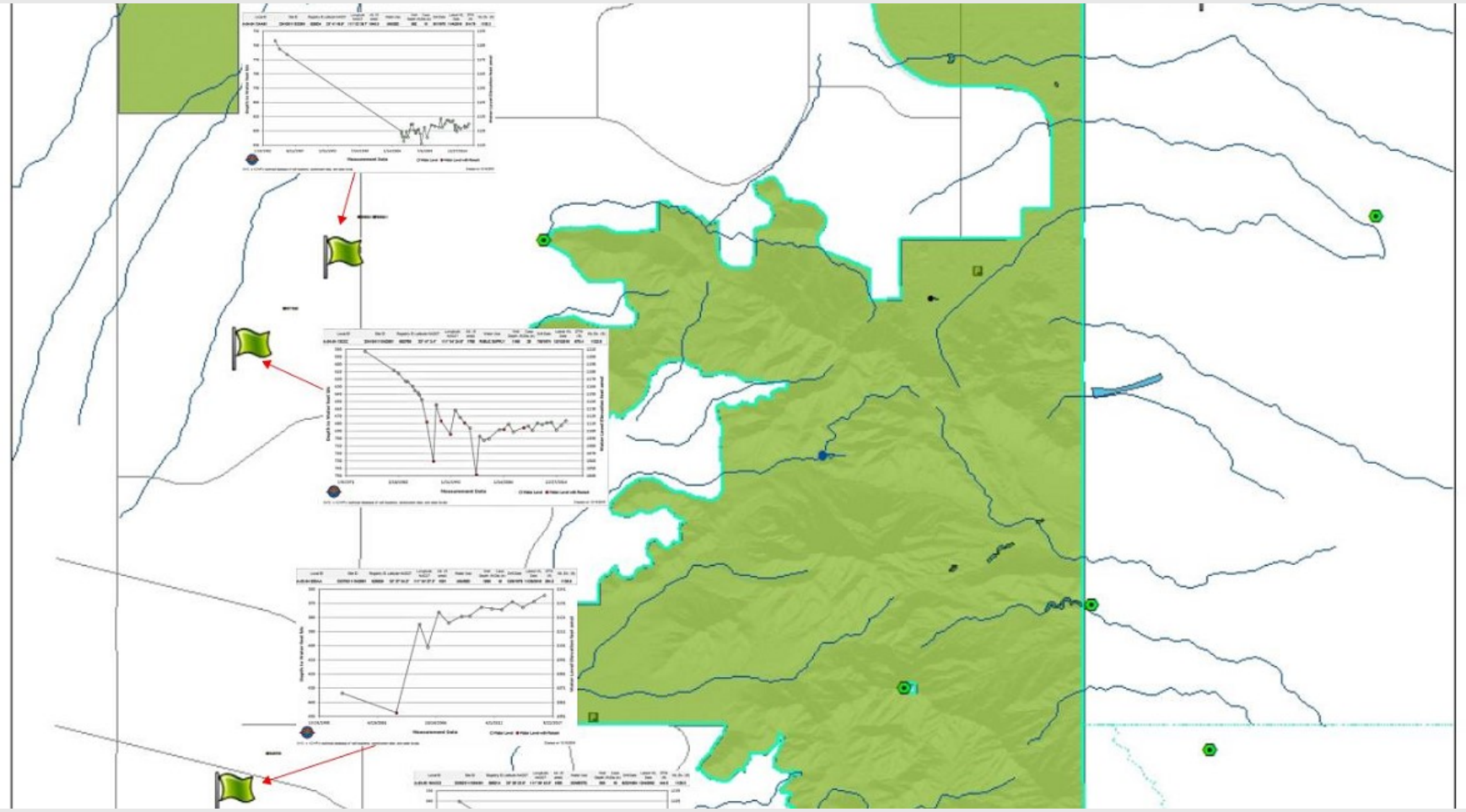
A-05-06 32CCC	334341111461201	888587	33° 43' 37.4"	111° 46' 7.1"	2351	PUBLIC SUPPLY	750	10	1/1/1971	12/1/2016	640	1711





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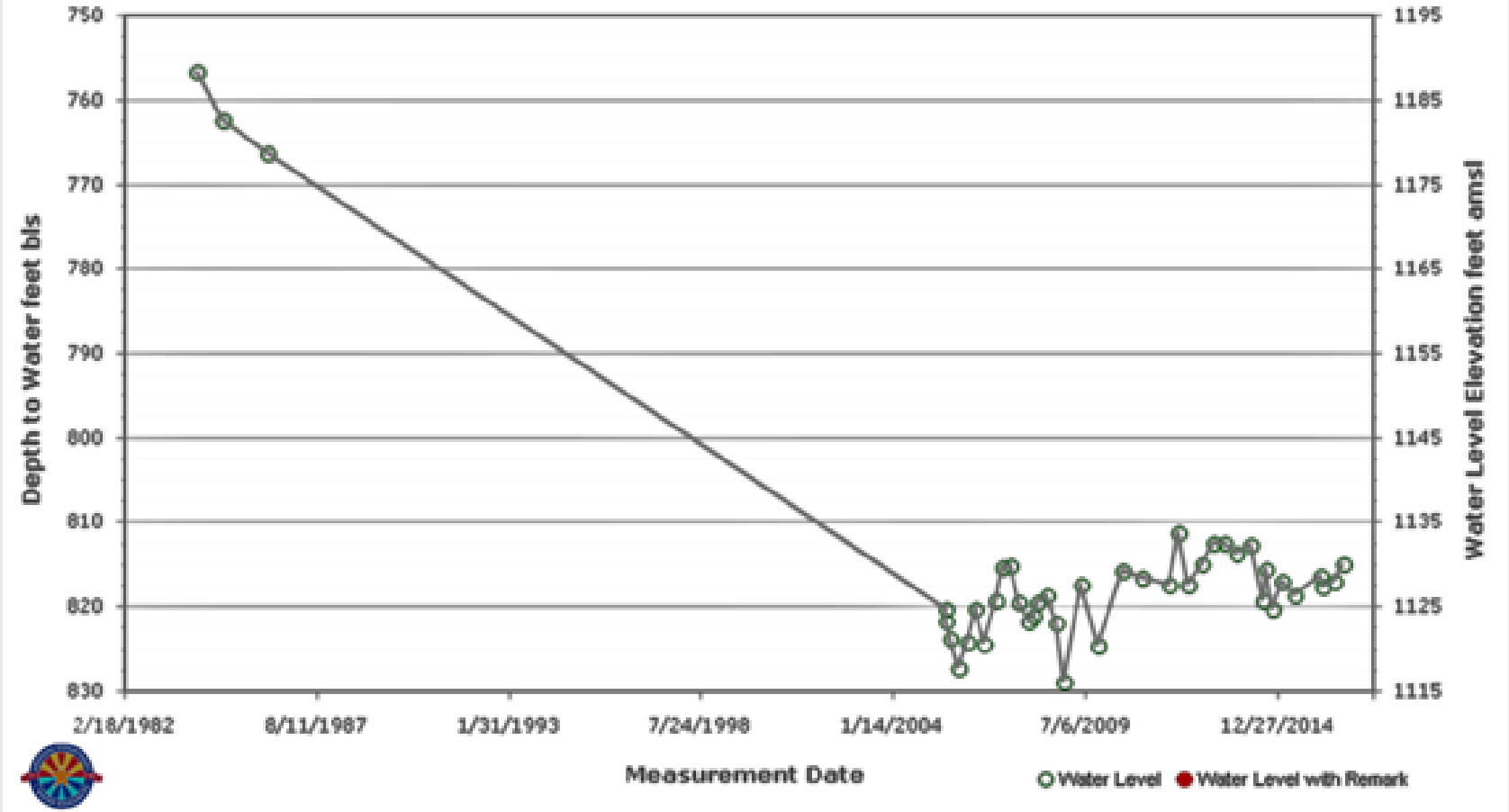
A-04-04 13AAB1	334150111533901	626834	33° 41' 48.6"	111° 53' 39.7"	1945.0	UNUSED	992	10	9/1/1970	11/4/2016	814.78	1130.3



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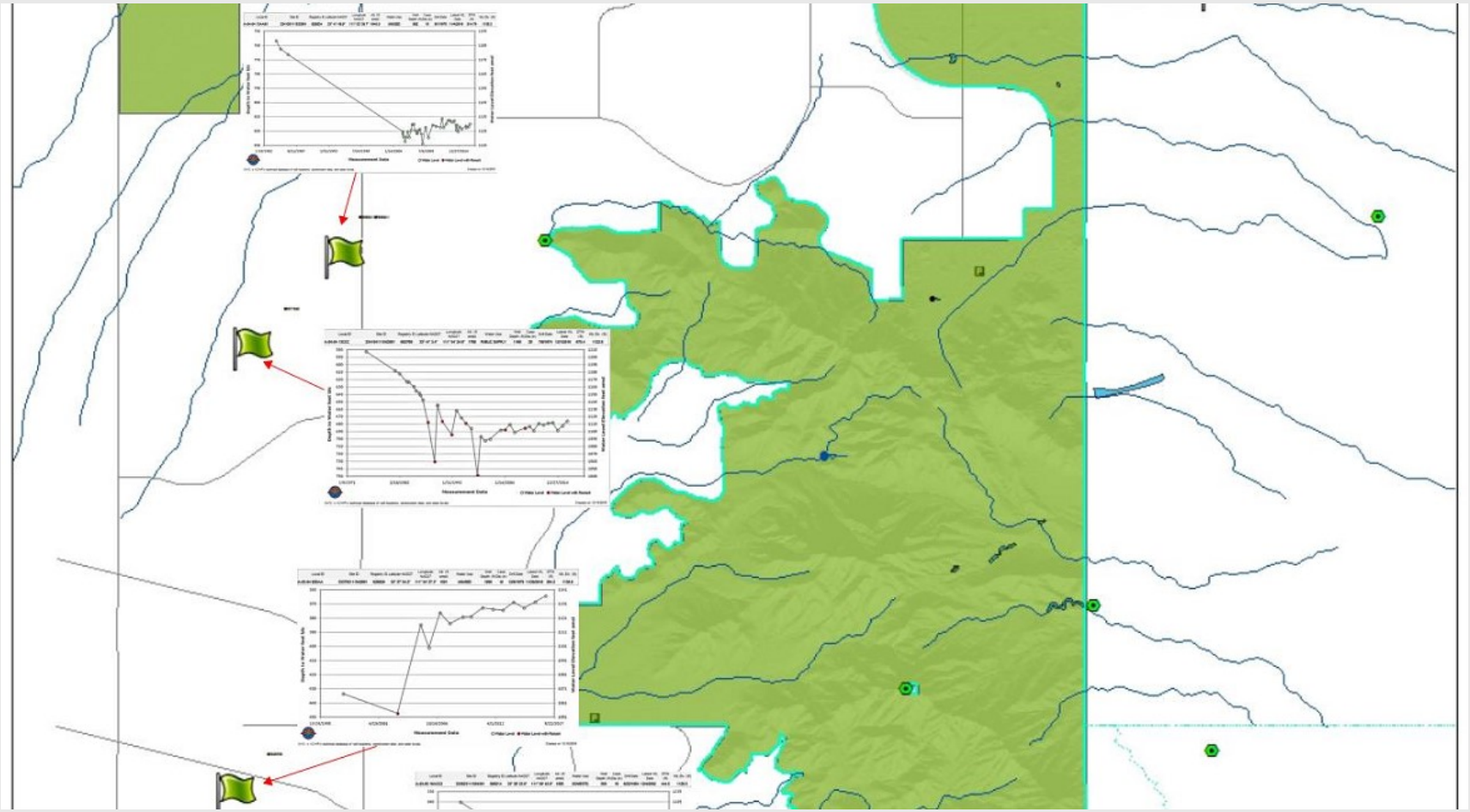

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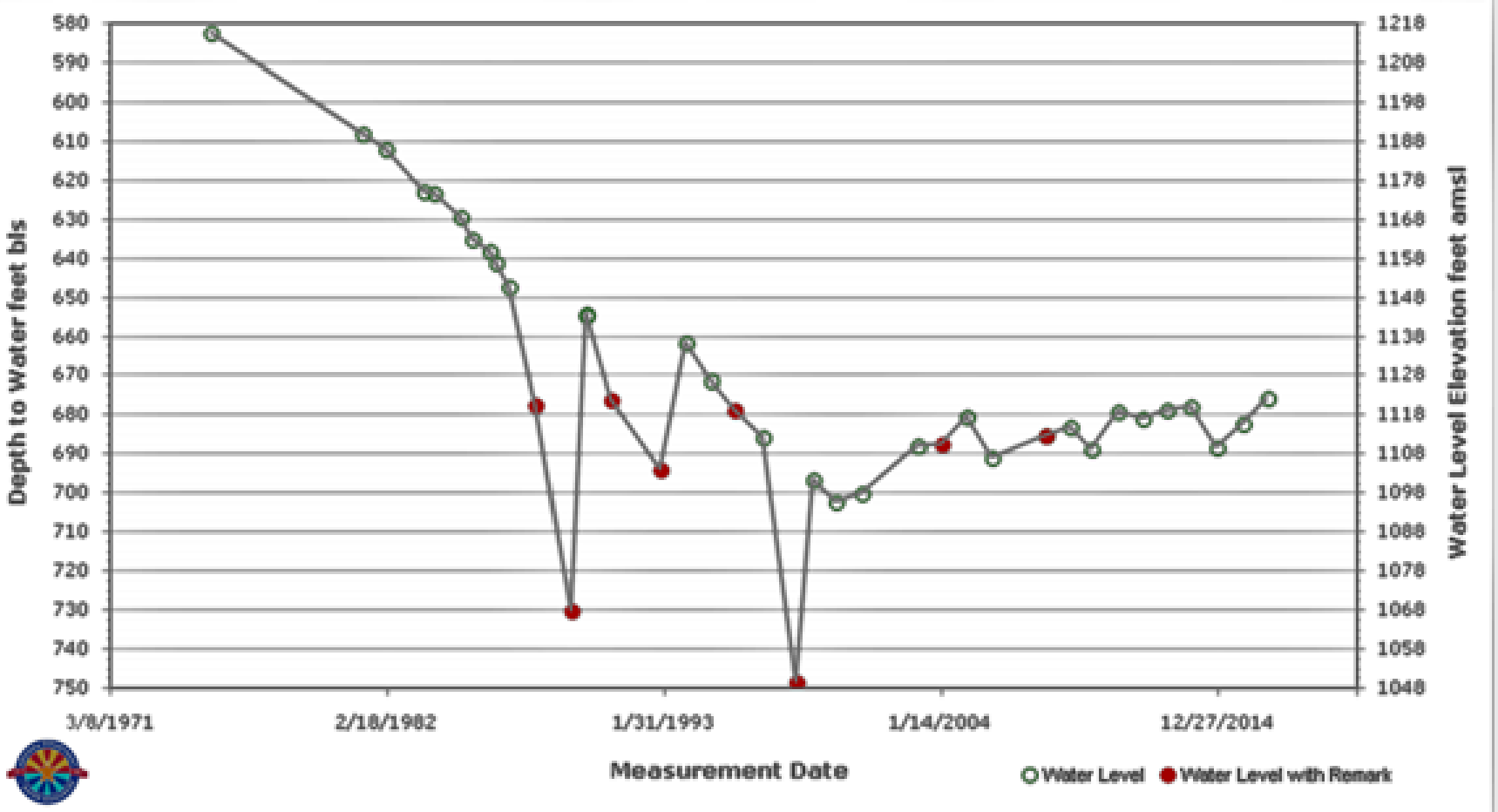
A-04-04 13CCC	334104111542501	602769	33° 41' 3.4"	111° 54' 24.6"	1798	PUBLIC SUPPLY	1169	20	7/8/1974	12/1/2016	675.4	1122.6



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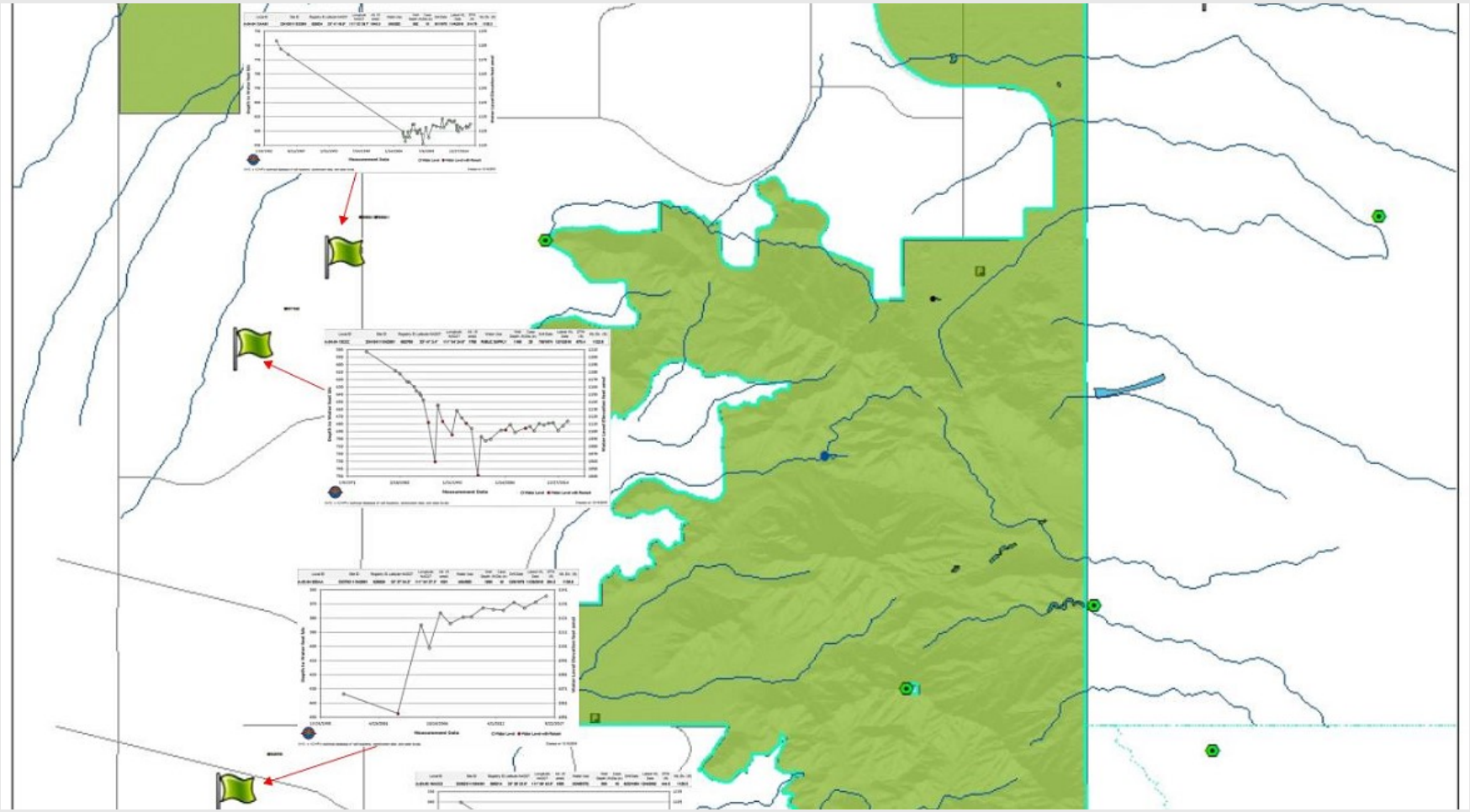

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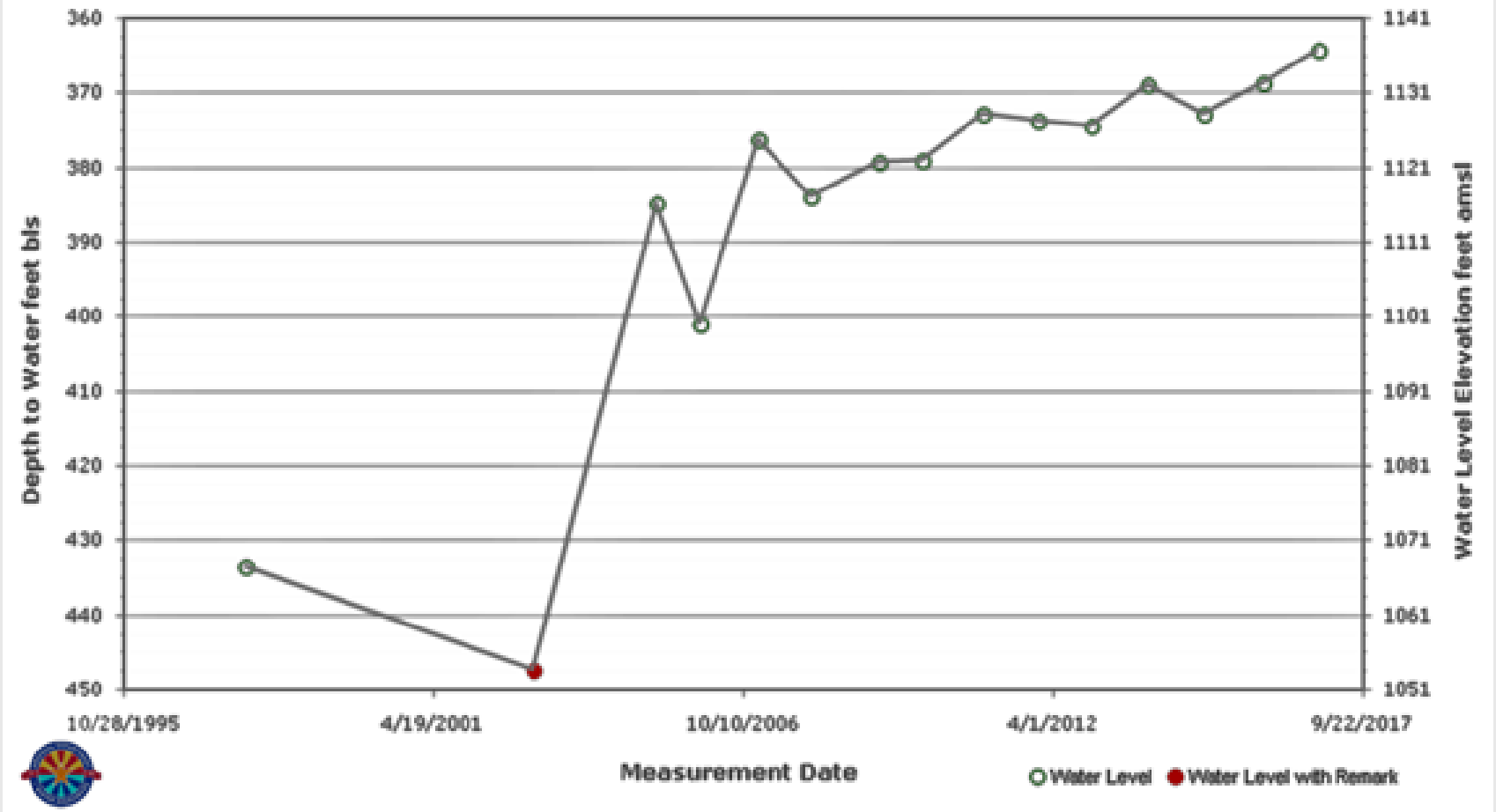
A-03-04 02DAA	333755111542601	626829	33° 37' 54.2"	111° 54' 27.3"	1501	UNUSED	1890	18	12/9/1979	11/30/2016	364.2	1136.8



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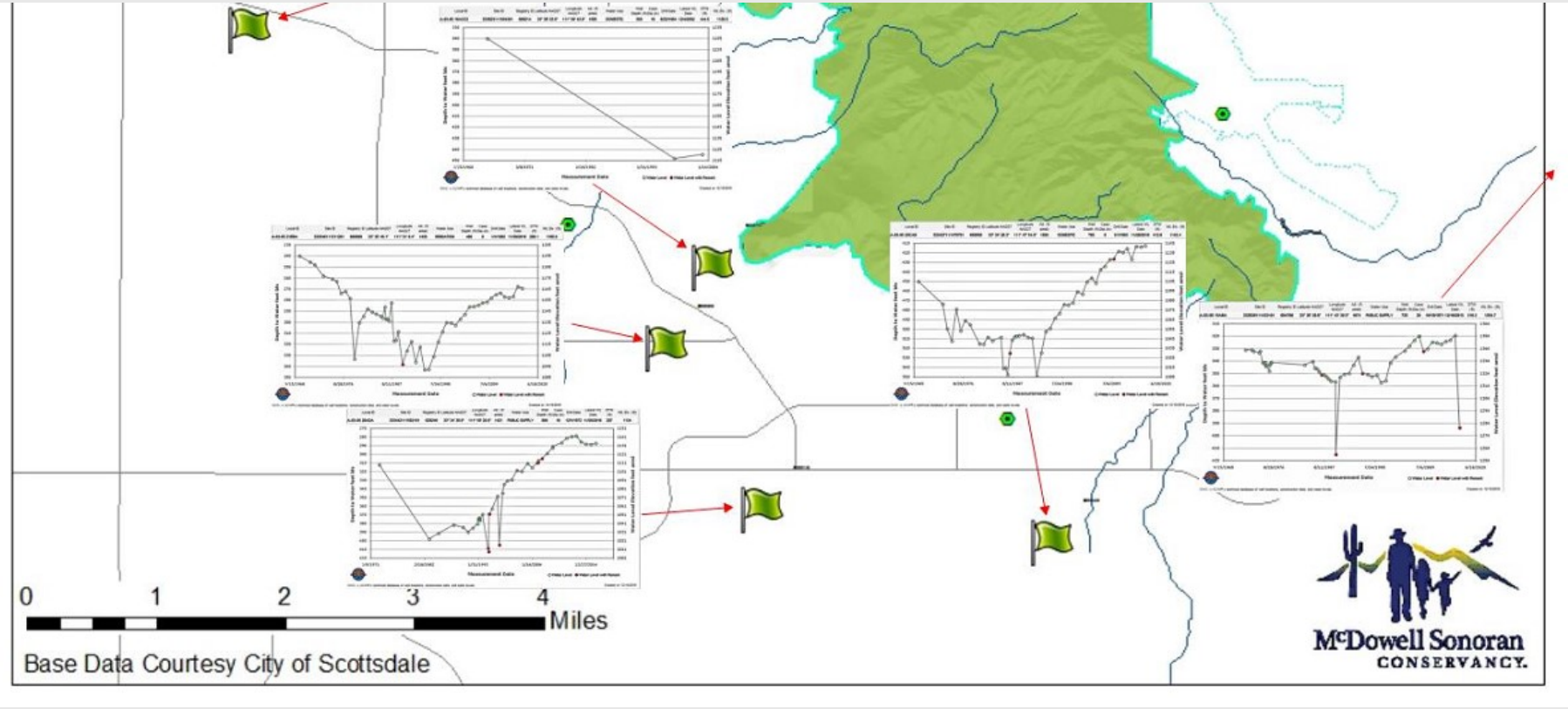

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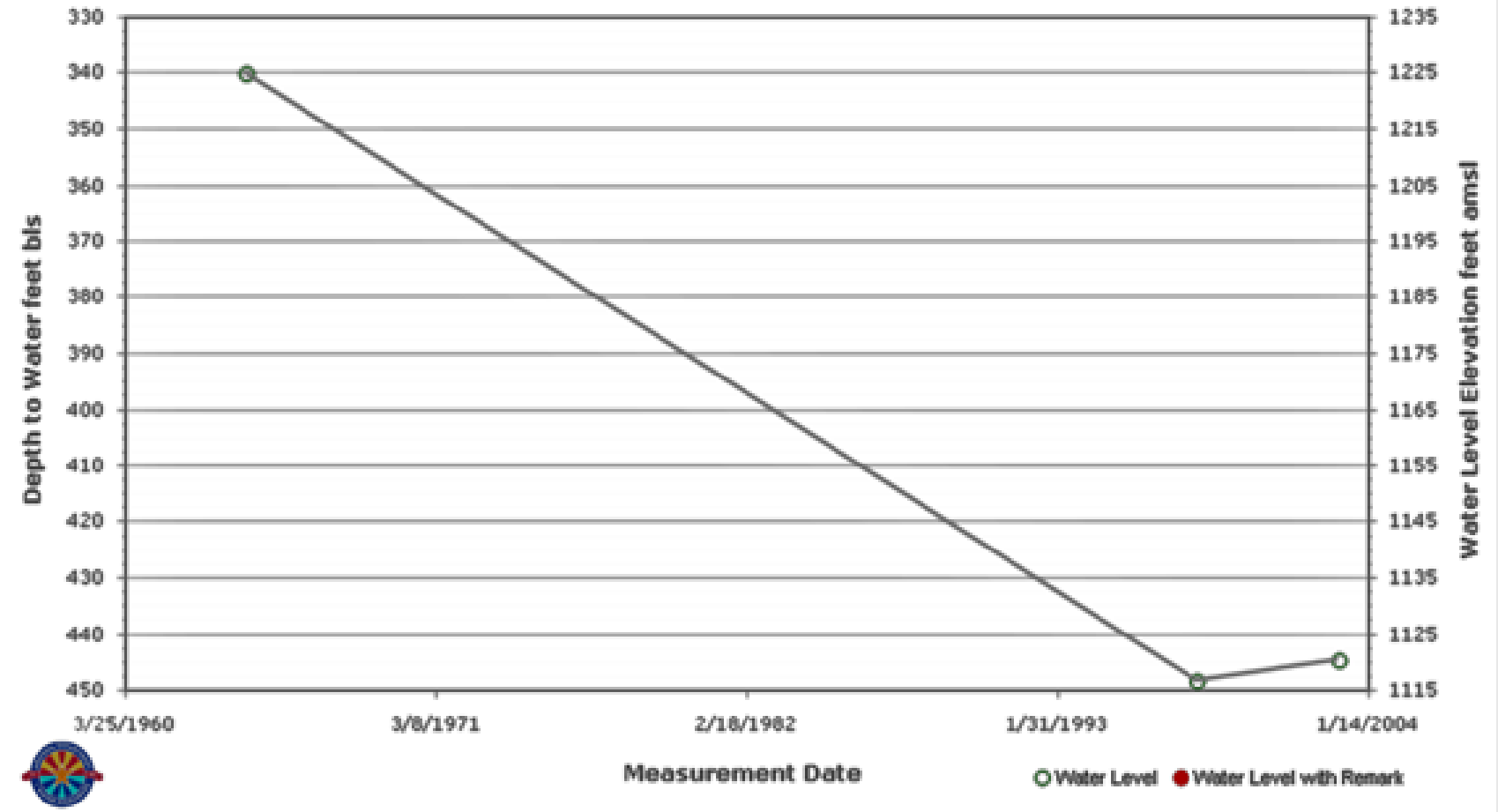
A-03-05 16ACC2	333623111504301	606214	33° 36' 23.0"	111° 50' 43.0"	1565	DOMESTIC	550	16	6/22/1964	12/4/2002	444.5	1120.5



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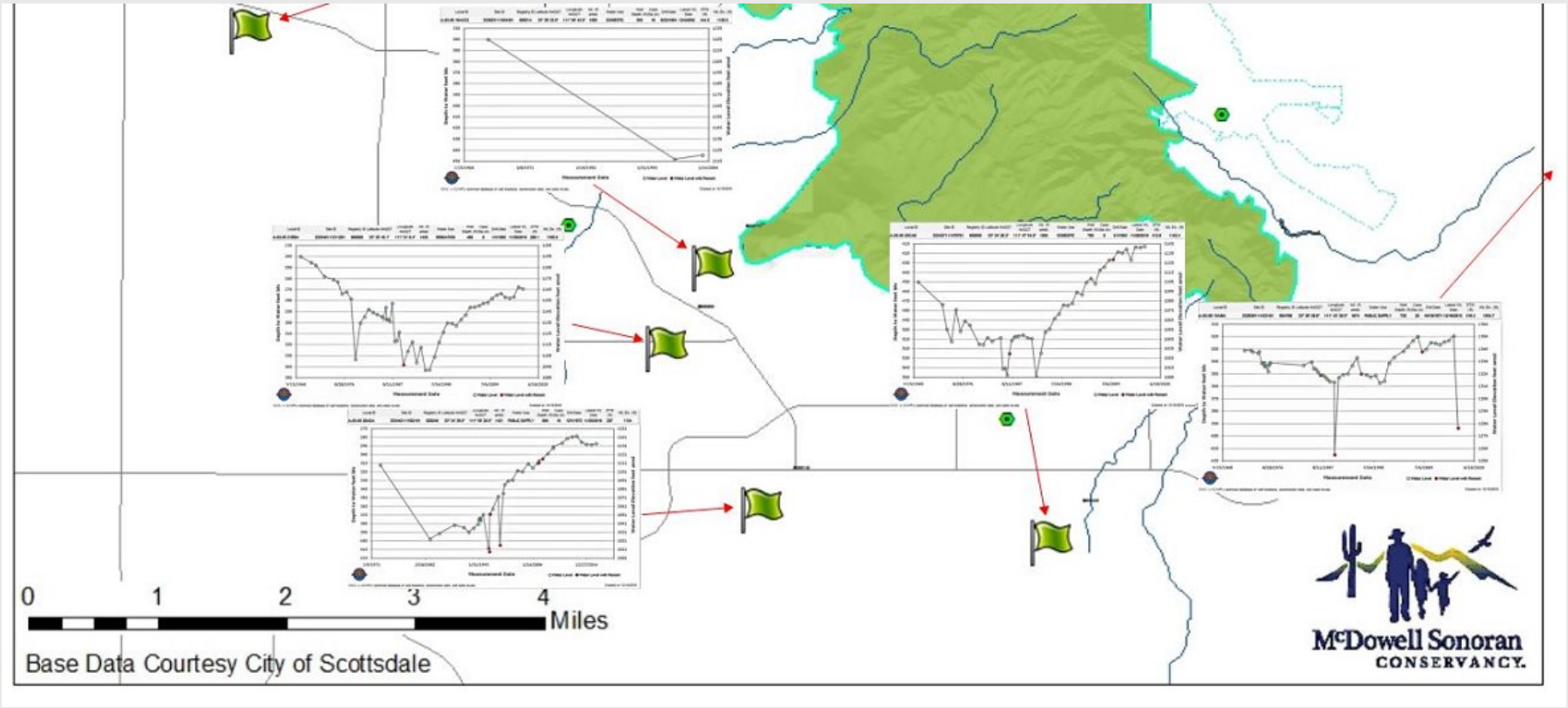

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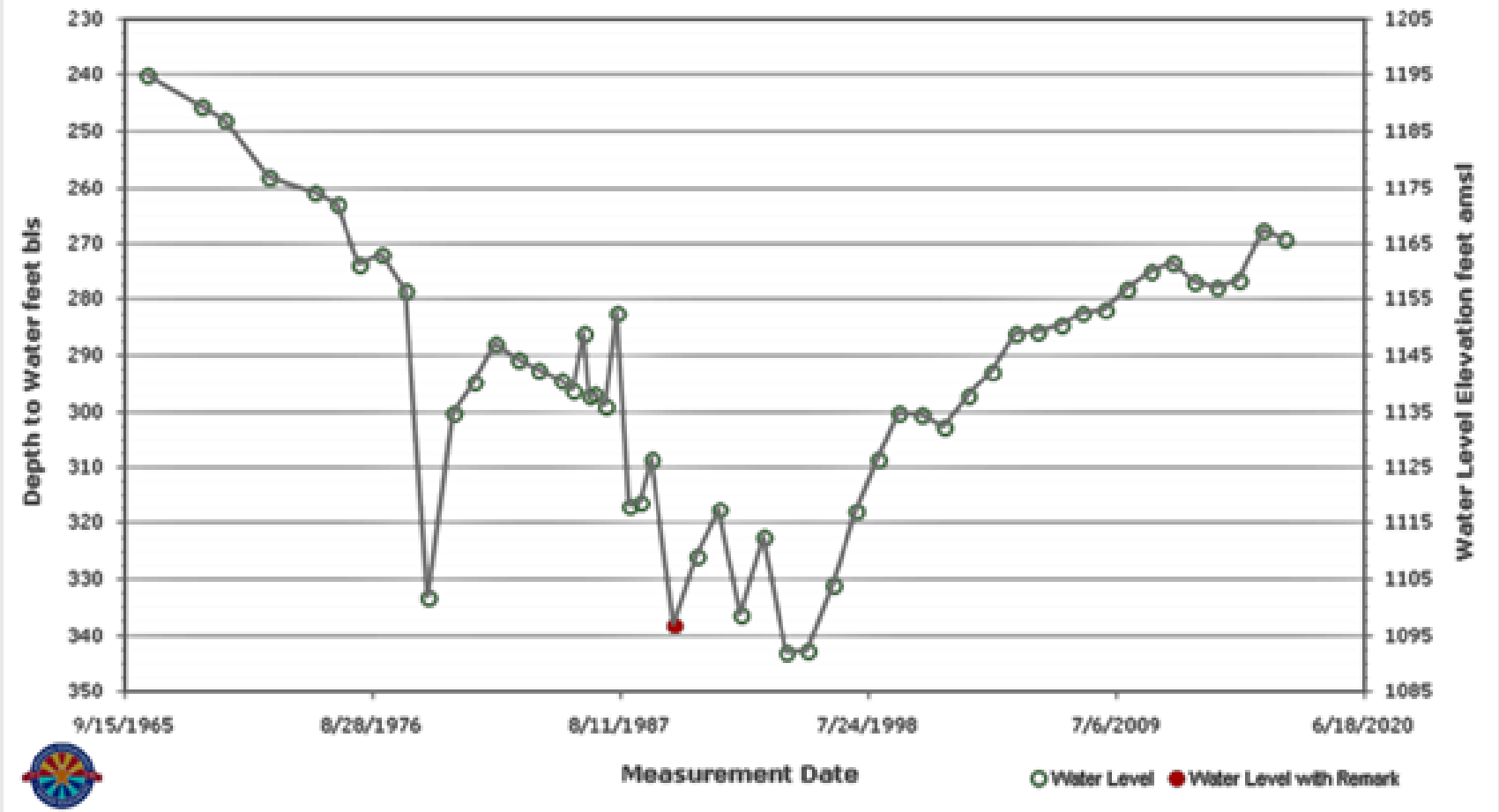
A-03-05 21BBA	333546111511201	600809	33° 35' 45.1"	111° 51' 9.4"	1435	IRRIGATION	400	8	1/1/1962	11/30/2016	269.1	1165.9



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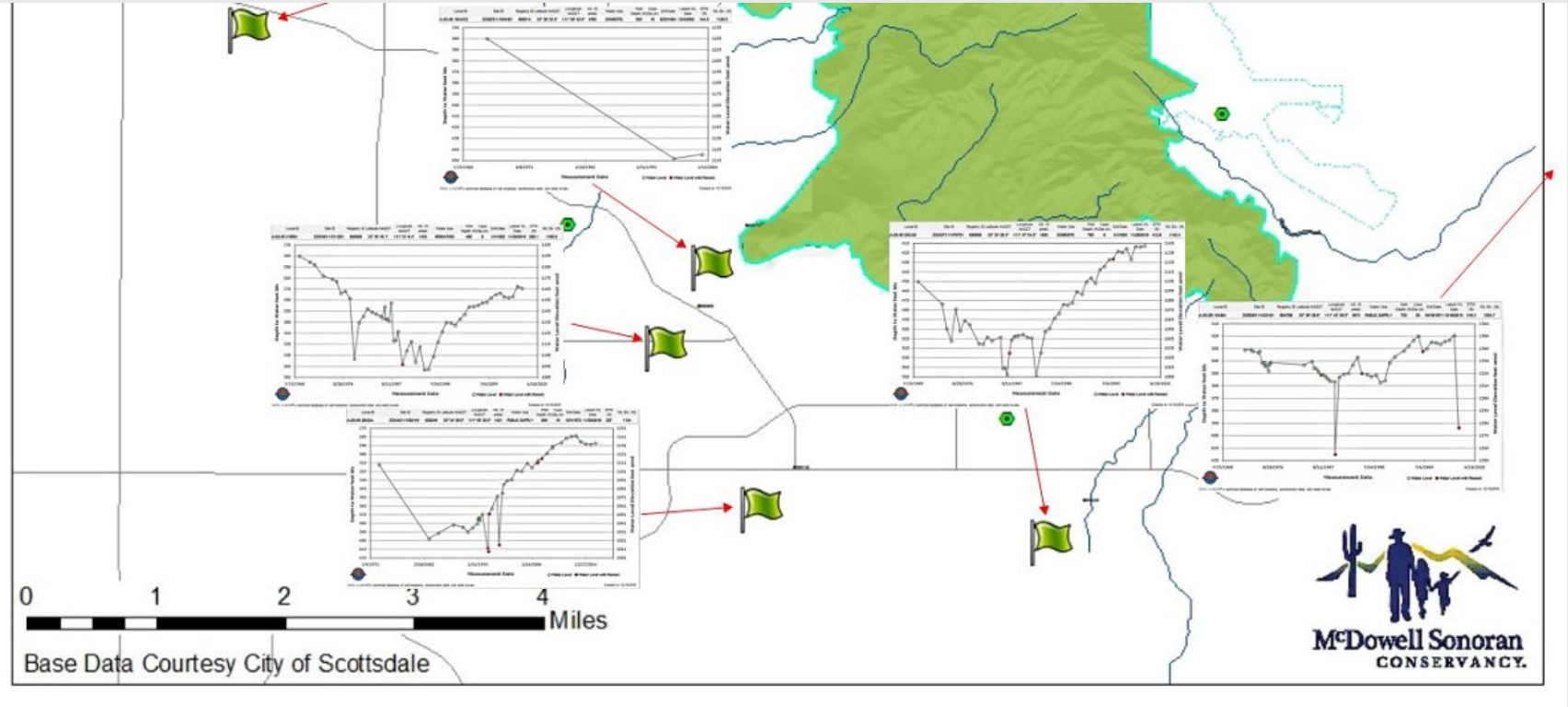

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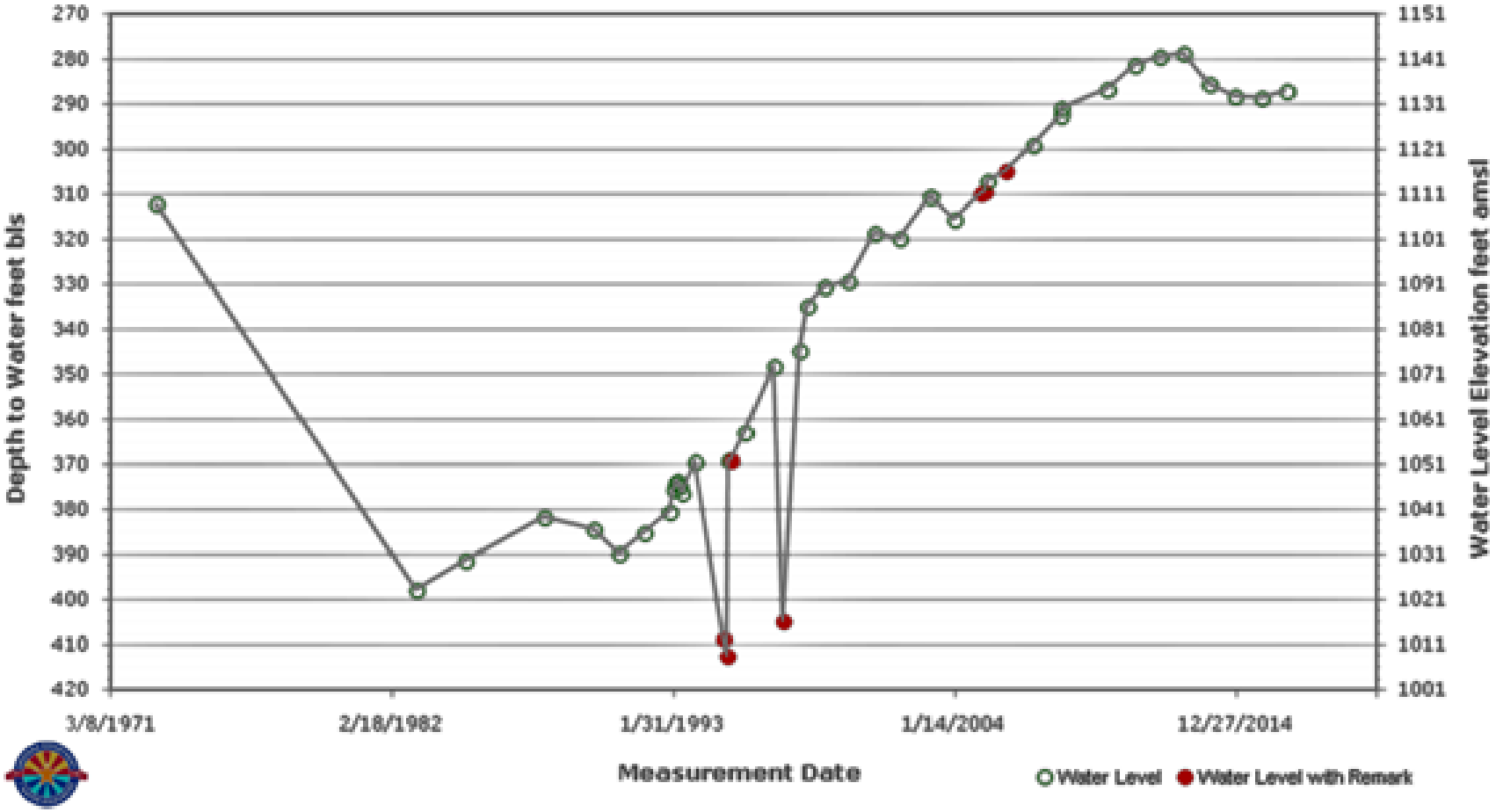
A-03-05 28ADA	333442111502101	629249	33° 34' 36.9"	111° 50' 20.0"	1421	PUBLIC SUPPLY	890	16	12/1/1972	11/30/2016	287	1134



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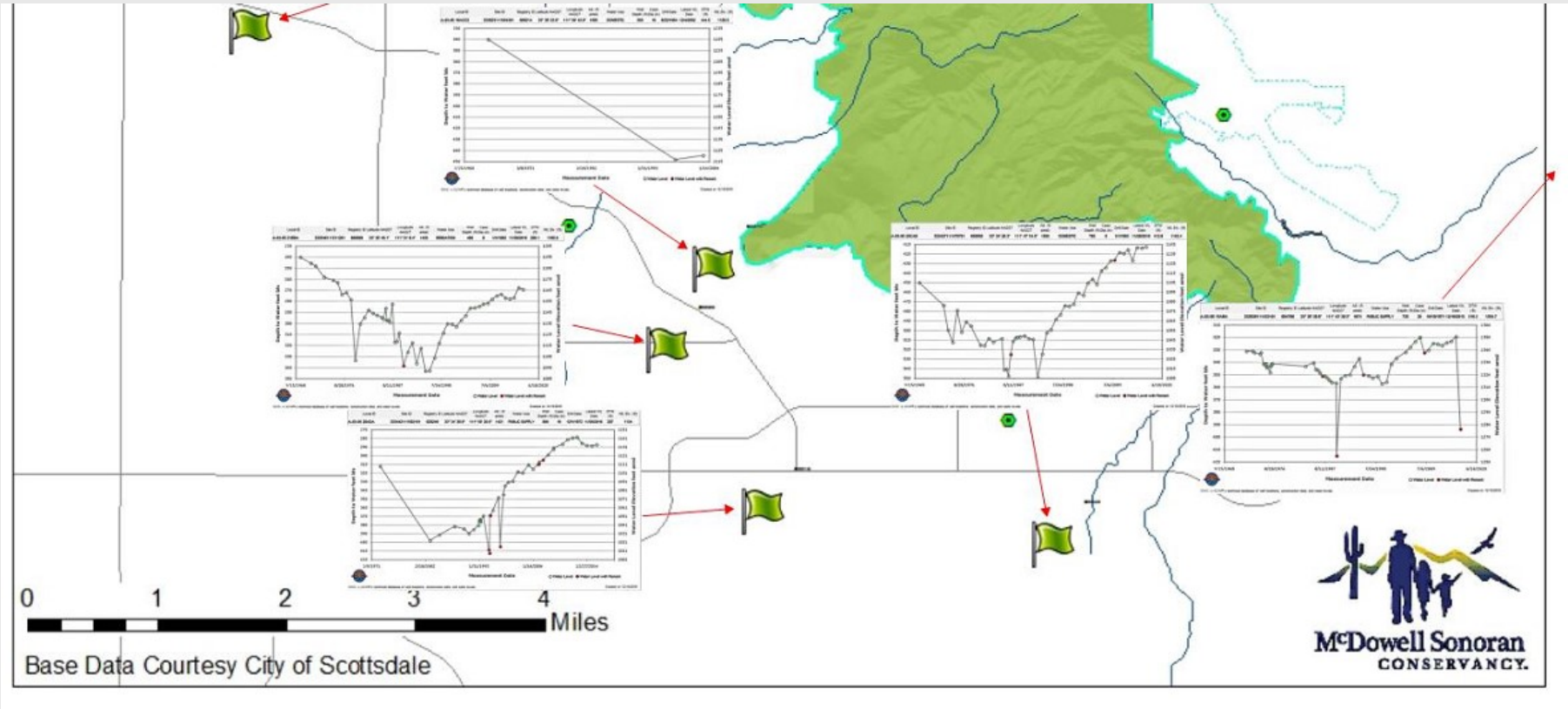

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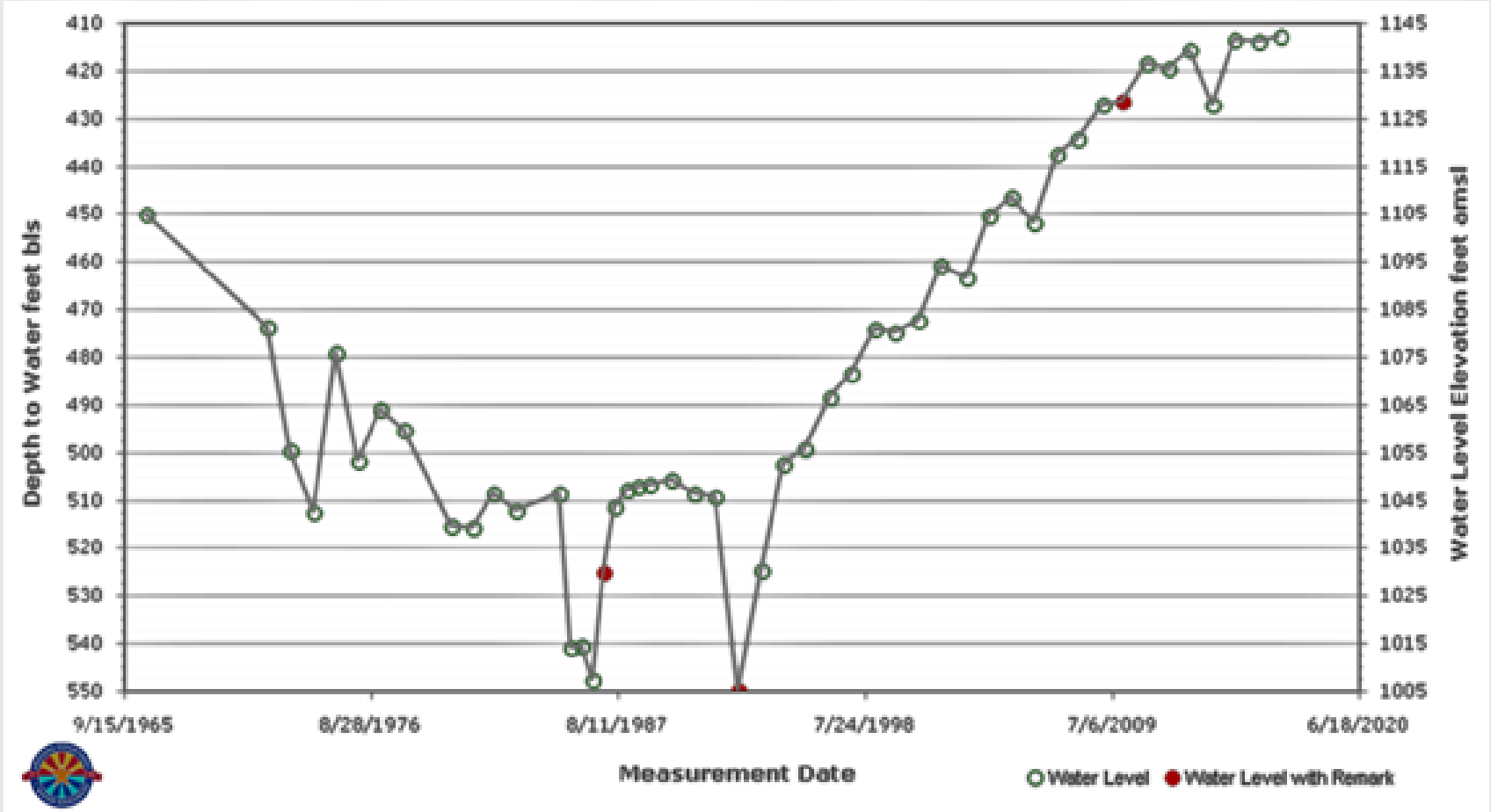
A-03-05 25CAB	333427111475701	600650	33° 34' 28.3"	111° 47' 54.0"	1555	DOMESTIC	705	8	1/1/1963	11/28/2016	412.6	1142.4



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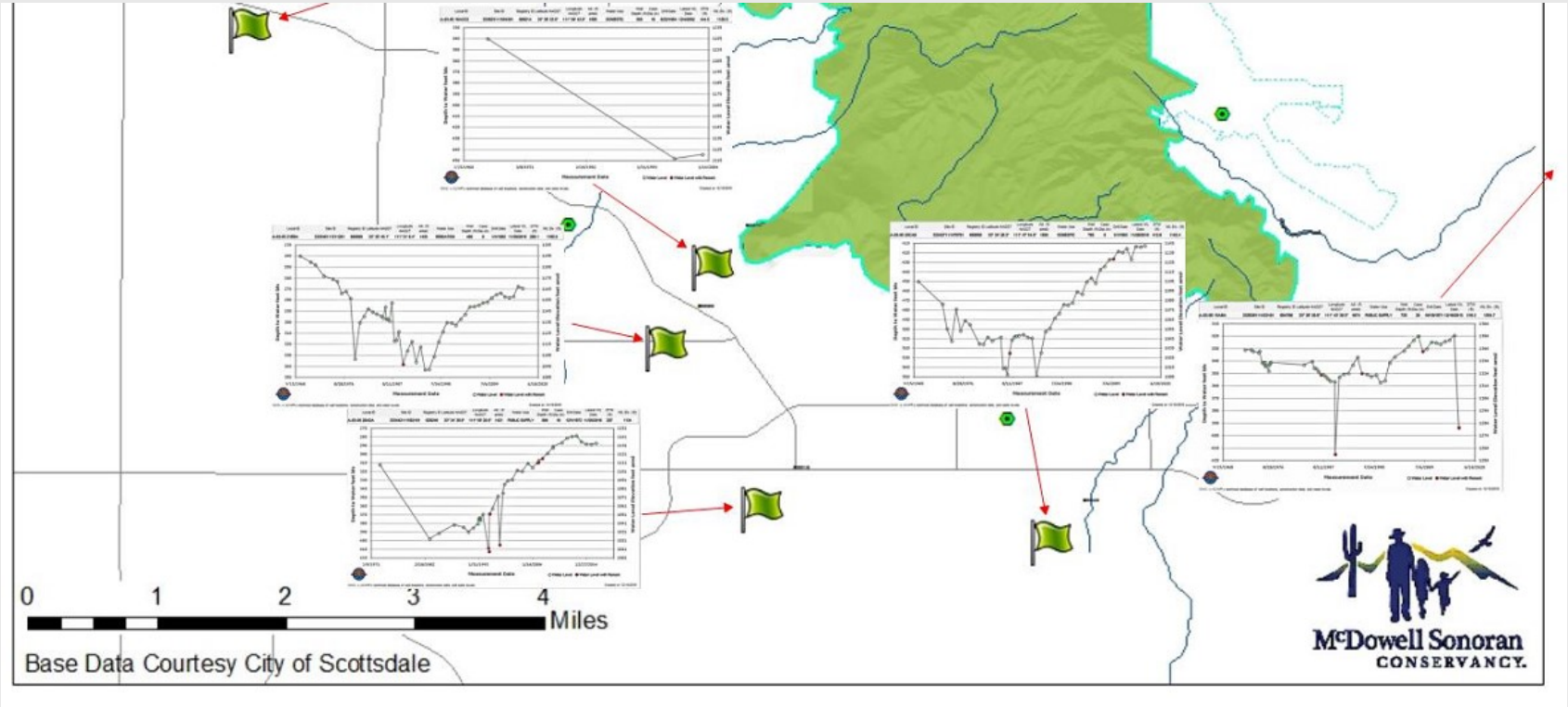

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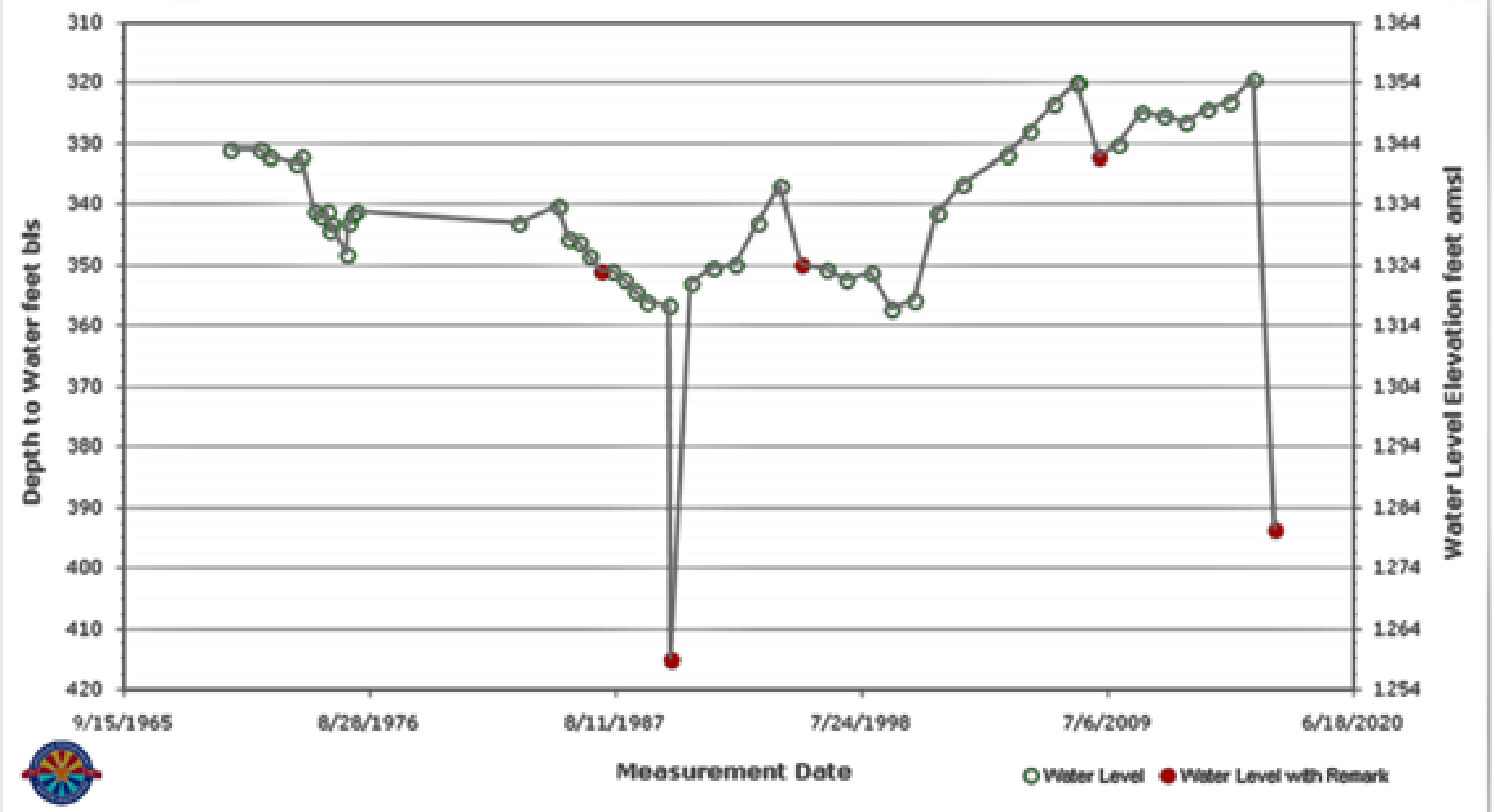
A-03-08 15ABA	333639111433101	604788	33° 36' 38.6"	111° 43' 30.5"	1674	PUBLIC SUPPLY	735	20	10/18/1971	12/16/2015	319.3	1354.7



GWSI is ADWR's technical database of well locations, construction data, and water levels.

Created on 12/10/2016

Summary

Water levels early decline prior to 1980's

- Increase depth
- Ground subsidence

Scottsdale acceptance of CAP water

- Reduced demand on groundwater supply
- Groundwater resources supplemented

Recent water levels appear to be increasing

Summary

No apparent issues of immediate concern

Likely minimal communication

Greater concern likely with prolonged drought

Most immediate impacts on water-sensitive species

NEXT STEPS

Continue investigation on subsurface geology of McDowells and Brown's Ranch (verify suspected lack of communication)

Locate wells on Preserve for future monitoring

Investigate potential for using phreatophyta as indicator of water-related ecosystem health

Phreatophytes

By T. W. ROBINSON

GEOLOGICAL SURVEY WATER-SUPPLY PAPER 1423

UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON: 1958

TABLE 1.—*Phreatophytes in Western United States*

[The quality of the ground water with respect to its suitability for crop growth is indicated by numerals as follows: 1, excellent to good; 2, good to poor; 3, poor to unsatisfactory. The use of ground water, including precipitation, unless otherwise stated is presumed to be for a plant growth of 100-percent volume density (Gatewood and others, 1950, p. 23-27)]

Scientific name	*Common name*	*Occurrence as a phreatophyte*	*Relation to ground water*			*Remarks*
			Depth to water below land surface (feet)	*Quality*	*Use (acre feet per acre)*	
Acacia greggii A. Gray.	Catclaw, devilsclaw, uña de gato.	Southern California to western Texas.		1		Uses more water than mesquite (McGinnies and Arnold, 1939, p. 236). Forms thickets along streams and washes.
Acer negundo Linnaeus.	Boxelder	Canada to Oklahoma and Arizona.				Occurs in moist places and along streams, chiefly in mountains. Observed in the flood plain of the North Canadian River near Oklahoma City, Okla. Widely used as a shade tree.
Alhagi camelorum Fischer.	Camelthorn	Arizona				Introduced into Southwestern United States from Asia Minor. Poor browse plant. Observed growing as a phreatophyte along Little Colorado River between Holbrook and Winslow, Ariz., in localities where the depth to water ranged from 4 to 6 ft. Aggressive and thicket forming, root system deep and extensive (Van Dersal, 1938, p. 45). (Fig. 9.)
Allenrolfea occidentalis (S. Watson) Kuntze.	Pickleweed, iodine-bush.	California to western Texas.	1-20	3		For additional information see page 49 and figure 22.
Alnus	Alder				5.3	Occurs along streams, river bottom land, and other wet sites. The use of 5.3 ft. (Blaney and others 1933, p. 112) was for the period May to October 1932 in Coldwater Canyon, altitude 2,400 ft., San Bernardino Mountains, Calif., where alder constituted 82 percent of the vegetation.

The End

Questions?

watermonitor@mcdowellsonoran.org

Next,
2C Restoration

Project: 2C Restoration

Lisa Rivera

Team lead
Steward, Class 59

Certified Citizen Scientist

Phase 2C Closed Trail Restoration Study

Why is restoration important?

Ecological restoration combats habitat degradation and fragmentation

Increases plant diversity

Preserve ordinance requires degraded lands in Preserve be restored

Photo credit: Lisa Rivera

Need for Study

Currently, closed trails mechanically ripped, covered with large pieces of vegetation litter to deter use by humans

We do not know if this is most successful, quickest method to restore degraded lands to natural condition

Photo credit: Lisa Rivera

Purpose of the study

Created by Dr. Helen Rowe, Director of the McDowell Sonoran Conservancy Field Institute

Test various ecological restoration techniques on trails that have been closed

Purpose of the study

Through results, develop best practices & methods for restoring trails, old roads, degraded areas with soil compaction

Study results relevant to regional land managers (The Central Arizona Conservation Alliance identified improving restoration best practices as high priority)

Research questions

Does soil ripping improve establishment of native plant community? And establishment from seed mixes?

Does establishment of seed differ when seed mixes are applied before monsoon vs winter rains?

How does purchased seed mix compare with local topsoil in establishing diverse native plant communities?

Study design/methods

10 transect sites with 8 quadrats/plots at each site

4 plots in control (non-ripped) portion of closed trail

4 plots in ripped portion of closed trail

Photo credits: Leona Weinstein

Soil ripping

Decreases bulk density

Improves water infiltration

Better plant growth

Could disturb soil symbionts (microbial/fungal health of the soil)

Photo credit: Leona Weinstein

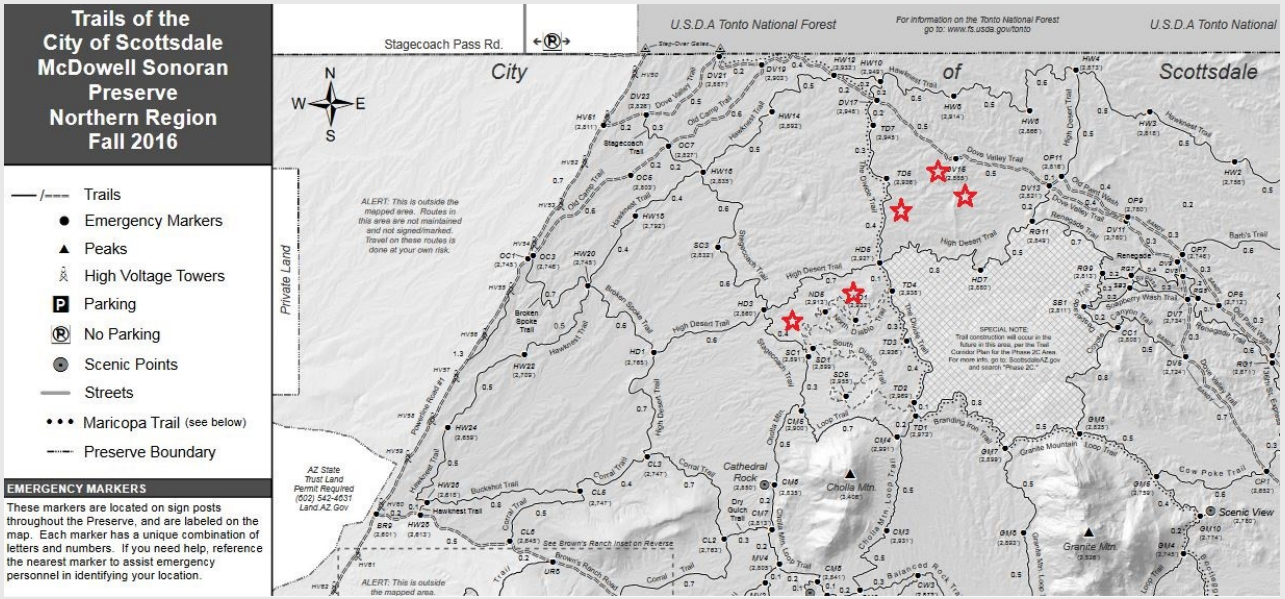
Study design/methods

Four ecological restoration methods tested at each site

- Seed mix applied before summer monsoons
- Seed mix applied before winter rains
- Application of local topsoil collected from under nearby plants
- No treatment applied (control)

Photo credit: Lisa Rivera

Location of study



North-central area of Preserve, “2C” area

North of Cholla, Granite Mountains; south of Tonto NF

Red stars approximate locations of sites

Creation of 10 transect sites

Completed Spring 2016

At each transect, set up eight 0.5 x 1 meter test quadrats/plots surrounded by 1 x 1.5 meter buffer quadrat/plot

Baseline plant data collected in non-ripped plots

Photo credit: Leona Weinstein

Seed selection

Native seed species were chosen by Field Institute

Purchased in bulk by City of Scottsdale in July 2016

Challenging search for suitable vendor

Photo credit: Lisa Rivera

Seed selection

A few seed varieties excluded due to purity concerns after being examined by botanist Steve Jones

Photo credit: Debbie Langenfeld

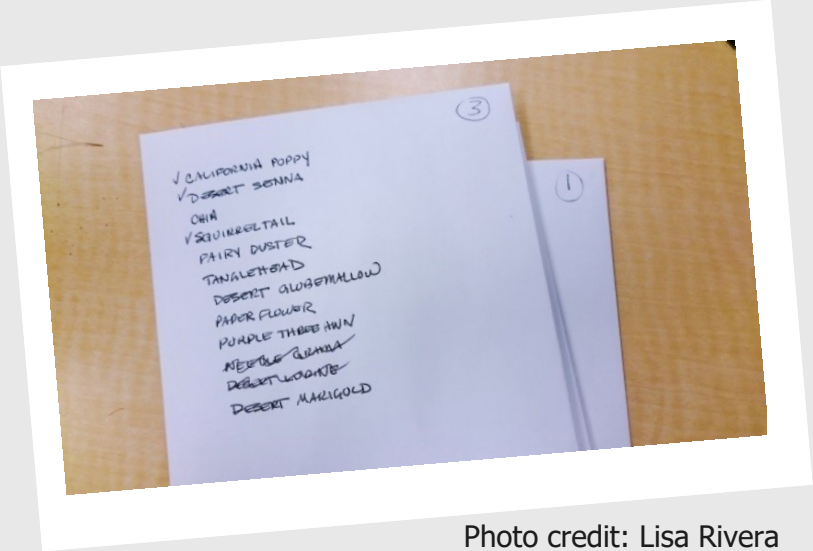


Photo credit: Lisa Rivera

Seeds precisely weighed to create 40+ duplicate seed packets with 10 species

Seed species

Mexican Gold Poppy

(*Eschscholzia californica mexicana*)

Photo credit: Patrick Alexander, courtesy of SEINet (Southwest Education and Information Network)

Fairy duster

(*Calliandra eriophylla*)

Photo credit: Karen Wellner, courtesy of SEINet (Southwest Education and Information Network)

Seed species

Paper flower

(*Psilostrophe cooperi*)

Photo credit: Liz Makings, courtesy of SEINet (Southwest Education and Information Network)

Desert Senna

(*Senna covesii*)

Photo credit: Sue D. Carnahan, courtesy of SEINet (Southwest Education and Information Network)

Seed species

Tanglehead

(*Heteropogon contortus*)

Photo credit: Sue Carnahan, courtesy of SEINet (Southwest Education and Information Network)

Purple Threeawn

(*Aristida purpurea*)

Photo credit: Max Licher, courtesy of SEINet (Southwest Education and Information Network)

Seed Species

Squirrel tail

(*Elymus elymoides*)

Photo credit: Max Licher, courtesy of SEINet (Southwest Education and Information Network)

Chia

(*Salvia columbariae*)

Photo credit: Patrick Alexander, courtesy of SEINet (Southwest Education and Information Network)

Seed species

Desert marigold

(*Baileya multiradiata*)

Photo credit: Max Licher, courtesy of SEINet (Southwest Education and Information Network)

Globemallow

(*Sphaeralcea ambigua*)

Photo credit: Lisa Rivera

Summer seed treatment

In July 2016, planted seeds from seed packets in one plot on ripped and non-ripped areas at each transect site

Photo credit: Debbie Langenfeld

Winter seed treatment

In Nov 2016, planted seeds from our seed packets in one plot on the ripped and non-ripped areas at each transect site

Photo credit: Debbie Langenfeld

Seed bank treatment

Nov. 2016, topsoil was collected from the base of many different plant species near each transect site

All of collected topsoil was combined at central location and thoroughly mixed

Photo credit: Debbie Langenfeld

Seed bank treatment

Equal amounts of soil and two cholla balls were placed in one plot on the ripped and non-ripped areas at each transect site

Photo credit: Lisa Rivera

Seed bank breatment (control)

Some seed bank soil being grown in control environment at Scottsdale Community College greenhouse

Plant growth monitored by students

Provides clearer understanding of which seed species are present in the seed bank soil

Photo credits: Clayton Grubb

Spring 2017 data collection

Photo credit: Leona Weinstein

Photo credit: Bill Soule

March 2

March 20

Originally planned for February, but postponed until mid March to allow for more plant growth

Spring 2017 field work

Visited each of 10 transect sites to collect data

Worked in teams consisting of botanist and 1-3 citizen scientists

Collected all data in 4 work days from Mar 13-20

Photo credit: Debbie Langenfeld

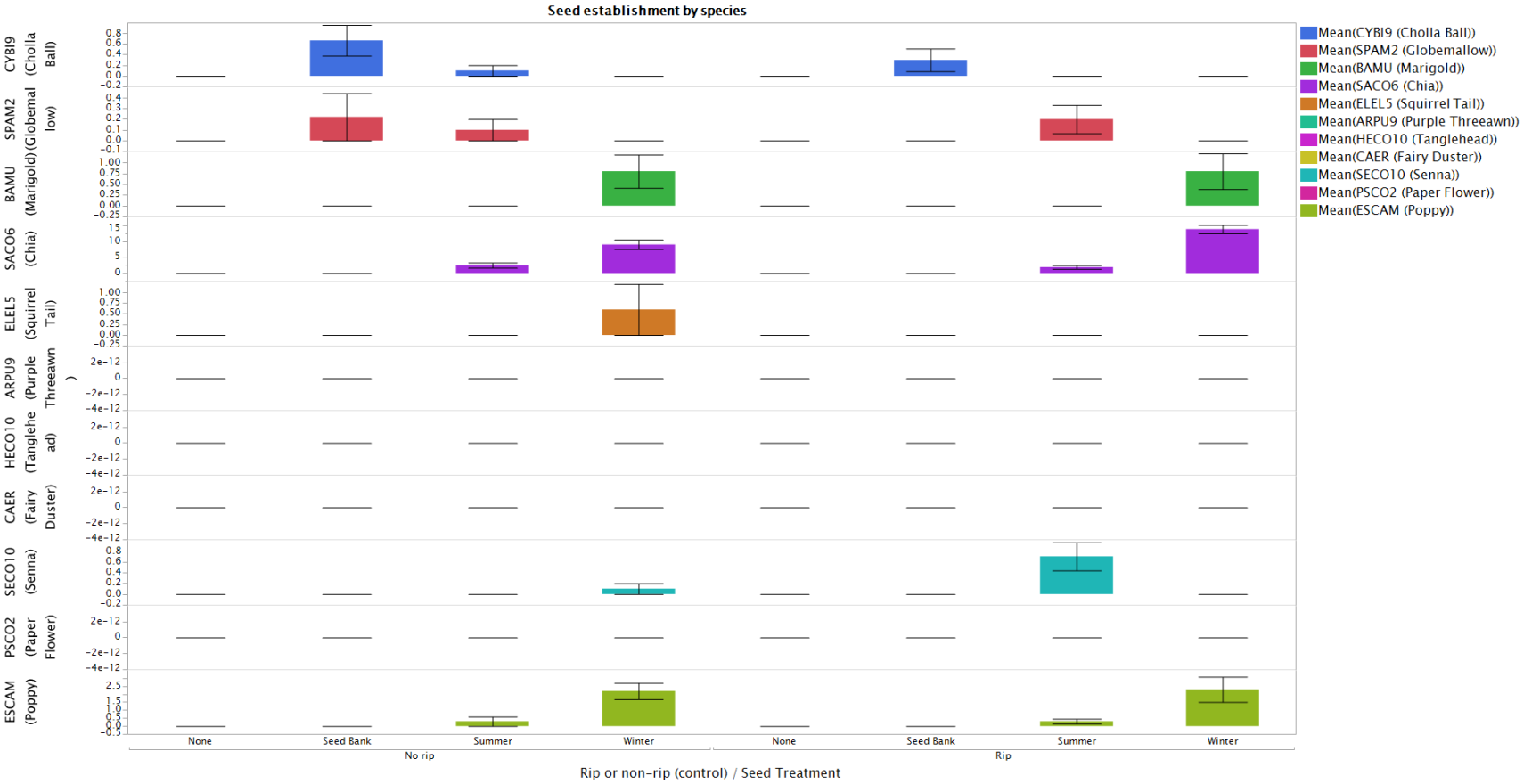
Data collection: seedling counts

Counted number of seedlings of each seed species in all plots, not just ones receiving summer and winter treatments

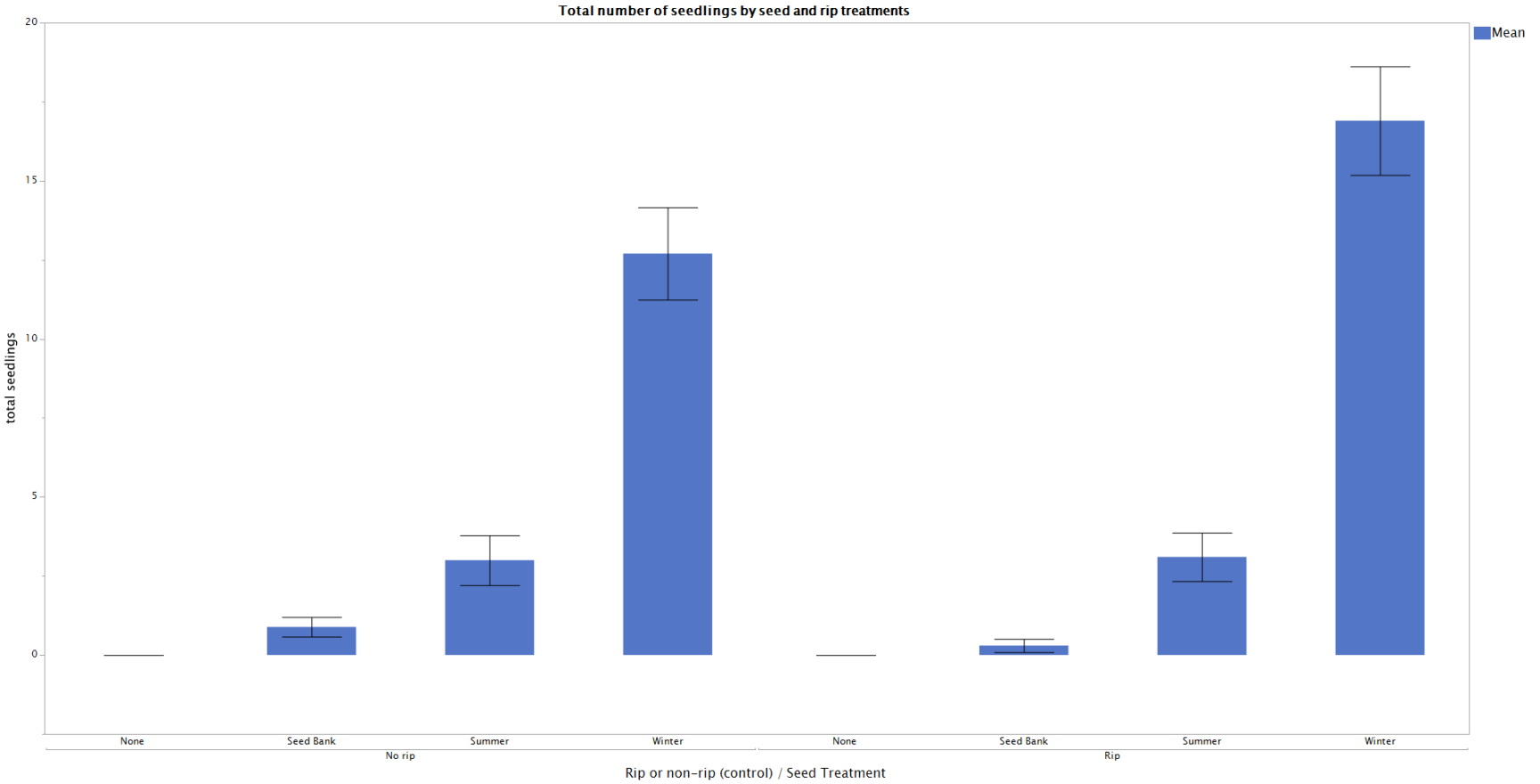
Data will help determine if seedlings were result of planted seeds or naturally occurring seeds from area

Photo credit: Debbie Langenfeld

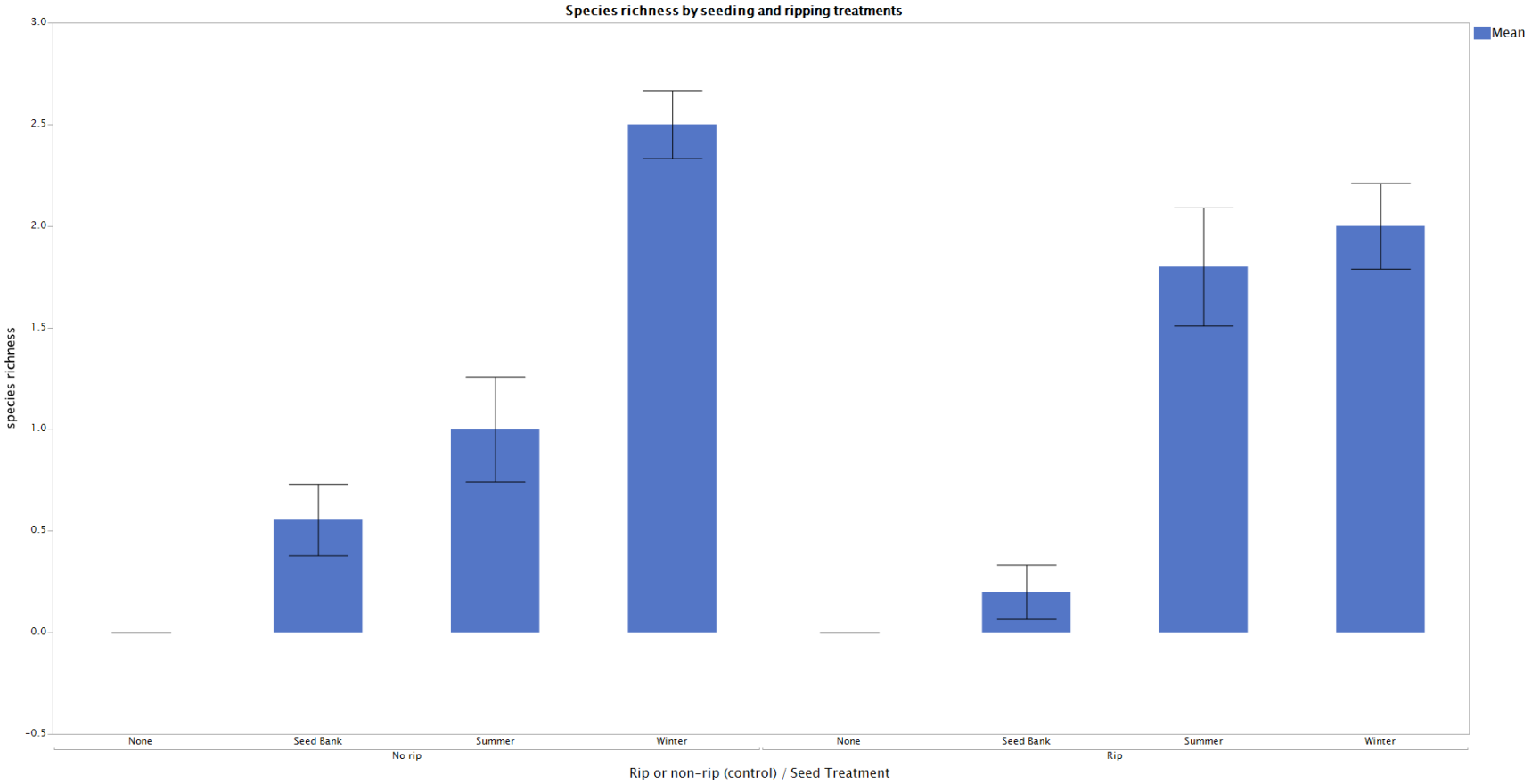
Number of seedlings by species and treatment



Total number of seedlings by seed and rip treatments



Seedling richness by seed and rip treatment



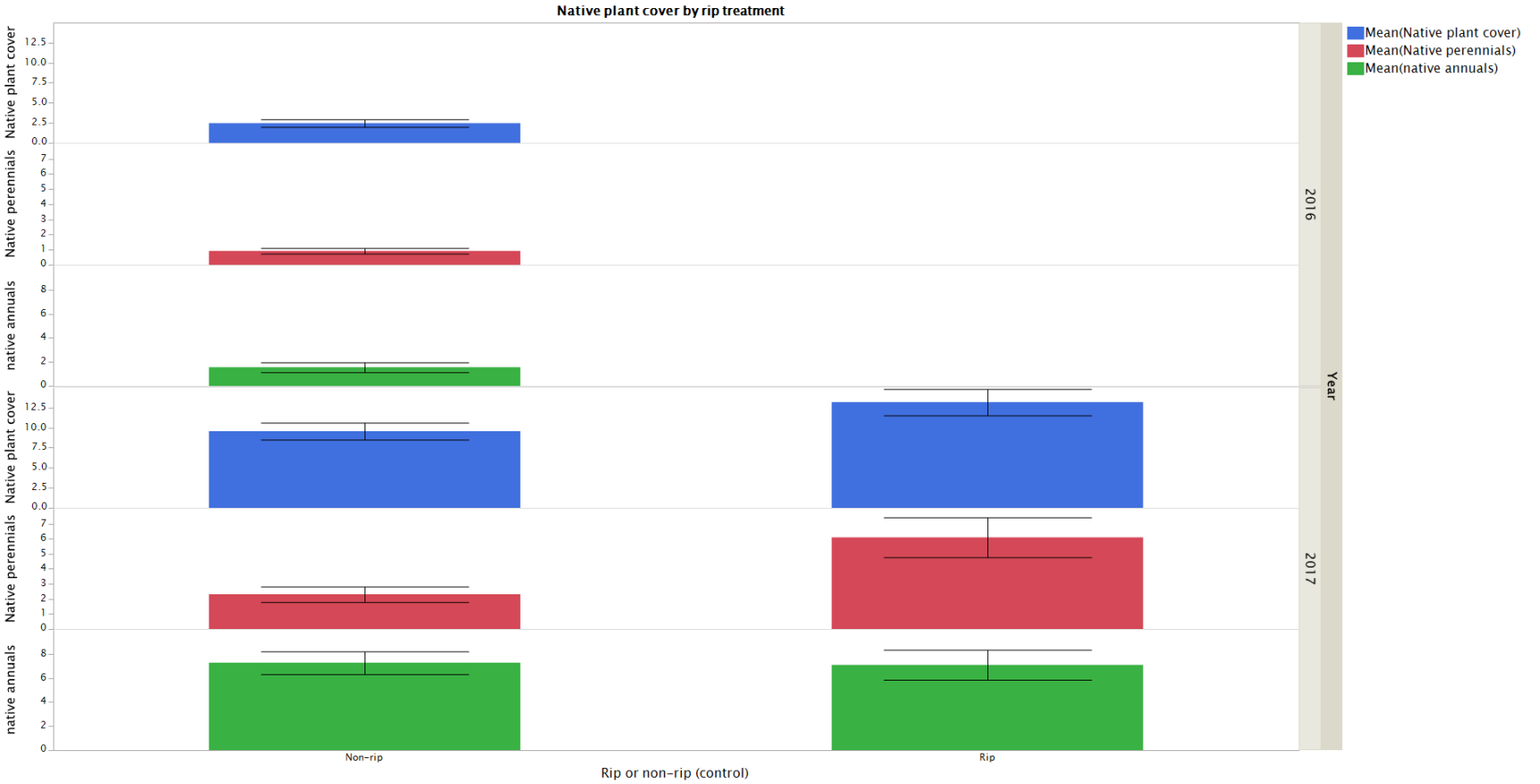
Data collection: coverage

Recorded species and percent cover of plants growing in study plots

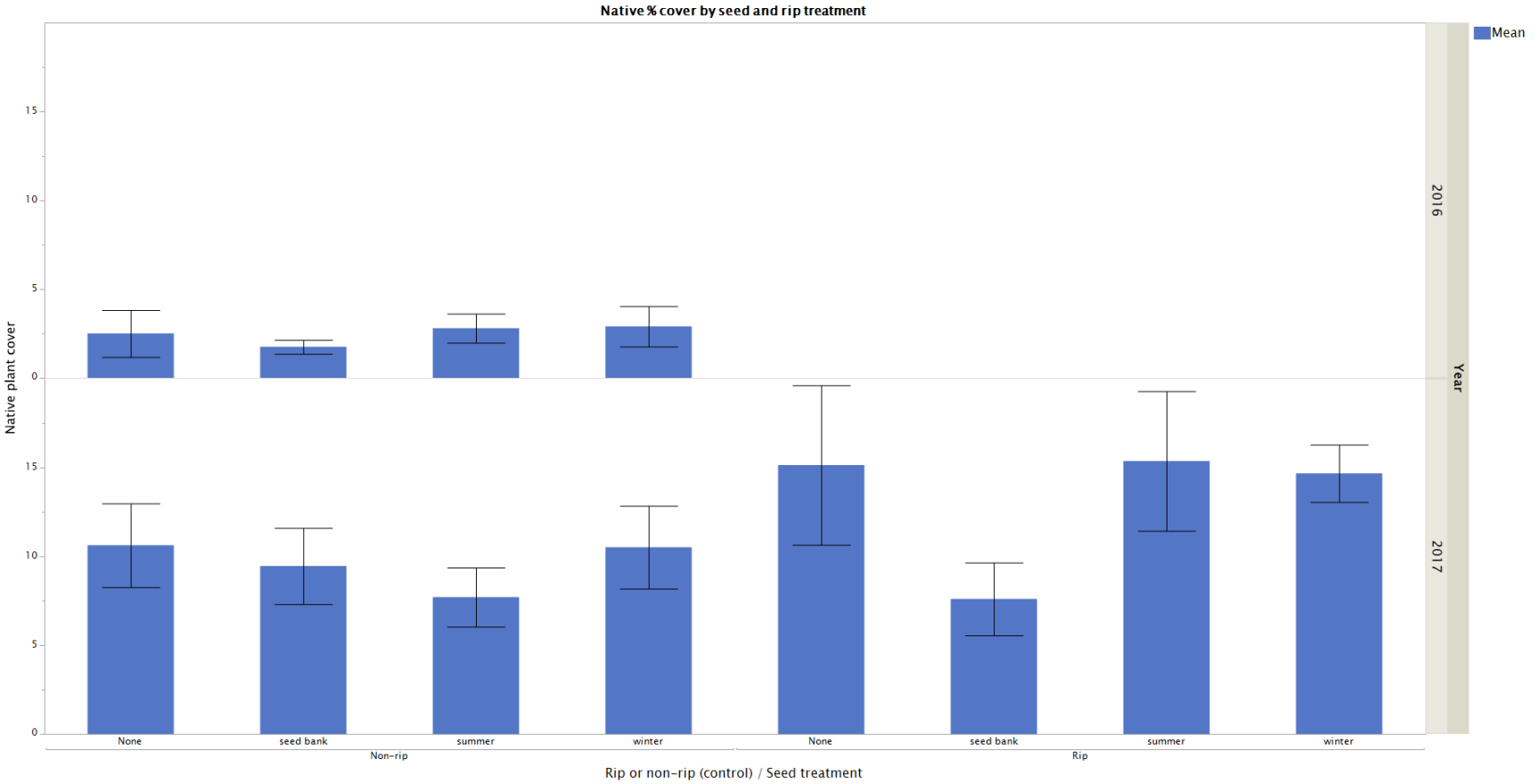
Also recorded percent cover of bare ground, litter, gravel, stones, and soil crust

Photo credit: Debbie Langenfeld

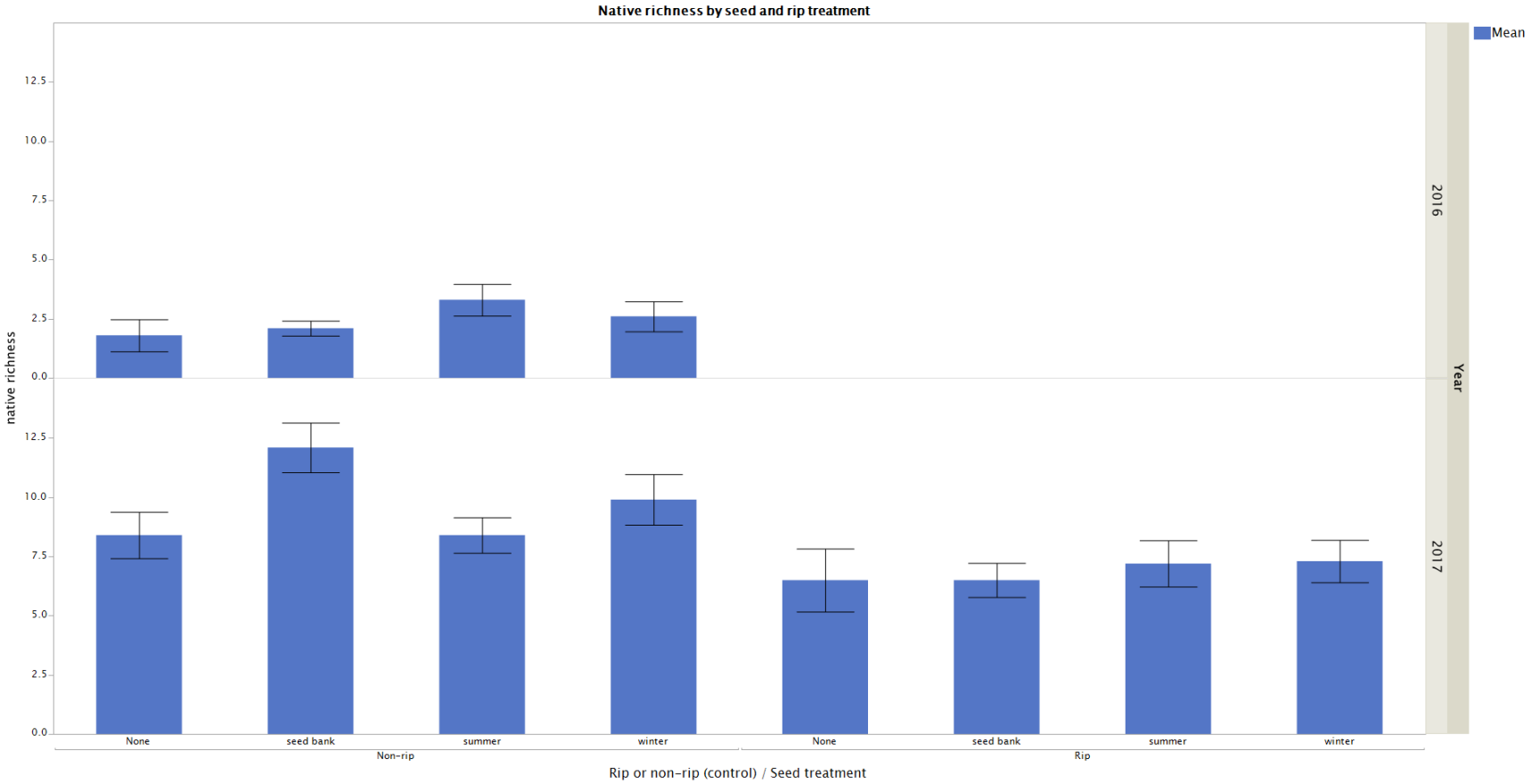
Native plant % cover by rip treatment



Native plant % cover by seed and rip treatment



Native richness of plant % cover by seed and rip treament



Summary of data analysis

Four seed species have not established seedlings (at least not yet)

The Winter Seed plots had the highest number of seedlings

3 non-native species have grown in the study plots (red brome, hairy burstwort, and *Schismus barbatus)*

Summary of data analysis

Ripped plots had overall higher amount of plant cover

Perennials appear to grow better in ripped plots

Overall, native richness of plant species greater in non-ripped plots than ripped plots

Most exciting: The high native species richness in non-ripped Seed Bank plots rivaled non-ripped Winter Seed plots

Also…new species was found!

On last day of data collection, botanist Steve Jones noticed tiny *Linanthus bigelovii* seedling at edge of one quadrat

Plant is native to Sonoran Desert

All signs point to plant originating in Preserve, and not result of contaminant in seed mix planted

Photo credit: Max Licher, courtesy of SEINet (Southwest Education and Information Network)

What's next?

Data will be collected this October to gather more information on plant growth and diversity

Data collection repeated in spring 2018 to monitor long-term results

After 2 years, likely to be a break in data collection, with a return a few years later to collect longer-term results

Photo credit: Leona Weinstein

Questions?

Photo credit: Lisa Rivera

To sign up for Restoration project email updates, contact:

Lisa Rivera, Restoration Project Lead
restoration@mcdowellsonoran.org

McDowell Sonoran Conservancy Field Institute Update May 2017

Let’s take a look at the plan for the next 12 months…

The next 12 months…

Dr. Helen Rowe

Director, MSCFI

Steward, Class 54

Project research partners and national organizations

Wildlife: Scott Sprague, Jan Schipper, Garth Paine, Sharon Hall

Butterflies: Ron Rutowski, National Butterfly Association

Arthropods: Stevan Earl

Plant Phenology: National Phenology Network

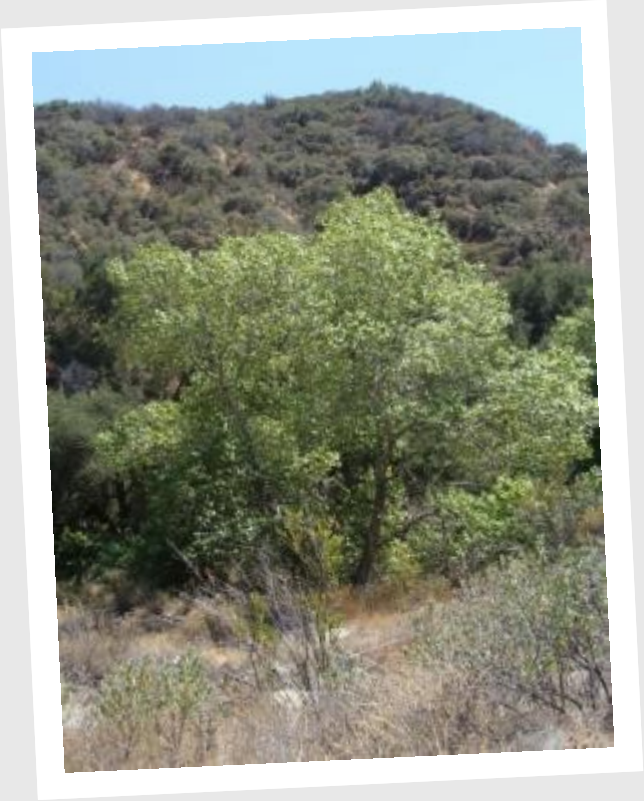
Birds: Walter Thurber, Audubon

Herps: Dave Webber & Natalie Case

Bats: Marianne Moore, Russ Benford

Cottonwoods: Nashelly Menses

Priority 1: Assess the impact of urban stressors and climate change on the Preserve

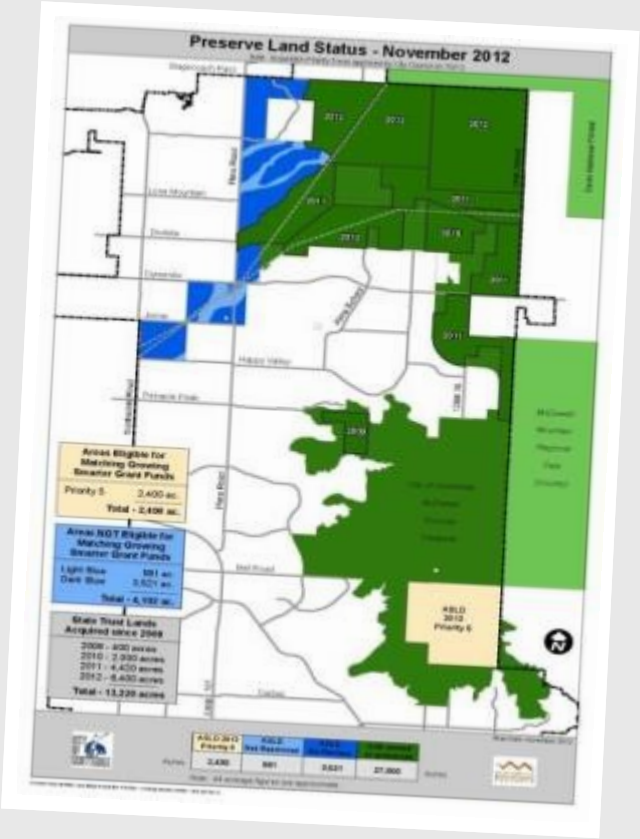


Plants

Sensitive animal species

Priority 1: Assess the impact of urban stressors and climate change on the Preserve

Water resources



Wildlife

Monitoring is critical to **inform adaptive management** and **ensure ongoing protection** of Preserve in face of climate change, urbanization and other perturbations

Our ongoing monitoring

- Phenology (NPN)
- Arthropods (CAP-LTER)
- Bird surveys (Audubon)
- Butterfly Counts – Spring and Fall (NABA)
- Bat monitoring at Dixie Mine, maternity roost
- Surface water maps and monitoring on preserve (and weather stations)
- Investigating wells on the preserve for groundwater monitoring
- Amphibian monitoring

Priority 2: Improve best management practices in ecological restoration and control of invasive non-native plant species for the Sonoran Desert and other arid lands.

Nonnative plant monitoring & removal

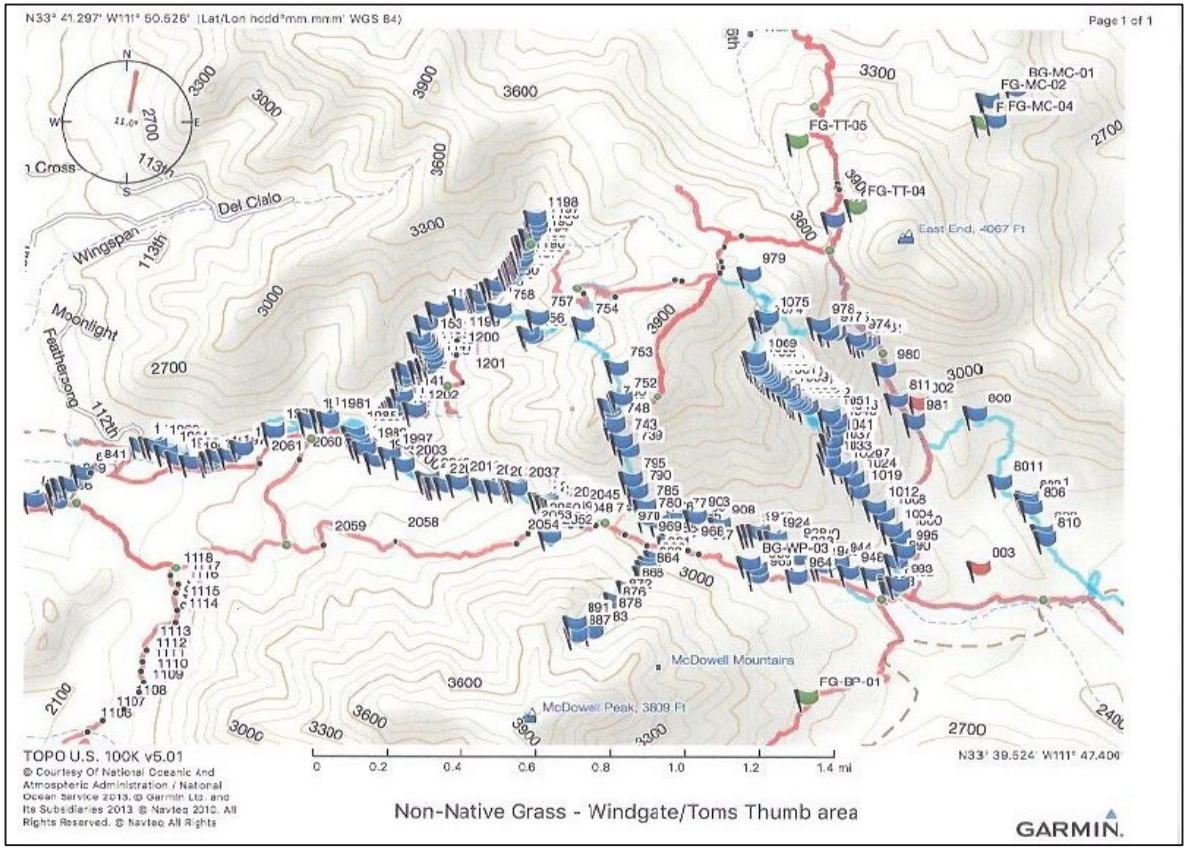
Restoration

Closed trail restoration project

Fountain grass & Buffelgrass

Dispersed removals

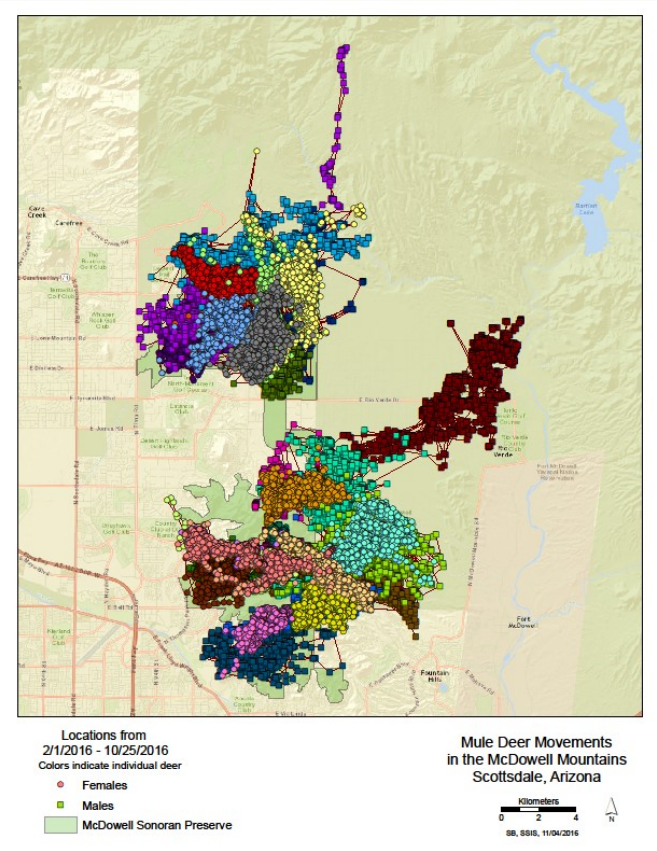
Mapping



Mule Deer Collar Project

Two-year project

Collars fall of in February 2018!



Camera trapping with acoustic ecology

Jr. Citizen Science Festival

Fall and Spring

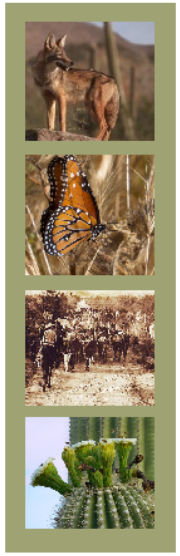
2-day events

Symposium February 2018

McDowell Sonoran Preserve Research Symposium Planned for October 24-25

McDowell Sonoran CONSERVANCY

Please join us for the the first-ever McDowell Sonoran Preserve Research Symposium



This two-day event brings together researchers, students, citizens, and community leaders to share and learn about the scientific and historical research conducted within Scottsdale's McDowell Sonoran Preserve and the surrounding area. This event is hosted by the McDowell Sonoran Conservancy's Field Institute and Scottsdale Community College's Center for Native and Urban Wildlife.

Purpose:

- Promote awareness of the research being undertaken on the Preserve and Sonoran Desert.
- Encourage networking among scientists, students, and the public
- Trigger new research and collaborations that benefit the Preserve and surrounding parks, preserves, and natural areas.

When:

October 24, 8:00 am – 4:00 pm

- Presentations
- Posters
- Biodiversity tours

October 25, 8:30 am – 12:00 p.m.

- Educational hikes to research sites in the Preserve
- Workshops and tours at Scottsdale Community College

Where:

Scottsdale Community College, 9000 E Chaparral Rd, Scottsdale, AZ 85256 in the Science Lecture Building.

Registration

Registration for the symposium is $20, which includes a Saturday continental breakfast, morning and afternoon refreshments (coffee & tea), and Sunday activities. A student rate of $10 is offered to undergraduate and graduate students. To register, go to www.mcdowellsonoran.org and find link under "Latest News". For more information, to submit an abstract, or to inquire about scholarships, contact mspresearch@mcdowellsonoran.org.

Scottsdale Community College · Center for Native and Urban Wildlife · Maricopa Community Colleges — The Maricopa Community Colleges are EEO/AA Institutions. · McDowell Sonoran PRESERVE · City of Scottsdale

Schedule
Scottsdale's McDowell Sonoran Preserve Research Symposium

McDowell Sonoran CONSERVANCY

October 24-25 Scottsdale Community College, Science Lecture Building
9000 Chaparral Road, Scottsdale 85256

Scottsdale Community College · Center for Native and Urban Wildlife · Maricopa Community Colleges — The Maricopa Community Colleges are EEO/AA Institutions. · McDowell Sonoran PRESERVE · City of Scottsdale

Saturday, October 24

8:00 – 8:20 - Sign-in and registration
8:20 – 8:30 – Welcome and introduction: Helen Rowe and John Weser
8:30 – 9:00 - Keynote Speaker – Virginia Korte, Scottsdale City Council

Oral Presentations

9:00 – 9:15 : Geologic History of the McDowell Mountains
9:20 – 9:35: Ghost Road
9:40 – 9:55: Vegetation and Flora of the McDowell Sonoran Preserve

10:00– 10:20 – Refreshment break - refreshments, posters and tours

Oral Presentations (continued)

10:35 – 10:50: Ground Dwelling Arthropods in Scottsdale's McDowell Sonoran Preserve: Results from a Three-Year Study
10:55 – 11:10: A Story Of Survival At Brown's Ranch: Re-vegetating With Tall Pots
11:15 – 11:30: A Survey of the Herpetofauna Occurring in Scottsdale's McDowell Sonoran Preserve
11:35 – 11:50: Non-Native Plant Species in Scottsdale's McDowell Sonoran Preserve: Assessing the Feasibility and Efficacy of New Technology in Vegetation Monitoring and Plant Ecology
11:55 – 12:10: McDowell Sonoran Conservancy Stewards and the Experience of "Place": A Focus Group Pilot Study

12:15 – 1:00: Lunch and Center for Native and Urban Wildlife guided tours

1:00 – 2:00: Poster presentations
2:00 – 2:30: Keynote speaker: Sharon Hall, CAP LTER
2:30 – 3:45: Panel Discussion: The Future of Conservation in the Phoenix Valley
3:45 – 4:00: Closing

Sunday, October 25

8:30 – 12:00 Guided Hikes in Scottsdale's McDowell Sonoran Preserve

Marcus Landslide Hike – Brian Gootee and Ron Rutowski
Brown's Ranch Hike – John Weser and Len Marcisz

8:30 – 12:00 Scottsdale Community College Center for Native and Urban Wildlife workshops and tours

Bee box workshop
Tours of propagation yard
Willow cutting workshop
Tours of burrowing owl habitat

For information contact mspresearch@mcdowellsonoran.org

Pending funding…

Next year new and expanded projects

Buffelgrass and Fountaingrass Removal Study

What is the most cost effective approach to:

a) Control buffelgrass and fountain grass

b) Protect native plant diversity

New and expanded projects

- Bat monitoring (expanded)
- Long term plant monitoring study group
- Restoration planning for native seed development
- Remove tamarisk at Dixie Mine (monitor community response)

Regional Partnership Building

Central Arizona Conservation Alliance

Regional Open Space Strategy

Questions?

McDowell Sonoran Conservancy Field Institute Update May 2017

Some closing remarks from Melanie…
And then cupcakes!

McDowell Sonoran Conservancy Field Institute Update May 2017