



ARIZONA FLOODPLAIN MANAGEMENT ASSOCIATION

Volume 47, Number 1
Spring 2023 Newsletter

Spotlight on Arizona's Climate

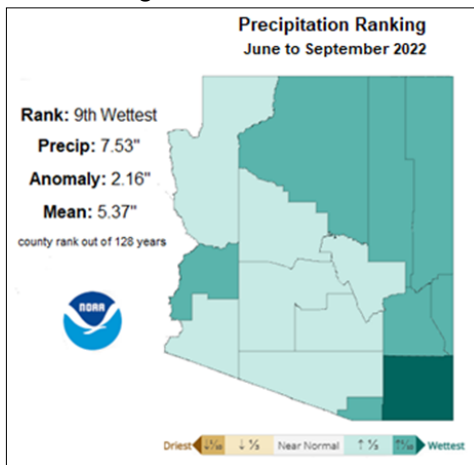
Erinanne Saffell, PhD, Arizona State Climatologist

In 1973, the National Oceanic and Atmospheric Administration (NOAA) notified the states that NOAA was terminating their Federal State Climatology Program. That meant that each state was now responsible for appointing their own state climatologist. The first Arizona State Climatologist, Dr. Robert Durrenberger, was appointed on July 25, 1974. [Dr. Erinanne Saffell](#) was appointed as the 6th Arizona State Climatologist in 2021.

The Arizona State Climatologist is the Director of the [Arizona State Climate Office](#), and the Office evaluates and synthesizes climate data, providing context and relevancy about the climate of Arizona. The Office serves the people and state of Arizona in a variety of ways, and one is through map design and production that evaluates and explains the climate across the state.

Last monsoon season was very wet, ranking as the 9th wettest June to September in the period of record (Arizona's period of record goes back to 1895). Cochise County had their wettest monsoon season on record (and also received the most lightning strikes across the state for Monsoon 2022).

[\(conclusion on page 13\)](#)



Average statewide precipitation for June to September, 2022, ranked as the ninth wettest June to September in the 128 years of record.

Spotlight on the Reliability of the CAP

Don D. Crandall, CAP Water Control Manager

The severity of the Colorado River Basin drought necessitates a significant amount of Central Arizona Water Conservation District (CAWCD) resources and attention. The Central Arizona Project (CAP) is a vital component of Arizona's water supply and is considered essential to the state's economy, environment and quality of life. CAP delivers water from the Colorado River to central and southern Arizona, providing water to nearly 6 million people, supporting cities, industries and tribes – as well as the economic development that comes along with that. The continuity of water supply for these Arizona water users depends on the operational reliability of the CAP system, which remains essential, particularly during a water shortage.



[\(conclusion on page 14\)](#)

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Upcoming Events:

2023 AFMA Spring Conference
Flagstaff
May 3-5

2023 ASFPM Conference
Raleigh, NC or Virtual
May 7-11

2023 AFMA Fall Conference
Tucson
November 1-3

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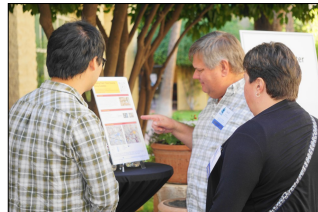
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AFMA Chair, Katherine Fish**Views from the Chair**

Hello AFMA Membership!

AFMA's Board of Directors is continually looking for ways to improve, not only the conferences but every interaction with the members. We plan the conferences with the goal of providing information that is applicable to all the jobs you do. We actively seek out presentations on topics that are relevant and will be a benefit to the membership. If you are working on a project, or just completed one, please consider doing a presentation at the next conference. There is probably someone sitting in the audience that is struggling with how to approach a problem and your presentation will provide the solution they need.

I hope you have seen some of the latest changes we've made in our efforts to keep the Association moving forward. At the conference, we have incorporated a **Training Track**, aimed to appeal to new engineers or EITs. We felt this group could benefit from both concentrated training and the opportunity to meet other people in their field. The training is specifically designed to break and have meals with the rest of the conference attendees so everyone could interact. We are also actively working on student involvement with the universities. We hope the **Student Poster Session** during Thursday lunch will become a permanent feature.



After the last conference, you may have seen an email blast asking about your interest to **join a committee**. We had more than a few people respond which was much appreciated and remember you can join a committee at any time. If you're interested, please talk to any of the Board members or chair of the committee you want to join.

You will now have one more choice when choosing which committee to join. The Board approved the formation of the new **Nature-based Stormwater Management Committee**. This committee will be providing information about Low Impact Development and Green Infrastructure applications throughout Arizona. We are looking forward to seeing this committees' ideas come to life.

Have you seen the **new website**? We are so excited to have something that is more user friendly and accessible for you to use. In my opinion, it's much more visually appealing. The carousel (a term I learned recently) has our hot topics along with a cool photo. Check back often to see what's coming up!

You may have also noticed a "**Save the Date**" email along with the call for presentations. This is another improvement we're bringing to the membership. The hotel room block for conferences is often open sooner than registration. We want to make sure you are getting the correct price for your stay during the conference.

All of these changes have been the ideas of Board or Committee members. I would like to thank them for their commitment to the organization and hope they realize how much we all appreciate the time and effort they put in to making things better.

Enjoy Flagstaff!

(Photos by Jimmy Tonthat)

Jack Moody, Vice Chair

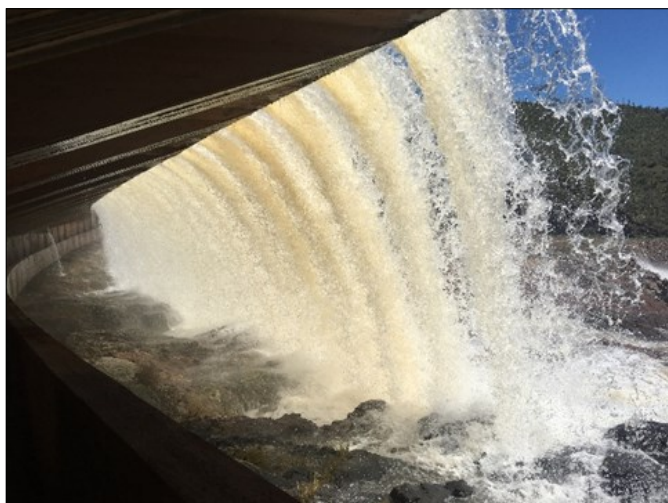
We are all Friends here at AFMA



I have been involved in AFMA for many years – make that many decades – on committees and as an officer, and hopefully I will for many more to come. I love this organization, the people, and the work we do in floodplain management. It has been a pleasure to get to know so many of my fellow members through the years and I consider most of you friends. Not the kind of Friends that see each other every day in an apartment in New York, but the kind of friends that see each other only once or twice a year and enjoy catching up. So, I look forward to seeing you all at the Spring Conference in Flagstaff.

The weather this winter and all the runoff it has produced has been the topic of discussion with many of my friends. The winter this year was unusually wet with much higher-than-average rainfall in the Arizona deserts and significantly greater-than-average snow in the mountains. We all know that we needed this added precipitation to help fill our reservoirs for our household and industrial uses. We use this water for drinking, cooking, bathing, farming, industry, and many other consumptive uses. But we also use this water in a non-consumptive way, recreation. We use it for things like swimming, paddle boarding, boating, water skiing, whitewater rafting, canoeing, and – my favorite – fishing. Like many of you, seeing all the lakes filling up has made me very happy.

The Salt River system consists of six lakes that are used for recreation: Roosevelt, Apache, Canyon, and Saguaro on the Salt River, and Horseshoe and Bartlett on the Verde River. Roosevelt Lake is the largest of all and has more capacity than the other five combined. As of this writing, all of these lakes are either full or expected to fill with the remaining snow melt. Because of this, Salt River Project is releasing water from the system. This is quite a sight, especially to us drainage nerds.



The underside of Horseshoe Dam Spillway

In my opinion, one of the best releases is from the Horseshoe Dam spillway. This spillway has a walkway underneath so you can see the “waterfall” from the back side. It is quite impressive, and I recommend it to all of you. Unfortunately, at the time of this writing, it is spilling too much water and the Verde River below has inundated the road to the dam and lake. I learned of this the hard way. I know the slogan of our industry is “Turn around, don’t drown”, so I didn’t get to see it this year. Fortunately, I have photos from the last time Horseshoe Dam spilled in 2019. The flow in these photographs was just under 2,000 cfs. This year, the flow over the spillway was up to 29,500 cfs.

[*\(conclusion on page 15\)*](#)

Jean Marie Rieck, Secretary

New/Upcoming Federal Environmental Law and Policy Changes

The EPA and USACE finalized a new definition of Waters of the U.S. (WOTUS) effective March 20, 2023. The Clean Water Act (CWA) provides a comprehensive set of federal protections for surface waters considered to be Waters of the United States (WOTUS); however the CWA does not define WOTUS. Instead, the EPA and USACE define WOTUS through regulation, and there have been many attempts to provide guidance or interpret intent.



What is included in the new definition of WOTUS?

1. Traditional navigable waters, territorial seas, and interstate waters
2. Impoundments of traditional navigable waters, territorial seas, and interstate waters
3. Tributaries that meet the relatively permanent standard (RPS) or significant nexus standard (SNS)
4. Wetlands adjacent to: (a) Traditional navigable waters, territorial seas, and interstate waters; (b) Relatively permanent impoundments or jurisdictional tributaries that meet the RPS; and (c) Impoundments or jurisdictional tributaries that meet the SNS
5. Intrastate lakes and ponds, streams, or wetlands that meet the RPS or SNS

What is excluded from the new definition of WOTUS?

1. Water-filled depressions created in dry land incidental to construction (e.g., borrow pits)
2. Artificial lakes or ponds created by excavating or diking dry land and used only for stock watering, irrigation, settling basins, or rice growing
3. Artificial reflecting pools, swimming pools, or other ornamental water bodies created by excavating/diking dry land
4. Ditches that do not carry relatively permanent flowing water (including roadside ditches)
5. Artificially irrigated areas (areas that would normally be dry land if left unirrigated)
6. Waste treatment ponds or lagoons
7. Prior converted cropland (excluding wetlands converted to cropland prior to 1985)

Relatively Permanent Standard (RPS): This standard is a test that identifies relatively permanent, standing, or continuously flowing waters or tributaries that have a continuous surface connection to WOTUS. The connection does not need to be continuous; it could be a natural landform or physical feature (e.g., swale, drainage) with intermittent flow. The test excludes sheet flow or features with an unclear physical connection (e.g., floodplains), shallow subsurface connections, or features separated by a human-made barrier.

Significant Nexus Standard (SNS): This standard is a test that evaluates features adjacent to but lacking continuous surface connection to WOTUS, features adjacent to non-relatively permanent water, and tributaries that flow for short duration flow in direct response to precipitation. This standard is important because the aggregate effects of ephemeral streams can have substantial impact on integrity of downstream WOTUS and can be a regular or direct source of freshwater for sparse traditional navigable waters in arid Southwest. A Significant Nexus Analysis must investigate the chemical, physical, or biological contributions of drainage features within a project area on downstream traditionally navigable waters, territorial seas, and interstate waters. A notable change is that the analysis needs to evaluate potential downstream contributions from the entire project “region” which not only includes the project area or reach of potential WOTUS within the project area but also the entire upstream watershed.

Impact on current or upcoming projects: The new definition should not change things significantly. A preliminary or approved jurisdictional determination of potential WOTUS still needs to be conducted in most cases and the process for conducting determinations remains unchanged. Because the new definition is basically a continuance of what has been done for many years (with the exception of the Navigable Waters Protection Rule), the USACE review and determination process and timeline should not be significantly changed.

What to expect for future planning

- Expect the unexpected and develop a permitting approach that can account for future changes.
- Anticipate that lawsuits may arise and cause more uncertainty in the future.
- Stay current with proposed federal and state legislation.
- Expect slightly longer than normal USACE review times for jurisdictional determination reviews/approvals this year.

Note that Approved Jurisdictional Determinations (AJDs) issued under the 2020 Navigable Waters Protection Rule might need to be reopened because they did not account for all features now considered to be WOTUS. Recent AJDs issued under Rapanos should still be valid for their 5-year shelf life.

Mark Fountain, Treasurer

Precipitation and Money, but not Raining Money

For those that I haven't had the pleasure of meeting yet, I am the new AFMA Treasurer. I want to take a quick moment and give a huge Kudos to Bob Haneline who has been instrumental in making this transition easy. His great organization skills and efficient transfer of the body of knowledge has made the process quite painless. Thank you, Bob, for your years of service and dedication to AFMA! We look forward to your continued support of the organization and serving as a backup to our operating accounts.

With a wet 2023 well underway I'm sure you've found yourself spending time outdoors and making the best of the cooler temps—maybe even enjoying that fluffy white stuff! With several trips north this spring we've been off-roading in the National Forests, sledding at the Cinders, and Snowboarding at Arizona Snowbowl. Blessed with 338" of season total snow, there was a little something for everybody.



Looking ahead, what does the future look like regarding the finances of AFMA? It should come as no surprise that costs for services are generally increasing. Accommodations across the service industry are seeing price hikes with raw goods and services increasing quickly. Obviously, that impacts the future of operations.

As you know, AFMA takes great pride in providing reasonably priced offerings for field trips, training events, and the semi-annual conferences. Previous efforts for adjustment included the very modest increase in the conference costs to help cover the costs of services, which was well received by the memberships. Going forward, we will diligently review the costs of services and seek to strike the right balance between the dues and conferences to match market adjustments as necessary.

So, what can AFMA do to combat the depreciation of cash in our accounts and strive to maximize our opportunities? We are currently discussing several opportunities to remain proactive in these times of change. One item we are exploring is short to mid-term investment accounts with favorable terms and interest rates to help generate additional interest from a portion of our accounts, which can be used to help offset the otherwise observed depreciation of our buying power. This is a unique opportunity afforded to the board per our Articles of Incorporation and the structure of AFMA. Stay tuned for additional findings and actions taken to help leverage our opportunities as an organization.

Switching lanes and thinking toward to next generation of professionals, let's also discuss the rising costs of education and how AFMA plays a role in supporting the efforts of students through scholarships. Annually, AFMA seeks candidates with applications due each April. This year, multiple scholarships are available, and the award value has been increased to from \$2,000 to \$3,000 to help alleviate rising education costs. AFMA is honored to proactively promote the education of future water resources professionals.

If you haven't already done so, please visit our AFMA webpage and donate toward the 2023-2024 AFMA scholarship (see the rotating banner). You can make one on behalf of your company and/or on behalf of yourself. Log in and fill out the details to help fund this outstanding opportunity. Each donation made counts as a charitable contribution to AFMA as a 501(C)(3) and aids in the reduction of your personal taxes! Take advantage of this opportunity and support a great cause today!



Elizabeth Rockwell, Associate Member Representative

Spring Conference Details

We are just around the corner from the Spring 2023 AFMA Conference to be held May 3-5 in Flagstaff. The conference committee and I have been working diligently in the planning for this conference, and we have all sorts of activities planned to keep you involved and busy during the conference.

We kick off on Wednesday, and in addition to a full slate of free classes like normal, we will include our second **Training Track** course. The training track is a specialized track that will allow for an attendee to gain new skills, and attend a multi-day training workshop, while still having access to all the networking benefits of attending an AFMA conference. The Training Track course this conference is a HEC-RAS Basic Training. The training will be held Wednesday 8:00 AM - 5:00 PM, and Thursday 8:00 AM - 2:00 PM. When the class concludes, attendees will be invited to join the rest of the conference for the Thursday afternoon sessions, and the Friday plenary session as well. Along the way, attendees will attend the same meals as the rest of the conference. There is a separate registration page if you are interested in attending the HEC-RAS Basic Training, so check out AFMA's website for more information.



On Wednesday evening, after the classic 5 - 6 PM reception, we invite you to join us on a trip to the Lowell Observatory. This activity requires a separate registration from the main conference and will cost each attendee \$40. The cost includes transportation to and from Lowell, a dinner catered by Bigfoot Barbeque, and the entrance fee into the Observatory. Please register ahead of time, so that we can get an accurate headcount! For more information, see our website <https://azfma.clubexpress.com>.

Since the conference is being held in the northern region, you can expect a presentation focus on our northern region counties: Mohave, Coconino, Yavapai, Navajo, and Apache. Wonderful attributes of the Northern Region include the weather and terrain. As such, we will be kicking off the conference proceedings on Thursday morning bright and early (6 AM), with a hike around the Little America Loop. This light, 2.3-mile trail, circles through Little America's property in approximately 50 minutes. Make sure to bring proper attire and shoes if you choose to attend.

Later in the morning on Thursday, keeping on theme with the northern region, we will dive into the plenary session with a local welcome from two deans from Northern Arizona University (NAU), and a Keynote Presentation from Thomas Siyuja, Sr., the Havasupai Tribal Chairman. On Thursday evening, after dinner and the silent auction, you can form a team to take a scavenger hunt around the Little America property and into downtown Flagstaff. We will conclude the conference on Friday with a field trip to investigate the post-fire flood mitigation measures due to the 2019 Museum and 2022 Pipeline Fires in Flagstaff.

This will be the second conference in a string of three, with the first being the Fall 2022 Conference in Tempe, and the third being the Fall 2023 Conference in Tucson, where we are putting a heavier focus on student engagement. Like in Tempe with Arizona State University (ASU), we will be hosting a **Student Poster Session** with students from NAU during lunch on Thursday, 12:00-1:30 PM. The Student Poster Session is open to undergraduate and graduate level students in civil engineering to share about a recent project, study, or something cool they'd like to talk about. The poster session will be a great networking opportunity for the students as well as our conference attendees, as many students may soon be looking for internships or full-time jobs as the semester comes to a close.

Looking into the future, we are planning the Fall 2023 AFMA Conference in the Southern Region, November 1 - 3 in Tucson. We will continue our close-to-universities tour at the Marriott Tucson University Park. For the Spring 2024 AFMA Conference, we will head back to the Central Region.

Thank you again for this opportunity to serve AFMA. If you have any suggestions, ideas or are interested in presenting at a future conference, please contact me at (602)-506-5460 or Elizabeth.Rockwell@maricopa.gov.

Chris Langham, Southern Region Representative

Southern Arizona Water Use

Southern Arizona is, like many other parts of the state, growing quickly due to the positive economic environment, exodus from other states, and desirable climate. This growth has been both anticipated and met with legislation to protect our limited natural water resources. While many in our calling (why not?) often focus on the design of solutions and protections from the impact of peak discharge storm events, it might do us well to pause on a parallel track and consider some of the long-term impacts to water use and available supply that impact the state. Note: this is not comprehensive, by any stretch.



One of the major developments in Southern Arizona's water management is through implementation of the Groundwater Management Act in 1980¹. This legislation regulates groundwater users in the region to develop and implement plans for sustainable water use, and it has been successful in managing groundwater usage and preventing over-pumping, which can lead to depletion of aquifers.

Southern Arizona had faced a series of droughts in recent years, leading to lower groundwater levels and depleting surface water resources². Further, as the Colorado River continues to struggle there is a very real risk of the Central Arizona Project (CAP) allotment to the southern region to be limited, or cut off, altogether³. The City of Tucson has used this potential reality to levy a 'CAP Surcharge' onto user water rates starting earlier this year⁴.

Another recent development is the Arizona Department of Water Resources' (ADWR) efforts to update its water management plans in Southern Arizona. ADWR is developing new plans to better manage the region's water including measures such as water conservation, reuse, and new infrastructure to capture and store water during wet periods. An act within the Douglas Active Management Area (AMA) has developed that "only those lands that were legally irrigated in the five years preceding that date (August 30, 2022) may be irrigated within the basin."⁵

These new limitations on water usage will certainly affect our farming communities first. How this will play out on the useful farming economy as a whole is unknown, but absolutely worth monitoring. The continued development of rules and actions seeking to appropriately use our limited water resources will likely be a political and objective balancing act. It is certain that the stakeholders will be watching and acting. Let's hope for another wet year and solid decision-making from the regulators and users.

Cheers (with a glass of water, of course)

Chris

1. Arizona's Groundwater Management Act of 1980 - <https://new.azwater.gov/news/articles/2016-18-11>
2. 2018 Depth to Groundwater Map - <https://www.tucsonaz.gov/files/water/docs/2018DEPTH.pdf>
3. Arizona to Lose 21% of the State's Annual Allotment of Colorado River Water in Historic Cuts - <https://www.azfamily.com/2022/08/16/colorado-river-cuts-expected-arizona-other-area-states/>
4. City of Tucson – Water and Environmental Service Rate Increases, 2023-2027 - <https://stories.opengov.com/tucsonaz/published/tv7IsMRxB>
5. Douglas AMA - <https://new.azwater.gov/ama/douglas-ama>

John Carr - Northern Region Representative**Oak Creek Floodplain Remapping Update**

On September 21, 2022, the Federal Emergency Management Agency (FEMA) issued a [Letter of Final Determination \(LFD\)](#) for the Oak Creek [Physical Map Revision \(PMR\)](#) and the updated [Flood Insurance Rate Maps \(FIRMs\)](#) became effective on March 21, 2023. The PMR covers the portions of Oak Creek in Coconino County and Sedona, with the remaining floodplain areas in Yavapai County to be updated in the next year.

Oak Creek had not been restudied in over 30 years. The hydrology, hydraulics, and floodplain mapping for Oak Creek were analyzed from the upper canyon to the confluence with the Verde River. This included the study and remapping of over 100 tributaries to Oak Creek.

The Oak Creek Floodplain Remapping Project was led by Yavapai County with the support of the Federal Emergency Management Agency, the City of Sedona, Coconino County, engineers, scientists, community organizations, residents, and business owners. A team led by Atkins North America, Inc. provided the flood study engineering and floodplain delineation, and Bender Consulting Services, Inc. provided outreach and risk communication services.

The table summarizes the impact on properties within the Coconino County portion of the study area.

Please refer to the [Flood Map Changes Viewer](#) compares the previous and effective maps.

PROJECT STATISTICS					
Jurisdiction	In/In ¹	In/Out ²	Out/In ³	Out/Out ⁴	No Structures ⁵
Coconino County	18	16	2	47	80
Sedona in Coconino	98	37	11	159	152
Totals	116	53	13	206	232

- Structures in the previous SFHA and in the new SFHA
- Structures in the previous SFHA, but out of the new SFHA
- Structures out of the previous SFHA and out of the new SFHA
- Properties without structures in the new SFHA

Geoff Brownell - Central Region Representative**Musings**

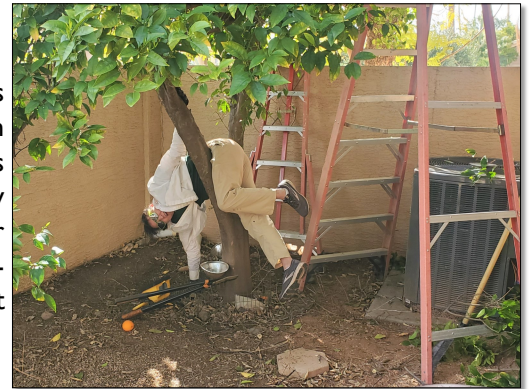
To paraphrase the great comedian Tom Segura (disclaimer: not for the faint of heart), there's an unspoken rule for early morning flights that the shades will be left down so people can rest. But there is always some grown wingnut (my word, not his) that wants to look at clouds like they've never seen them before. Well, I've got to admit it: I'm the wingnut and I suspect a lot of you are as well. Except we aren't looking at clouds, we are looking at drainage patterns. A couple of thoughts come to mind. First, we are lucky to live in the west. I heard this in my geology classes in college and I certainly appreciate it as a surface water professional. Having everything exposed, geomorphically and geologically speaking, is awesome. Things get decidedly less interesting, at least from this perspective, the farther east you fly. Second, is flooding really flooding if it happens in the Middle of Nowhere, NV (I fly to Reno a lot). Who knows? One thing I do know is that I annoy the heck out of my wife with this. She's an aisle person, I'm a window person, therein lies the conundrum. I have a whole strategy to maximize getting a row to ourselves while still contemplating wing location. It rarely works given how full flights are these days, and it usually puts us in the back of the plane. Although, I am 3 for 4 recently. (Side note on the one failure: nothing's worse than checking the airline app the morning of a flight with that empty middle seat only for someone to book it last minute. Who are these people? Definitely not engineers). I digress, but if it is not brutally obvious at this point, again, I'm a wingnut.



Laurie Miller – Newsletter

Avoiding Danger and Discomfort

Arizona is home to a number of critters best left alone. The more dangerous venomous/poisonous include the Mohave rattlesnake and more than a dozen other varieties, the bark scorpion, Africanized bees, and centipedes. Others not as potentially deadly include Gila Monsters, other scorpions, black widow and brown spiders, tarantulas, and Sonoran Desert toads. While an encounter may not be life-threatening, it certainly will be painful. Any and all may be encountered while out and about—including doing field work—so be careful out there! One seldom-discussed threat to Arizonans: trimming citrus trees.



Never fall off a ladder with a giant lopper in hand. Unless you have a tree to catch you.



Old Business:

There were no winners from last issue's trivia challenge, but the close-up photos on the left may help. Your mission: guess where they were taken, dig up the pertinent history lesson to wow your friends, and email me (Miller@LTMengineering.com) with the results. C'mon, people! The gauntlet has been thrown.

Brian Schalk - Nature-based Stormwater Management

New AFMA Committee Formed

For as long as people have been dealing with nuisance flooding or finding ways to use water as a resource, there has been implementation of relatively small drainage features that capture, attenuate, and/or divert flow. Now, as metropolitan areas continue to sprawl and the ever-increasing urbanization continues to disrupt the “natural” hydrologic cycle, there is a solid body of work throughout the southwest that has shown that strategic implementation of relatively small drainage features within the built environment can help mimic natural processes. This “mimicking” of natural processes can provide a multitude benefits, including, but not limited to, flood reduction, water conservation, and improved water quality.

The big question is – **how can** these small, nature-based stormwater management features cost-effectively fit within or supplement the traditional centralized stormwater management way of doing business. Or, a deeper question yet, **should** these nature-based stormwater management features be considered a viable stormwater management way of doing business. Of course the answers will vary, with some professionals firmly pro-LID/GSI and some firmly anti-LID/GSI. The challenge is that the responses from both sides of the fence are reasonable. LID/GSI proponents rattle off accolades that start with the top three – flood mitigation, water conservation, better water quality – and are quick to point out the more subtle benefits such as reduction in heat island effect, more canopy shade, enhanced community space, and better air quality. LID/GSI opponents legitimately point out that nature-based stormwater management alternatives do not fully address regulatory storm flooding, can be costly to construct, can be dependent on special maintenance efforts, and are not fully accepted by many regulatory agencies or by the land developers. Further, there is a lack of engineering standards and guidance to calculate design flow rate and capture volume, and one LID/GSI measure cannot solve neighborhood-wide drainage issues.

Because of the aforementioned pro- and anti-LID/GSI sentiments, AFMA has formed the Nature-Based Stormwater Management Committee, which will work to encourage discussion, identify successes, identify failures, identify challenges, present technologies, connect professionals/organizations, present the latest “happenings”, and hopefully identify practical approaches to enhance floodplain management by blending decentralized (nature-based) and centralized stormwater management opportunities.

If you find the topic of nature-based stormwater management interesting, I encourage you to join this committee. Please reach out to me at brian.schalk@wilsonco.com for more information.

Cindy DePonti - Chair, Technical Committee

Successful Field Trip



On February 24, 2023, another fully-booked Technical Committee field trip was realized with the generous help of the staff at the Flood Control District of Maricopa County (FCDMC).

Buckeye Flood Retarding Structure No. 1 (Buckeye FRS No. 1) is one of three structures north of Interstate 10 and south of the White Tank Mountains in western Maricopa County. The earthen dam, built in the 1970s by the Natural Resources Conservation Service, detains floodwater and conveys it to the Hassayampa River. The structure is 7.1 miles long, 26 feet high, and has a storage capacity of 6,345 acre-feet. The FCDMC is in the process of rehabilitating the dam to extend the life of the structure and ensure it continues to protect downstream properties from flooding.



Thirty AFMA members arrived at the FCDMC offices at 8 AM for an introduction to the project. The Dam Safety Branch produced a highly informative presentation, complete with maps, as-builts, and construction photographs, and Dave Degerness provided interesting and engaging narration. Jeff Wise prepared handouts that included the phased rehabilitation process and dam terminology.

After the presentation, Steve Waters welcomed the AFMA members to the Automated Local Evaluation in Real Time (ALERT) Operations Center and gave us a short tour of the FCDMC's state-of-the-art ALERT system, focusing on Buckeye FRS No. 1.



We then embarked on our journey to the dam. Jeff Wise and Tim Clark coordinated the 3-van transport to the structure and established the route we would take through the massive area actively under construction. Julie Cox coordinated the event between the Dam Safety Branch staff and the Technical Committee members, who arranged for the event's advertising and lunch. We concluded the morning tour with lunch at Jimmy John's, courtesy of AFMA. Each attendee was able to receive 3 CECs for attending.



The dam rehabilitation construction should be finished by the fall, so join us next year to see the completed project.

Ryan Sauer - Chair, Education & Public Involvement Committee

Scholarships & CFM Testing

AFMA recently released the latest round of scholarships for 2023/2024, and with it a few changes. The board has increased the amount from \$2000 to \$3000 each, we clarified that there may be multiple scholarship recipients, and it has been opened up to students entering their sophomore year in college. These changes came from a survey of past applicants on improving the scholarship program. Several noted that a little more funds could go a long way for students, and that sophomores fall into a “donut hole” of ineligibility for scholarships. There are many for incoming freshman, juniors, and seniors, but very few for 2nd year students. So AFMA is stepping in to see if we can fill that gap.



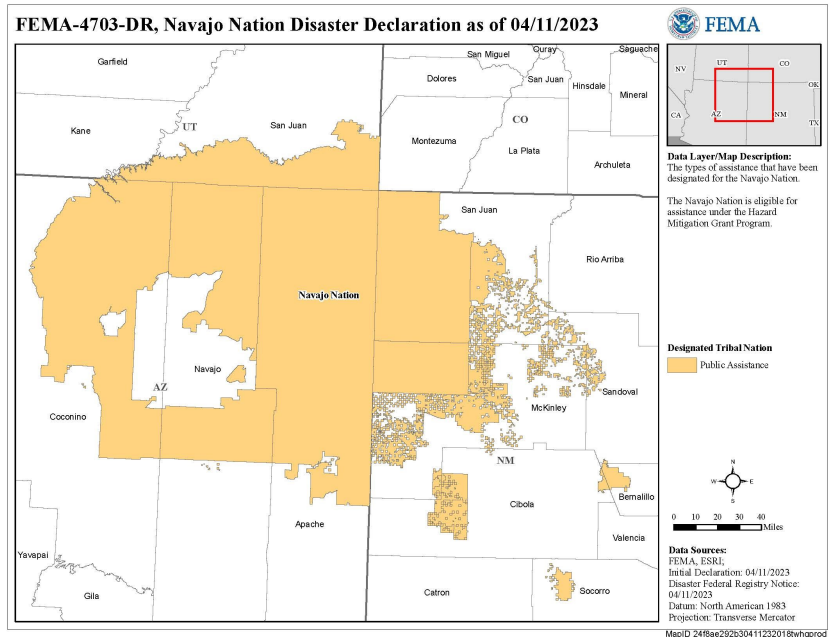
What does that mean for us? We could really use your financial support of the scholarship program. AFMA will conduct a silent auction/raffle event during the 2023 AFMA Spring Conference in Flagstaff to support the Scholarship Fund. We are looking for unique items that people will “bid up” and gift card donations for the raffle. All donations are tax deductible and 100% of the proceeds are awarded to selected students with no administrative costs deducted. Don’t forget to help support this worthy effort with a cash donation, silent auction donation, gift card donation, or raffle ticket purchase at the Thursday spring conference event! Go to <https://azfma.clubexpress.com> and select “Scholarship Fund” to make a cash donation, or email me at rsauer@entellus.com if you are interested in donating an item for the silent auction or raffle. And thank you to those who have already donated – it is extremely appreciated. All of this is to support the future of floodplain management in our great state.

And speaking of the future of floodplain management - the Association of State Floodplain Managers (ASFPM) has finally put its foot down. They no longer allow in-person paper exams at conferences, but they are making it very easy to take the exam. You can now take the exam any time throughout the year at select testing sites. Go to the ASFPM website for details <https://www.floods.org/certification-program-cfm/getting-certified>, and good luck!

Disaster Declaration for Portions of the Navajo Nation

From FEMA.gov:

A Presidential declaration of major disaster for the Navajo Nation (FEMA-1703-DR) was announced April 11, 2023. The declaration was a result of severe winter storms between January 14 and 17, 2023, which led to severe flooding during the spring melt. This means that the Navajo Nation is eligible for assistance under the Hazard Mitigation Grant Program.





The AFMA Fall Conference in Tempe introduced some new twists, including the debut of a Training Track and an invitation to ASU students to participate in a Student Poster Session. We were conveniently and comfortably set up at the Tempe Mission Palms, and their set-up of snack stations worked very well with the flow of the conference.



We kicked off Thursday with a warm welcome from Tempe Mayor Corey Woods and Keynote Speaker Enrique R. Vivoni, PhD, Director of the ASU Center for Hydrologic Innovations, School of Sustainable Engineering and the Built Environment. Friday ended with a field trip to Granite Reef Dam courtesy of Tim Skarupa, SRP.



Photos courtesy of Jimmy Tonthat, Kat Fish, and Laurie Miller.

Arizona's Climate *(continued from page 1)*

In contrast, Monsoon 2020 was the hottest and driest June to September on record, with every county across the state experiencing their driest June to September. The climate of Arizona is arid and semi-arid, so precipitation (seasonally and annually) is highly variable. For example, the five driest years on record are 1899-1903, and the five wettest years on record are 1905-1909; there is currently no discernable pattern to the variability of precipitation in Arizona.

However, Arizona has been in a long-term drought since Water Year 1994, surprisingly the year following the January 1993 floods (the wettest January on record in the state). The long-term average statewide water year precipitation is 12.26 inches. From WY1994, the statewide water year precipitation has averaged about an inch less, at 11.25 inches.

Precipitation Ranking June to September 2020

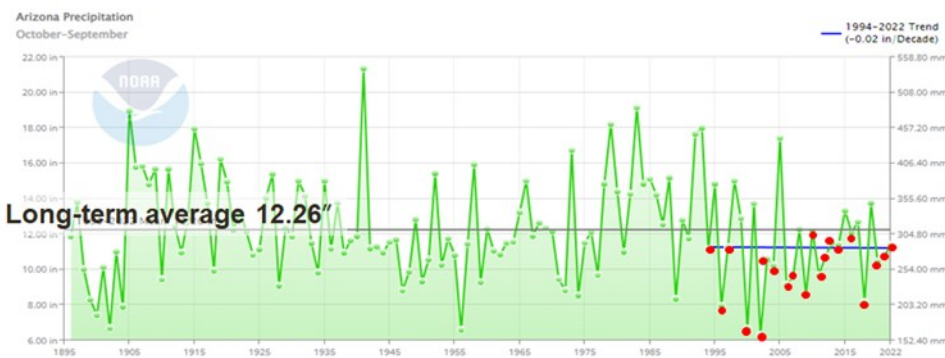
Rank: Driest
Precip: 1.46"
Anomaly: -3.91"
Mean: 5.37"
county rank out of 128 year



Driest 5% 4% Near Normal 1% 5% Wettest

Above: The average nationwide precipitation for June to September, 2022, was the driest June to September on record.

Left: The long-term average statewide precipitation is 12.26 inches.



Since WY1994, 20 water years have been below long-term average statewide precipitation, resulting in a deficit on nearly 30 inches of precipitation. When evaluating how long it might take to move out of the current drought, it's helpful to consider the long-term deficit. More than likely, it will take more than one wet year to move out of the long-term drought.

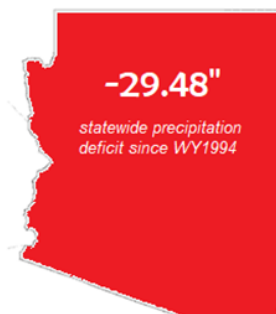
Right: Twenty of the last twenty-nine water years have experienced below-average precipitation.

Water Year	Surplus	Deficit
1994		-1.11
1995	2.58	
1996		-4.30
1997		-0.98
1998	2.76	
1999	0.45	
2000		-5.59
2001	1.49	
2002		-5.55
2003		-1.45
2004		-0.01
2005	5.18	
2006		-3.10
2007		-2.48
2008	0.02	
2009		-3.48
2010		-0.55
2011		-2.54
2012		-1.48
2013		-0.72
2014		-0.86
2015	1.07	
2016		-0.14
2017	0.45	
2018		-4.09
2019	1.50	
2020		-1.79
2021		-1.55
2022		-0.97
1994-2022	15.70	-43.18

Arizona's Long-Term Drought

Arizona has had below-average precipitation for 20 of the last 29 water years.

The state evaluates more than surplus or deficit, but this gives an idea of how much Arizona is below average.



A water year runs from Oct-Sep and is how water is managed. @AZStateClimate

The first four months of WY2023 ranked as the 24th wettest October to January on record. Northern Arizona has stored well above-average snowpack with good measures of soil moisture across much of the state. WY2023 is starting off much better, and the Arizona State Climate Office is happy to count every drop.

Author's Note: The position of Arizona State Climatologist is apolitical and focused on serving the people and state of Arizona. The Arizona State Climate Office is supported in service by Arizona State University, ASU School of Geographical Sciences and Urban Planning, and ASU Julie Ann Wrigley Global Futures Laboratory. The Arizona State Climatologist is a member of the American Association of State Climatologists, and the Arizona State Climate Office is the recognized State Climate Office for Arizona.

CAP Reliability [\(continued from page 1\)](#)

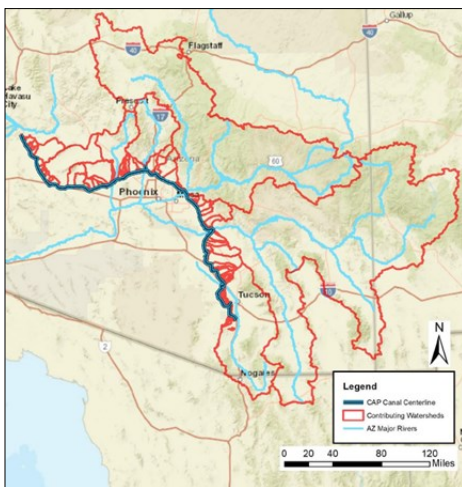
Although the Colorado River Basin is currently experiencing drought conditions, this does not necessarily mean that the risk of flooding in Arizona has decreased. For example, in July 2021, CAP Operations staff detected a high-level alarm in the canal, and water levels continued to rise from a breach in the protective embankment of the canal caused by heavy rainfall near McClellan Wash in Pinal County. Excessive amounts of water and sediment were released into the canal, causing significant damage to the protective dike and the canal.

Repairs were completed over two years with clean out and assessment completed in 2021 and final repairs in 2022. The initial phase included removal and replacement of the existing security fencing, dewatering, removal of damaged concrete panels, mud, and debris, replacement of drainage crossings, and repairs to the O&M road. The final phase, completed in 2022, involved installing a coffer dam, dewatering the canal, removing saturated base material, and replacing the concrete lining. The complete repair cost \$10.5 million.



After that incident, CAP established the Aqueduct Resiliency Committee (ARC), an internal committee to address both risks from flooding and future risks from subsidence. This group has been updating the original hydrology and hydraulics of the CAP system design. Its objective is to identify and quantify system-wide risks and develop a roadmap of improvements that will enhance the system's resilience to high risk scenarios.

The ARC recently met a significant milestone by comprehensively evaluating the flood risks associated with the CAP system. With the canal spanning 336 miles from Lake Havasu to south of Tucson and traversing five major drainages, and numerous smaller drainages, the sheer size of the system can be daunting. The system's performance relies on features such as protective embankments to collect surface water drainage and convey it across or under the canal.



JE Fuller conducted a study that combined flood control studies in the area, an inventory of the protective structures, approximate hydrology and hydraulics for each drainage basin, and an evaluation of the protective structures' adequacy, culminating in a set of recommended improvements for flood control. A range of GIS and LiDAR terrain data sources were used to conduct the modeling. A total of 418 individual watersheds were intercepted by the CAP, with 83 protective embankments cataloged in GIS. Each watershed was examined using USGS regression equations to develop approximate storm discharge and durations to compare with the original design. The original design hydrology was generally located close to the lower 95th percentile of the USGS regression, which could imply that the design under-predicted the 100-year peak flow. Large-scale FLO-2D models were created for most of the CAP-draining watersheds. Since Arizona lacks a comprehensive climatological data set that considers climate change, the study focused on comparing presently accessible data, including the sensitivity and risk

related to the design storm confidence intervals, duration, hydrology to rainfall, and hydrology to watershed area. Finally, protective features were assessed, resulting in the identification of 21 structures that could be overtopped in a 6-hour, 100-year storm event. Finally, conceptual-level improvements for each of these drainages were proposed.

The historic drought in the Colorado River Basin is undoubtedly concerning, and we must collaborate with other basin stakeholders while working within the state on water conservation, recovery, and alternate supplies. However, we must also prioritize the operational reliability of the CAP, which is critical infrastructure for Arizona's water supply, supporting the state's people and economy. CAP is focused on reliably delivering water and minimizing costs associated with unexpected flood damage. Protecting the system from flood control damage is an essential piece of our management of this vital Arizona water resource.

[*\(continued from page 3\)*](#)



Left and below: Horseshoe Dam spillway

Another interesting water flowing “sight to see” is Grand Falls. Grand Falls is a waterfall on the Little Colorado River within the Navajo Nation. At 181 feet tall, Grand Falls is said to be taller than Niagara Falls;



although, it falls in several tiers through a lava dam. Grand Falls typically only flows in the spring due to snow melt and since it runs through the high desert, it picks up significant amounts of sediment. It is therefore often referred to as “Chocolate Falls”. As is often the case, when something is worth seeing, it draws large crowds of people and the infrastructure is not able to handle that. Sadly, people were leaving significant amounts of trash and not respecting the private property, so the site has been closed. I hope it opens in the future so others can experience this impressive waterfall. Fortunately, I have a few photographs from 2019 when it was also flowing.



It is unfortunate that these both of these sights are not accessible at this time but keep your eyes open during future wet years for a chance to see either one or both of these sights.

Left and below: Grand Falls, aka Chocolate Falls.



Thank you again for this opportunity to serve AFMA as the Vice Chair. If you have any ideas or recommendations for the association, or would like to be more involved, please contact me at jack.moody@westwoodps.com or call me at 480-840-7708.

AFMA Fall 2023 Conference, November 1-3, 2023

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