

WeatherTAP RadarLab® Weather Radar Image, 08/14/2021 @ 01:24 AM MST

# **Flood Control District of Maricopa County**

### **Engineering Division, Flood Warning Branch**

# Storm Report : August 12-14, 2021



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## METEOROLOGY

A high-grade Monsoon pattern led to the development of organized clusters of severe thunderstorms that rolled off the higher terrain into the greater Phoenix Valley during the evening of August 13<sup>th</sup> before continuing into Gila Bend during the early morning hours on the 14<sup>th</sup>. Maricopa County rain gauges measured event totals anywhere from 1.00"-3.95". There were reports of urban flooding in Fountain Hills, Mesa, and Phoenix and the Town of Gila Bend experienced significant flash flooding due to runoff along Sand Tank Wash and other local washes.

#### Synopsis:

There are four common large-scale patterns that develop during the yearly North American Monsoon, which are historically quite favorable for producing active weather across southcentral AZ. The large-scale setup on August 13<sup>th</sup> quite closely mimicked a Great Basin High pattern (commonly referred as a Rim-to-Valley setup). It's characterized by the summer ridge settling across the Great Basin region of NV/UT. Clockwise flow around the high pressure center promotes deep northeasterly steering flow across AZ. Thunderstorm activity tends to develop across the higher terrain regions (Mogollon Rim and White Mountains) before moving west/southwest into the lower deserts as organized lines/clusters causing severe weather outbreaks and/or flash flooding. Please refer to the following page for more background information.

The synoptic setup on the evening of August 13<sup>th</sup> is shown in Figure 1 (below). The upper-level images (A and B) depict a diffuse ridge of high pressure draped across NV/UT and a well-defined inverted trough across southwestern NM. The positioning of the ridge and trough during this period created a large area of upper-level divergence (rising motion, yellow lines in A) across eastern AZ, which likely enhanced initial t-storm development across the Mogollon Rim and White Mountains regions. Both the 700mb and 850mb maps (images C and D) depict the moisture rich environment across AZ.

Mesoanalysis data across southcentral AZ in the near storm environment on Friday evening revealed a favorable setup for organized t-storms capable of severe weather and heavy rainfall. Evidence of this was shown by the 00Z, 5:00pm MST, KPHX sounding in Figure 2 below. Precipitable water was sampled at 1.90", which is an incredibly high (wet) value for August. In fact, according to the Storm Prediction (SPC) sounding climatology page this sounding set the period of record value for the date. Thermodynamic variables of note included: high CAPE/low CIN profile (extremely unstable atmosphere), negative lifted indices, and high DCAPE values indicative of strong downdrafts capable of damaging wind gusts. The vertical wind profile showed strong 700mb-500mb 20kt steering-level winds out of the northeast and low level (below 850mb) westerlies. The District's hourly Convective Quantitative Precipitation Forecast (QPF) at 8:06pm MST here was generated just before the first line of storms developed across the eastern half of the County and showed an atmosphere primed for heavy rainfall (notable 60min and 30min rainfall values highlighted in yellow). Another QPF generated at 11:06pm MST here shows the rainfall environment across southwestern Maricopa County just before storms dropped torrential rains over the area (discussed in detail in following sections). It's also worth noting an additional description of the setup for severe weather can be viewed on the Storm Prediction Center's weather event archive here. A full description of the heavy rain and flash flooding potential was conveyed by the Weather Prediction Center through its mesoscale precipitation discussions here and here.

#### Storm Summary and Radar Imagery:

Organized clusters of thunderstorms rolled across Maricopa County spanning roughly seven hours while bringing widespread heavy rainfall, numerous reports of severe weather, and flooding. The National Weather Service Phoenix WFO created a radar loop covering the entire event which can be viewed <u>here</u>. This loop will provide context to the following summary. As is customary with the Great Basin pattern,

storms initiated across the Mogollon Rim and White Mountains during the afternoon/early evening hours before moving west/southwest into portions of the lower deserts of Maricopa County.

A lead complex of storms exiting Payson grew upscale into a bow echo that ultimately traversed west along the Yavapai/Maricopa County line. Multiple reports of 60+mph winds were observed along this line along with heavy rainfall in Wickenburg and Aguila. Further south multiple strong/severe t-storms initiated along a line from the lower Salt River Lakes into east Mesa just after 8:00pm MST before progressing west into Fountain Hills, Scottsdale, and Paradise Valley. Fountain Hills and East Mesa received the heaviest rainfall with multiple gauges picking up 2.00" or more. There were multiple reports of flash flooding in these areas and impoundments were measured behind Spookhill FRS, Golden Eagle Park Dam, and North Heights Dam. By 10:00pm MST additional clusters of strong t-storms rapidly developed across central Phoenix, Glendale, Peoria, Surprise, and Estrella bringing anywhere from 0.75"-2.95". Heavy rain lead to severe water ponding which closed multiple sections of I-17 heading north out of metro Phoenix. Noteworthy runoff was also measured in the ACDC, East Fork Cave Creek, Cave Buttes Outlet, and Deadman Wash.

Multiple clusters of strong/severe t-storms, covered above, continued to grow upscale into a Mesoscale Convective System as they moved southwest through the greater Phoenix Valley and into the SR85/I-8 corridors. As of 12:00am MST, a nearly uniform line of storms could be seen stretching from Wenden east/southeast into Gila Bend and through Casa Grande. Of note, areas to the east and south of Gila Bend were hit with torrential rainfall. Multiple District gauges picked up anywhere from 1.50"-3.94" with the majority of that falling in a two-hour period. Heavy rain triggered significant flash flooding in area washes through the Town of Gila Bend. A period of record flow was measured along Sand Tank Wash @ I-8. Unfortunately, two people lost their lives and numerous homes were destroyed/damaged due to the flooding. An Emergency Declaration was issued for Gila Bend later in the morning on the 14th. One day rainfall totals (ending 8/14 6:00 am) around the County from the ALERT network can be viewed here; also local NWS storm reports can be viewed here.



**Figure 1**: depicts a forecast of storm-total rainfall ending at 5:00 AM on 8/14/2021. The forecast model run was completed at 5 AM on August 13<sup>th</sup>. The model suggests a large area of rainfall greater than 1.25 inches through west-central Maricopa County, which was for the most part verified. It missed an area of heavy rainfall south of I-8.

### 4-Panel 00Z Synoptic Setup 08/14/2021

#### FIGURE 2



**Figure 2**: depicts the synoptic setup at 00Z (5:00 PM MST) on September 13<sup>th</sup>,2021. The images are from the Storm Prediction Center upper air maps archive. **A)** is the 300mb map: the black lines are stream lines, the yellow lines are divergence, and station obs. are plotted at each available location **B)** is the 500mb map: the red dashed lines are isotherms, the other variables are colored the same as in A. **C)** is the 700mb map: variables are colored the same as **D**. **D)** is the 850mb map: the black lines are heights, the red dashed lines are isotherms, the green lines are isodrosotherms, blue barbs are wind speed, and station observations are plotted at each available location.



**Figure 3**: Observed Skew-T/log P (vertical profile of the atmosphere above Phoenix) diagram at 5:00pm MST on August 13<sup>th</sup>, 2021. Sounding generated from NOAA/SPC. The vertical axis is pressure in (hPa) and the horizontal axis is temperature in (°C). The thick solid red line is the temperature profile. The thick solid green line is the moisture profile. The dashed grey and orange lines are the atmospheric parcel profiles. The vertical axis on the right displays the wind speed and direction at each level in knots. Gray solid lines sloping from upper left to lower right are constant potential temperature (°K). Thin dashed blue and gray lines sloping from right to left are isotherms (°C). Thin dashed green lines sloping from right to left are mixing ratio (g/kg). The table in the bottom left displays various parcel attributes and thermodynamic indices. The image in the top right is a hodograph showing the change in speed and direction of the atmospheric winds with height.

TABLE	1	
		•

ID	Name	Location	Peak Wind Gust (mph)
3306	Durango Complex	Durango St. / 27th Ave., Phoenix	48
15006	Lake Pleasant	South end of the Lake, Peoria	37
15306	Lake Pleasant North	Deer Island near the north end of the Lake, Peoria	36
35206	EMF @ AZ Ave.	2.5 mi. S of Hunt Hwy. on Arizona Ave., Pinal Co.	44
82506	Horseshoe Lake	South end of the Lake, Tonto NF	63
82706	Bartlett Lake	West side of the Lake, Tonto NF	35
84206	Estrella Fan	Alignments Queen Creek & El Mirage Roads, Avondale	35
84706	Mobile	83 <sup>rd</sup> Ave. at Nahalia Rd., Goodyear	49
87506	Camelback L303	Camelback Rd. at Loop 303 Fwy., Glendale	50

Table 1: Peak wind gusts measured at FCDMC Weather Stations at or above 35 mph, Aug. 12-14, 2021

# PRECIPITATION



**Figure 4** above presents a plot of rainfall amounts for all FCDMC ALERT rain gages for the period 8/12/2021 0:00 through 8/14/2021 06:00. One gage recorded no rain (Narrows Damsite) and one gage failed to operate (Buckeye FRS #1). Tabular hourly data for all gages for the 54-hour period is available <u>here</u>.



**Figure 5** above presents an image of rainfall amounts for all FCDMC ALERT rain gages for the period 8/12/2021 0:00 through 8/14/2021 06:00. Click the image for a full-size view in your browser. Use CTRL +/- to zoom in/out.



6 Hour Totals Ending August 14, 2021 6:00am

Gage Adjusted Radar Totals

FIGURE 6



2801 West Durango Street, Phoenix, Arizona 85009, (602) 506-1501

www.maricopa.gov/floodcontrol

**Figure 6** above presents an image of rainfall amounts from gage-adjusted radar rainfall estimates for the period 8/14/2021 0:00 through 06:00. Recorded rainfall amounts at FCD automated rain gages are show in white numbers. The image gives a visual representation of where heavy rain fell in relation to Sand Tank and Bender Washes. The average rainfall over the entire Sand Tank Wash watershed was 1.20 inches.

### Rainfall from 8/11/2021 at Noon through 8/12/2021 at Noon



1 Day Totals ending 08/12/2021 12pm Gage Adjusted Radar Totals





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**Figure 7** above presents an image of rainfall amounts from gage-adjusted radar rainfall estimates for the period 8/11/2021 12:00 through 8/12/2021 12:00.

### Rainfall from 8/12/2021 at Noon through 8/13/2021 at Noon



1 Day Totals ending 08/13/2021 12pm Gage Adjusted Radar Totals





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**Figure 8** above presents an image of rainfall amounts from gage-adjusted radar rainfall estimates for the period 8/12/2021 12:00 through 8/13/2021 12:00.

### Rainfall from 8/13/2021 at Noon through 8/14/2021 at Noon



1 Day Totals ending 08/14/2021 12pm Gage Adjusted Radar Totals

FIGURE 9



<sup>2801</sup> West Durango Street, Phoenix, Arizona 85009, (602) 506-1501

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**Figure 9** above presents an image of rainfall amounts from gage-adjusted radar rainfall estimates for the period 8/13/2021 12:00 through 8/14/2021 12:00.

		Rainfa	ll Return	Perio	ds for Se	elected	ALERT	Gag	es Intei	rpola	ted fror	m NC	)AA Atla	as 14	, Vol. 1,	Ver.	5				- ~	Т	
					54-	hour F	Period E	Endin	g: 08/1	4/20	21-06:0	00:00	0						IA	3LE	: 2		
						Rain i	n Inche	s Re	oturn Pe	riode	in Yea	rs						L				1	
						num	minene	.s, ne	cumre	nous	, in rea	15											
				15min	15min	30min	30min	1hr	1hr	2hr	2hr	3hr	3hr	6hr	6hr	12hr	12hr	1day	1day	2dav	2dav	3dav	3day
ID	Name	In or Near	Elev. (ft)	Rain	Ret.Per.	Rain	Ret.Per.	Rain	Ret.Per.	Rain	Ret.Per.	Rain	Ret.Per.	Rain	Ret.Per.	Rain	Ret.Per.	Rain	Ret.Per.	Rain	Ret.Per.	Rain	Ret.Per.
23700	Cruff Wash	Arlington	940	0.47	1	0.87	3	1.30	6	2.13	32	2.24	31	2.40	27	2.44	19	2.44	13	2.48	11	2.48	9
19300	Desert Hills Wash	Cave Creek	1,860	0.63	3	1.22	10	1.61	13	1.73	11	1.85	12	2.28	21	2.28	11	2.32	5	2.91	8	2.91	6
20600	Galloway Wash @ Galloway Rd.	Cave Creek	2,295	0.83	6	1.10	5	1.30	5	1.46	4	1.89	11	2.13	11	2.13	5	2.13	3	2.36	2	2.40	2
33200	Chandler Blvd. @ Arizona Ave.	Chandler	1,215	0.71	7	1.14	14	1.34	11	1.38	8	1.50	10	1.73	10	1.77	6	1.77	3	1.77	2	1.77	1
38500	Florence Junction	Florence Jctn.	1,840	0.20	1	0.28	1	0.31	1	0.39	1	0.43	1	0.55	1	0.55	1	0.55	i 1	0.55	1	0.55	1
76700	Fountain Hills Fire Dept.	Fountain Hills	1,665	1.06	37	1.61	73	2.05	86	2.09	55	2.09	41	2.44	52	2.44	28	2.44	8	2.52	5	2.52	4
78500	Golden Eagle Blvd.	Fountain Hills	2,180	0.83	8	1.34	17	1.54	12	1.54	8	1.57	7	1.89	8	1.89	4	1.93	2	2.05	2	2.09	1
79000	Hesperus Dam	Fountain Hills	1,895	1.46	190	2.09	288	2.36	149	2.40	85	2.40	62	2.72	69	2.72	33	2.72	8	2.83	5	2.87	4
78200	North Heights Dam	Fountain Hills	1,825	1.22	60	1.73	84	2.01	57	2.01	32	2.01	25	2.36	31	2.36	15	2.36	5	2.48	3	2.48	3
77300	Stone Ridge Dam	Fountain Hills	1,710	1.02	30	1.61	73	1.97	68	2.05	49	2.09	41	2.48	57	2.48	30	2.48	9	2.56	5	2.60	4
77500	Sun Ridge Canyon Dam	Fountain Hills	1,890	1.02	25	1.50	39	1.85	38	1.85	23	1.89	20	2.24	25	2.28	14	2.28	5	2.32	3	2.36	2
40500	Bender Wash	Gila Bend	1,200	0.94	31	1.69	200	2.83	1000	3.78	1000	3.86	1000	3.94	1000	3.94	679	3.94	306	3.94	287	3.94	127
43000	Maricopa Mountains	Gila Bend	1,210	1.02	50	1.85	433	3.03	1000	3.78	1000	3.78	1000	3.90	1000	3.90	867	3.90	269	4.06	271	4.06	127
40300	Sand Tank Wash	Gila Bend	1,160	1.06	55	1.73	192	2.48	615	2.83	434	2.91	307	2.95	192	2.95	129	2.95	45	2.99	37	2.99	26
71000	Sauceda Wash	Gila Bend	850	0.75	11	1.38	52	1.97	129	2.32	140	2.48	136	2.56	87	2.56	52	2.56	i 25	2.56	19	2.56	15
89500	Bullard Wash @ Indian School Rd.	Goodyear	1,025	0.87	17	1.30	28	1.61	28	1.77	30	1.89	36	2.09	39	2.13	31	2.17	8	2.17	6	2.17	5
89200	Bullard Wash @ Van Buren St.	Goodyear	980	0.91	19	1.38	34	1.57	22	1.61	17	1.69	19	1.77	15	1.77	11	1.77	4	1.81	3	1.81	3
87500	Camelback Rd. @ Loop 303	Goodyear	1,080	0.59	4	0.91	6	1.46	17	1.85	37	1.97	44	2.17	49	2.17	36	2.17	8	2.17	5	2.20	5
34000	Falcon Field	Mesa	1,370	1.02	45	1.85	268	2.17	188	2.24	129	2.36	124	2.52	105	2.52	73	2.52	18	3.46	54	3.50	39
34200	Greenfield Rd. @ Adobe Rd.	Mesa	1,335	0.79	13	1.06	13	1.10	6	1.22	6	1.34	8	1.46	6	1.46	4	1.46	j 2	1.89	4	1.93	3
31400	Hermosa Vista Park	Mesa	1,310	0.75	11	1.02	11	1.18	8	1.26	7	1.38	8	1.54	8	1.54	5	1.54	3	2.72	16	2.80	14
34700	Main St. @ Hawes Rd.	Mesa	1,590	0.59	4	0.83	5	1.46	19	1.46	13	1.46	11	1.46	6	1.46	4	1.46	j 2	2.64	13	2.64	8
34400	Recker Rd. @ McLellan Rd.	Mesa	1,450	0.98	36	1.54	82	1.77	54	1.85	43	2.01	52	2.13	39	2.13	25	2.13	7	3.39	46	3.39	27
81500	Spookhill FRS @ Brown Rd.	Mesa	1,595	1.10	58	1.65	107	2.05	109	2.09	76	2.20	78	2.32	57	2.32	33	2.36	10	3.23	31	3.27	17
79800	Spookhill FRS @ McKellips Rd.	Mesa	1,590	0.79	12	1.30	30	1.61	30	1.65	22	1.77	25	1.89	18	1.89	11	1.89	4	3.19	28	3.23	15
15000	Lake Pleasant	Peoria	1,815	0.83	8	1.22	11	1.57	13	1.65	10	1.65	8	1.65	5	1.65	3	1.65	2	2.48	5	2.48	4
6800	Camelback Rd. @ 24th Ave.	Phoenix	1,140	0.71	6	1.02	8	1.22	7	1.57	14	1.65	14	1.97	18	2.01	13	2.05	7	2.05	5	2.24	6
58600	CAP Reach11 Dike #2	Phoenix	1,540	0.87	17	1.38	39	1.46	18	1.50	12	1.57	10	1.77	10	1.81	7	1.81	. 3	1.85	3	2.05	3
3300	Durango Complex	Phoenix	1,050	1.22	91	1.46	48	1.69	33	2.60	254	2.60	165	2.95	209	2.95	130	2.95	40	2.95	25	2.95	19
8700	East Fork Cave Cr. Basin #3	Phoenix	1,430	0.87	13	1.38	27	1.57	18	1.61	12	1.73	14	1.93	14	1.97	9	1.97	4	1.97	3	2.09	3
8200	East Fork Cave Cr. Basin #4	Phoenix	1,465	0.91	18	1.30	25	1.54	20	1.57	12	1.61	11	1.85	12	1.89	8	1.85	4	1.89	3	1.93	
8500	East Fork Cave Cr. near /th Ave.	Phoenix	1,340	1.06	30	1.61	59	1.81	34	1.89	23	1.97	25	2.1/	24	2.20	16	2.20	/	2.20	5	2.20	4
3800	Grand Ave. @ 27th Ave.	Phoenix	1,100	0.67	5	1.06	10	1.50	1/	1.85	32	1.97	34	2.24	3/	2.28	26	2.28	12	2.28	8	2.28	
12500	Greenway Kd. @ 32nd Ave.	Phoenix	1,295	0.94	15	1.22	13	1.40	- 11	1.50	8	1.54	8	1.//	9	1.//	3	1.//	3	1.//	3	1.//	
13300	Phoenix Basin #7	Phoenix	1,400	1.20	90	1.//	115	2.05		2.09	40	2.17	45	2.40	45	2.44	31	2.44	12	2.44	8	2.48	
5500	Priveria Dam 26	Phoenix	1,425	1.00	35	1.05	/8	1.9/	04	2.03	42	2.1/	40	2.30	41	2.40	28	2.40	11	2.40	/	2.44	
66700	Rueser Rd. @ 2310 AVe.	Phoenix	1,000	0.83	13	1.18	1/	1.58	13	1.89	30	1.93	32	2.32	48	2.30	32	2.30	12	2.30	9	2.30	
5500	Salt Pivor @ 67th Avo	Phoenix	005	0.03	15	1 19	16	1.14	10	1.01	31	1.05	20	1.65	32	1.69	23	1.60	10	1.60	/	1.60	
75500	Ashar Hills	Rio Verde	1 660	0.67	13	1.18	10	1.50	10	1.36	8 24	2.12	20	2.17	24	2.17	10	2.17	3	2.09	3	4.02	24
5000	Lost Dog Wash	Scottsdalo	1,000	1.22	70	1.2/	25	1.58	10	1.60	24	2.13	39	1.60	24	1.69	13	1.69	4	3.56	30	2.69	24
1900	Thompson Beak	Scottsdale	3 / 85	0.91	/8	1.54	23	1.05	25	1.09	5	1.09	12	1.09		1.09	4	1.05	2	1.97	3	2.00	4
14500	El Mirago Drain	Sup City Wort	1 265	0.91	10	1.20	11	2.05	103	2.00	62	2.40	60	2.40	76	2.40	5	2.00	12	2.40	1	2.17	
14500	crivinage Dram	journ City west	1,205	0.79	11	1.42	44	2.05	103	2.09	03	2.20	09	2.40	/6	2.40	51	2.40	/ 13	2.40	9	2.40	0

**Table 2:** Return period calculations were performed for all FCD rain gages for the durations shown in the Table above (15 min. – 3 days). Gages with at least two 10-year return periods across all durations are listed in this Table. The Table is sorted by the column labeled "In or Near", then by "Name". Rain gage elevations are conditionally coded from yellow (850') to green (3,485'), while return periods are coded from white (1 year) to red (500 years). Click on the Table to download a PNG file for detailed viewing. Data from six individual gages are presented on the following pages - the figures include a location map, daily rain totals, selected return periods and an hourly rainfall plot.







**FIGURE 12** 











### **Runoff and Impoundment Summary**

Another wide-scale rainfall and runoff event occurred during the period of August 12-14, 2021. Runoff was recorded by many streamflow stations during this period, and several locations had record flows and impoundments. Gila Bend and specifically Sand Tank Wash had a very large flow, and Fountain Hills saw their six dams record high or impoundments-of-record. Additionally, there were other scattered runoff and impoundments of note. This section will focus on Gila Bend and Fountain Hills with a brief mention of the other locations.

#### <u>Gila Bend</u>

The Sand Tank mountains south of I-8 and the town of Gila Bend had copious rainfall in a range of about three to four inches. Much of that rain fell in a one to three-hour period. A very large quantity of water flowed into Sand Tank Wash that then passed the I-8 bridge and streamgage (#40007). The flow was so significant that the channel at the bridge and downstream of the bridge was greatly altered.







FIGURES 16 a-d



Sand Tank Wash at I-8, August 16, 2021

The photos above are intended to depict the magnitude of the channel changes that occurred due to the runoff event on August 14, 2021.

From a post-event inspection on August 16, 2021, it was evident that the runoff at Sand Tank Wash was of a greater magnitude than that recorded by the ALERT gage, which showed a peak of 7.69 feet and 5,000 cfs, which was the highest rated value.



In addition to the evidence at the gage, inspection of the high watermarks downstream of the I-8 bridge indicated that the flow was very wide and may have consumed much of the floodway as defined by the current floodplain map. Inspection of the I-8 bridge showed water marks approximately 3 feet below the low chord.



Figure 18: Current Floodplain Map for the area around Sand Tank Wash

A peak discharge estimate was conducted from previous cross sections extended to the floodplain limits. That analysis indicated a peak discharge of about 14,000 cfs at 8.7 feet gage height. Using the USGS StreamStats program to estimate return periods for this event, 14,000 cfs is approximately a 60-year event. According to the current Flood Insurance Study, the 100-year event has a peak discharge of 23,700 cfs.



Sand Tank Wash @ I-8 PT

Figure 19 - Sand Tank Wash @ I-8 hydrograph adjusted to the estimated peak of 14,000 cfs

As of this writing, the USGS is conducting an indirect measurement of the peak from this event and that peak estimate is still pending. This report will be updated with their conclusions when that estimate is received.



Another area where occupied structures suffered flood damage was along Scott Ave. Wash (left side of Figure 20). Line B to B' is a raised area or ridge line between Scott Ave. and Sand Tank Washes. It is likely that water from Sand Tank Wash overtopped this ridge line and was intercepted by Scott Ave. Wash, aggravating the flood condition for structures north of the railroad underpass.



This large flood continued northward to the Gila River. While passing through the Town, it caused significant damage to the Paloma Canal, Union Pacific Railroad bridge, Indian Road and Watermelon Road. Significant flooding of low-lying residential and commercial areas was experienced.

A second major wash affecting the town of Gila Bend in this area is Bender Wash (#40507). Though the precipitation gage at the Bender Wash streamgage had an impressive 3.94 inches of precipitation, the verified flow was not overly significant at 395 cfs. The automated streamgage failed to register any flow during the event but the on-site crest-stage gage provided an estimate of the peak flow.

#### Fountain Hills

On the opposite side of Maricopa County is the town of Fountain Hills which has six dams constructed for flood control in the steep hilly terrain of that community. Table 3 below summarizes the impoundments from August 13, 2021.

Location	ID	Peak GH	Percent	Time of	Record
		(feet)	Full	Peak	Event
Aspen Dam	78707	9.03	12.2	22:39	Yes
Golden Eagle Park Dam	78007	13.00	17.4	22:28	No
Hesperus Dam	79007	11.28	4.1	22:23	Yes
North Heights Dam	78207	18.47	22.0	22:24	Yes
Stone Ridge Dam	77307	10.48	13.6	22:34	Yes
Sun Ridge Canyon Dam	77507	7.50	0.3	22:12	No

TABLE 3

Hydrographs for each dam are provided below.









#### Other Runoff

As previously mentioned, the storm coverage extended to much of the county and many streamgages had runoff and many impoundment stations had stored water. The most significant was the station at East Fork Cave Creek near 7<sup>th</sup> Avenue (#8507.)

It had a peak discharge of 3,610 cfs at 7.08 feet gage height on 08/13/2021 23:26:00. Though not a record, this flow was near the record from 2005. A hydrograph is provided below.



Beyond this noted event, Skunk Creek, Cave Creek, New River, Indian Bend Wash, Arizona Canal Diversion Channel, East Maricopa Floodway, Pecos Basin, and Phoenix Dams had significant flows and impoundments. Additional information about these events can be gained by querying the FCDMC <u>water-level web page</u> for Daily Surface Water Reports and Data Plots.

### Public Outreach Summary

The District has a total of 410 ALERT stations located throughout Maricopa and adjoining Counties. All of the information for these stations is available in real-time on our webpage. During this event (Aug 12-14) we used social media to help inform the news and public of the current weather and rainfall information.

Our best platform continues to be Twitter: <u>@FCDFloodInfo</u>. We are up to 2,709 followers which consist of different agencies, news media and the public. We had a total of 72,302 impressions and 14,198 engagements over this 3-day period. Our top post had over 29,192 impressions. Our second highest post with 10,331 impressions was the MSP Weather Outlook posted at 1:45pm on August 13.

The Flood Control District of	Maricopa Impressions	29,192
County @FCDFloodInfo Check out the 24-hr rainfall tota	Is from around Total engagements	11,535
the County! Every operational g	auge received rally ranged Media engagements	8,103
from 0.50"-2.50" across the great	ater Phoenix Detail expands	1,952
Valley #azwx #Monsoon2021 See the data here:	Link clicks	1,288
https://alert.fcd.maricopa.gov/al	ert/Google/v3/ Profile clicks	101
gmap.numi pic.twitter.com/uk	Likes	51
	Retweets	20
	Hashtag clicks	17
FIGURE 29	Replies	3



Our Facebook page <u>Flood Control District of Maricopa County</u> had 1,289 impressions and 98 engagements over this 3-day period. Our top post had a total of 300 impressions.

	Performance	for Your Post				
Flood Control District of Maricopa County	300 People Reached					
Check out the 24-hr rainfall totals from around the County! Every operational gauge received measurable rainfall. Totals generally ranged	14 Reactions, Comments & Shares 🧃					
from 0.50"-2.50" across the greater Phoenix Valley See the data here: https://alert.fcd.maricopa.gov/alert/Google/v3/mobile.html	12 12	12 On Post	0 On Shares			
Referesh Dizz (9-54-2023 EN-19 Zaufell Teals Lat 5-for) Flood Control District of Maricopa County () References 44 () () () () () () () () () () () () ()	2 Wow	2 On Post	0 On Shares			
10 Female Mandels 10 Female Mandels 1 Hour Rainfall 1	0 Comments	0 On Post	0 On Shares			
1 Tary Raidell Concernent of the concernent of t	0 Shares	0 On Post	0 On Shares			
Impoundement Data Weather Data Weather Data Weather Data Weather Data Weather Data	30 Post Clicks					
Air Quality M() Air Quality Wr. Data Remove Data	13 Photo Views	12 Link Clicks 7	5 Other Clicks (i)			
	NEGATIVE FEEDBAC	к				
	1 Hide Post	0 Hide /	All Posts			
	0 Report as Spam	0 Unlike	e Page			
	Reported stats may I	FIGURE 31	appears on posts			

Our <u>ALERT Interactive Data Display Map</u> is the primary tool for access to our ALERT data. During this event there were a total of 34,205 sessions. The highest impact day was August 14<sup>th</sup> with 20,277 pageviews. This ranks as the third highest daily pageviews count since we started tracking them in June 2013.



Figure 32, ALERT Interactive Data Display map pageviews: June 2013 - Aug. 2021

## **DATA SOURCES**

- 1. NOAA National Severe Storms Laboratory; Multi-Radar Multi-Sensor System, Norman, OK <a href="http://nmg.ou.edu/">http://nmg.ou.edu/</a>
- 2. Iowa State University, Iowa Environmental Mesonet, Local Storm Report App, Ames, IA: <u>https://mesonet.agron.iastate.edu/lsr/</u>
- 3. Flood Control District of Maricopa County, Phoenix, AZ <u>https://www.maricopa.gov/floodcontrol</u> and <u>https://www.reportaflood.org</u>
- 4. National Weather Service, National Hurricane Center, Miami, FL: <u>http://www.nhc.noaa.gov/?epac</u>
- 5. NOAA Atlas 14 Point Precipitation Frequency Data Server, https://hdsc.nws.noaa.gov/hdsc/pfds/pfds\_map\_cont.html
- 6. National Weather Service, Weather Prediction Center, College Park, MD: <u>http://www.wpc.ncep.noaa.gov/</u>
- 7. National Weather Service, Tucson WFO, Monsoon Tracker, Tucson, AZ: https://www.wrh.noaa.gov/twc/monsoon/monsoon\_patterns.php
- 8. National Weather Service, Weather Prediction Center, College Park, MY: <u>http://www.wpc.ncep.noaa.gov/</u>
- 9. National Weather Service, Phoenix WFO, Storm Report for August 13-14, 2021: https://www.weather.gov/psr/StormReportfor1314August2021
- 10. WeatherTAP RadarLab®: <u>https://www.weathertap.com</u>
- 11. USGS StreamStats: <u>https://streamstats.usgs.gov/ss/</u>