



Apache Junction FRS looking E towards Superstition Mtns, 07-28-2022, FCD O&M Staff

Flood Control District of Maricopa County

Flood Warning Branch

MSP Verification Report & Season Recap: Monsoon Season 2022



TABLE OF CONTENTS

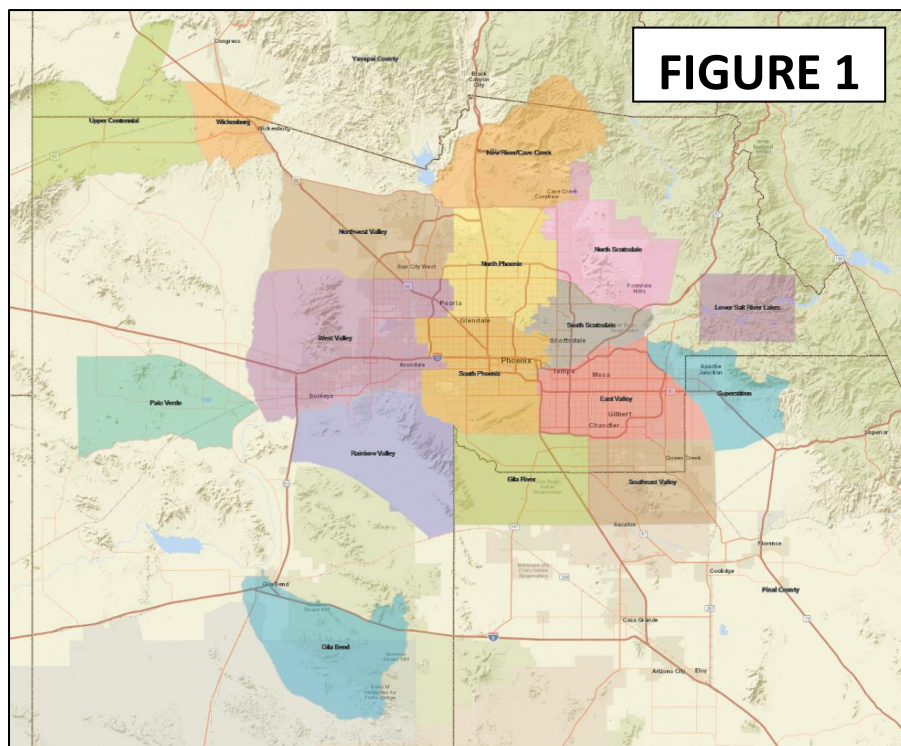
INTRODUCTION	3
MSP PRODUCT DESCRIPTION	4
2022 MONSOON SEASON RECAP	6
MSP VERIFICATION METRICS AND CRITERIA	11
OUTLOOK VERIFICATION	15
MESSAGE VERIFICATION.....	17
LAKE ALERT VERIFICATION	19
QPF STORM TOTAL PRECIPITATION VERIFICATION.....	20
SUMMARY	22
APPENDIX A: MSP OUTLOOKS - VERIFICATION TABLES	24
APPENDIX B: MSP MESSAGES - VERIFICATION TABLES	63
APPENDIX C: MSP LAKE ALERTS - VERIFICATION TABLES	83
APPENDIX E: QPF STORM TOTAL PRECIPITATION - VERIFICATION TABLES	86

INTRODUCTION

This report was generated by the Flood Warning Branch of the Flood Control District of Maricopa County (FCDMC). It covers the length of the monsoon season as defined by the National Weather Service Phoenix WFO: June 15th- September 30th. This report includes daily records on Weather Outlooks and Statements issued by the Meteorological Services Program (MSP) as well as a complete verification and summary of these products.

The Flood Warning Branch of the FCDMC operates a year-round MSP that's purpose is to provide detailed meteorological forecasts and support to county, city, and other local agencies. The program covers 5,400 square miles encompassing Maricopa County and surrounding watersheds. The goal of the Flood Control District's MSP is to reduce response time for emergency managers by providing timely and accurate weather information, primarily regarding the potential for flood-producing rainfall. During the length of the Monsoon season the MSP goes on a weekly rotating 24/7 manned schedule. A Duty Officer is selected for each day who is responsible for issuing MSP products, providing support to clients, and serves as the on-call supervisor during non-business hours. A supporting officer is also named and can be available to the duty officer in the case of a significant weather event. All MSP forecast products are disseminated via email and text alerts. Emergency managers may also be notified by telephone to aid in decision making.

The MSP has broken down the 5,400 square mile operational area into 17 forecast zones. These zones are the primary warning areas identified by emergency management officials. A map of the forecast zone locations is shown below in Figure 1.



MSP PRODUCT DESCRIPTION

Weather Outlook:

The Weather Outlook is disseminated to clients daily no later than 2PM during the monsoon season. This product covers the today through tomorrow period and occasionally the following 2-3 days where appropriate. Occasionally, due to unexpected weather pattern changes, Weather Outlooks will be updated throughout the day or first thing the following morning. Weather Outlooks include a synopsis of expected weather conditions; the “probability of occurrence” of rain; the expected “prime time” for the bulk of the rain; and the amount of rain expected during the prime-time period. Temperature forecasts and trends are included as well as a forecast of peak wind speeds. Click [here](#) for an example.

Message 1 – Alert:

When it is believed developing weather conditions may lead to heavy rain and/or minor to moderate flooding an Alert is issued. Lead time will generally be less than an hour in advance of the expected event. The Alert will normally identify the affected zone(s), the time frame of the event (valid time), rainfall potential, and the type of areas that will be impacted, such as roads and/or washes. Click [here](#) for an example.

Message 2 – Flash Flood Watch:

When it appears the developing weather event may lead to flash flooding a Watch is issued for the possible affected areas. Lead time will generally be 1 to 2 hours in advance of the expected event but can stretch to a day or more with reliable guidance. The Watch will include the time frame it will be in effect (valid time), and a section describing what may take place (comments). Click [here](#) for an example.

Message 3 – Flash Flood Warning:

When it appears that significant flash flooding is imminent or has started to take place, a Warning will be issued for the affected areas. Lead time will generally be less than an hour. The Warning will normally identify the affected zone(s), a time frame of the event, rainfall potential, and a section describing what is expected to take place (comments). Click [here](#) for an example.

Message 1, 2 and 3 Update:

This product, issued as needed, will update an existing Alert, Watch or Warning. Click [here](#) for an example.

Message 4 – Cancel:

When an event (Watch or Warning) no longer poses a threat, and the expiration time has not been reached, a Cancel message may be issued. Click [here](#) for an example.

Lake Alerts:

In addition to the above MSP program, weather guidance is provided for Maricopa County lakes/reservoirs from June 15 through September 30. Lake Alerts are issued as needed to inform of approaching adverse weather conditions. Emphasis in these statements is on expected wind gusts and lightning activity. Click [here](#) for an example.

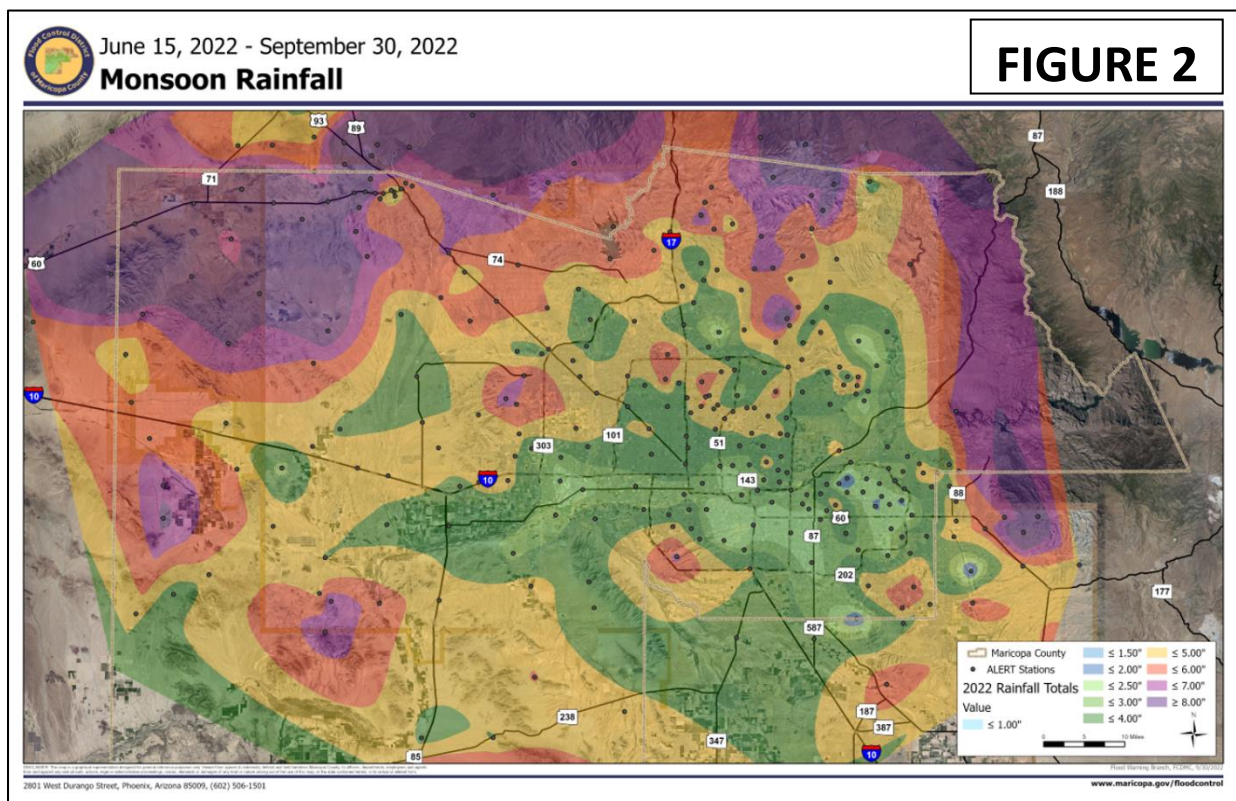
Additional Products:

At the request of clients, site specific products may be issued to support unusual or special operations, such as specific wind forecasts to aid in the fighting of fires, forecasting for special events at the County lakes or parks, or District construction projects.

Additional information and data regarding the FCDMC can be found online [here](#)

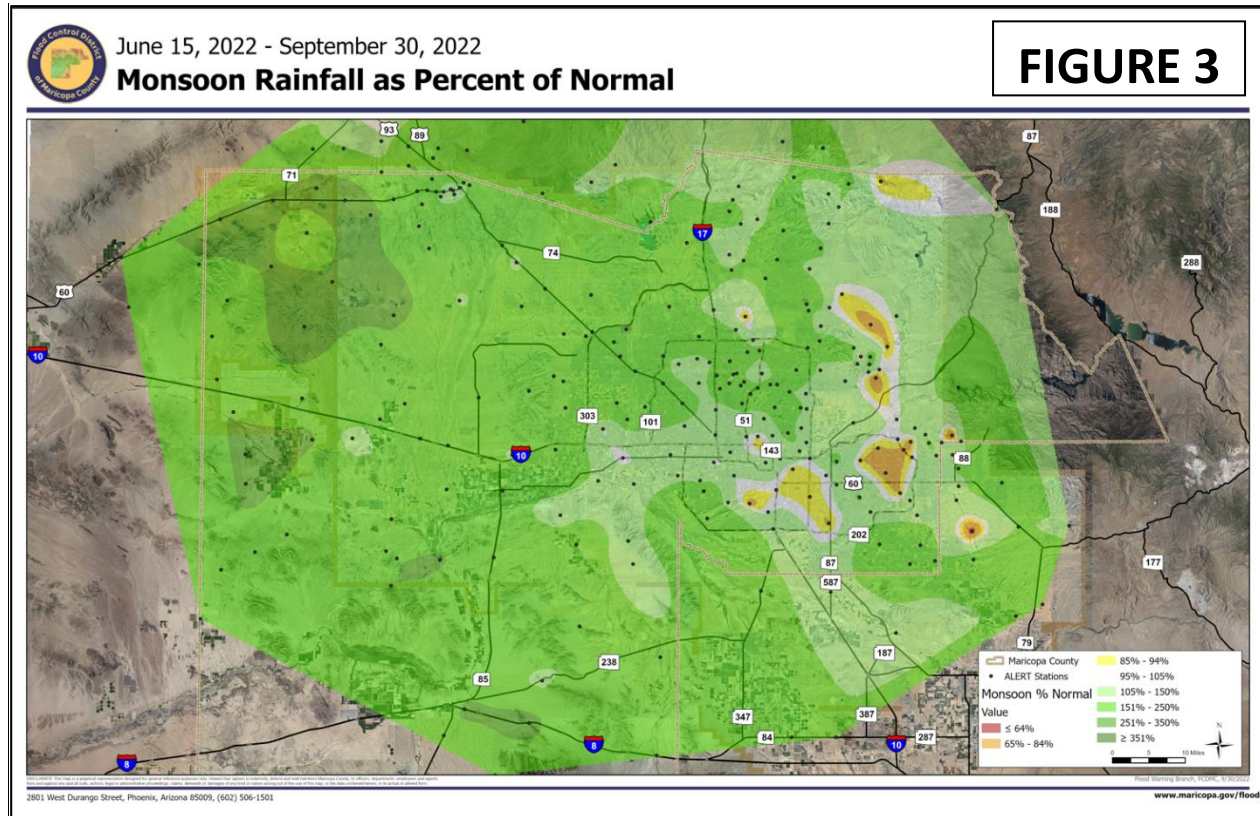
2022 MONSOON SEASON RECAP

According to the FCDMC ALERT rain gage network, the 2022 monsoon season was characterized as being much wetter than normal. When averaged across 287 of the oldest county rain gages, 4.92" of rain fell which was 161% of the mean value of 3.09" and ranked as sixth wettest on record. An image showing a 42 year period of record can be viewed [here](#). It's worth noting below normal rainfall was recorded at Sky Harbor Airport despite normal to above normal rainfall across most of the Phoenix urban corridor. The official rain total as reported by the NWS Phoenix office was 2.23" which was 0.20" below the period average of 2.43". Click [here](#) to see a technical summary plot from Sky Harbor Airport covering the monsoon season courtesy of the University of Arizona CSAP/CLIMAS organization. Figure 2, below, offers a more comprehensive picture of the rainfall distribution across the MSP forecast area. This figure was generated using FCDMC ALERT rain gage data from around the county. The shaded contours depict precipitation totals from June 15th – September 30th. The largest rainfall totals fell across the higher terrain of northern and eastern portions of Maricopa County.



Totals steadily trended downward while heading east towards the lower elevation areas near the Pinal County border. Figure 3, on the next page, shows the ratio of 2022 monsoon precipitation versus normal monsoon precipitation. Similar to Figure 2, contours were generated using FCDMC ALERT rain gage data from around the county. The only below normal values present were across eastern Maricopa County as represented by yellow/orange shading. Most of the greater Phoenix urban corridor registered anywhere from 100%-200% of

normal. Some higher terrain areas north/west of the Valley and far southwestern locales (near Gila Bend) observed 250% to 350%+ of normal, which further puts an exclamation point on how wet the 2022 monsoon was. These two figures serve as a strong reminder to the importance of having a widely distributed rain gage network to fully capture the distribution of monsoon rains.



June Recap/Notable Events:

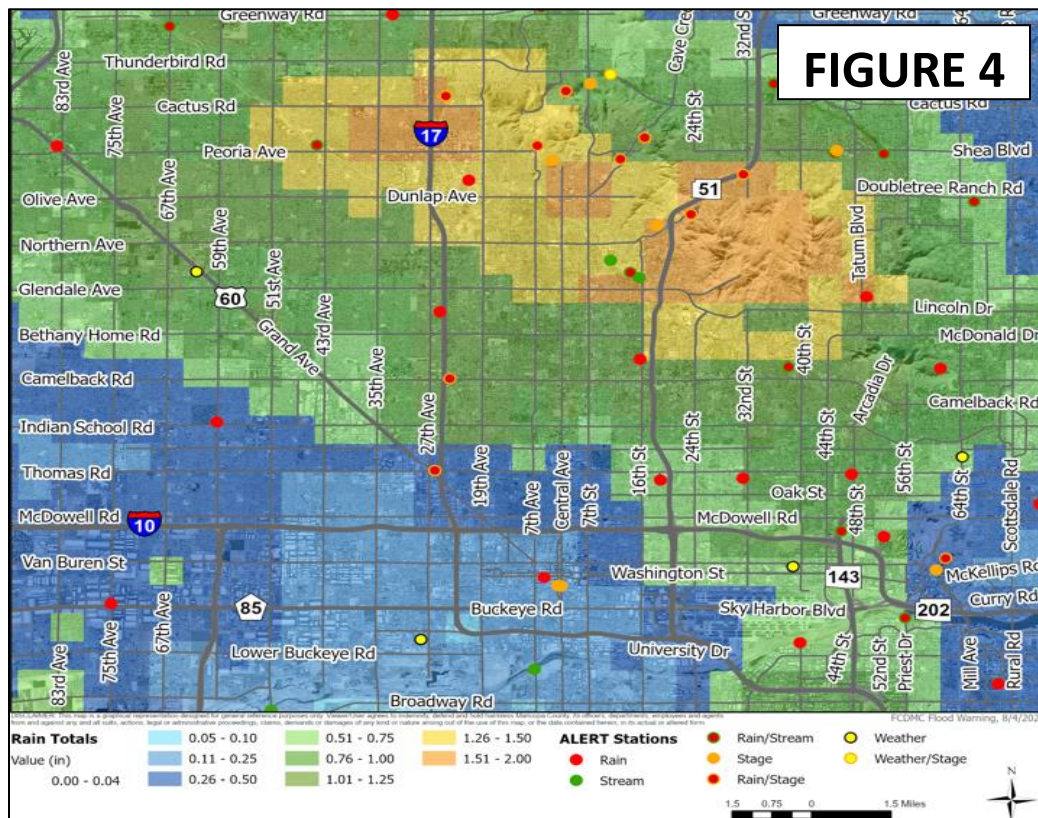
- After another abnormally dry winter and spring, the onset of the 2022 monsoon season arrived over a week early, initiating on June 25th in Phoenix and on the 21st in Tucson. Monsoon statistics for Phoenix Sky Harbor can be found [here](#).
- According to the NWS Phoenix WFO, Sky Harbor Airport registered the sixth hottest average temperature for June on record at 94.2°F and fourth warmest average low temperature on record at 81.9°F. Eight daily heat records were tied/broken. The airport registered 0.30" of rain during June good for eighth wettest on record. Furthermore, 0.18" of rain fell on June 26th, which set the new daily record for the date.

July Recap/Notable Events:

- After a quiet start to July, a favorable Four Corners High pattern setup by mid-month lending to an extended period of active events. Of note, on July 17th a large cluster of organized severe storms developed across the Southeast Valley. These storms dropped anywhere from 0.75"-1.50" of rain across Mesa and the Salt River Pima-

Maricopa Indian Community and brought a large swath of damaging wind gusts in excess of 60mph. A complete storm overview of this event was generated by the NWS Phoenix WFO and can be viewed [here](#).

- A high-grade monsoon pattern strongly aided by a slow-moving inverted trough led to multiple active days to finish out the month of July. Of note was significant flooding that occurred on July 28th across far eastern Maricopa and northeastern Pinal counties. Strong t-storms moved west off the higher terrain into Apache Junction, Mesa, Fountain Hills, and Rio Verde areas bringing torrential rainfall. Significant flooding was observed in Apache Junction and Mesa. Apache Junction FRS, Signal Butte FRS, and Powerline FRS all had sizeable impoundments behind the dams due to the heavy rain. A complete storm overview of this event was generated by the NWS Phoenix WFO and can be viewed [here](#).
- Two nights later on the 30th a classic southeasterly flow event unfolded across the Phoenix Valley with afternoon storms moving northeast out of the Tucson area. A large dust storm preceded strong storms that moved from southern Phoenix up along the I-17 corridor into Anthem and New River. Storms dropped anywhere from 1.00"-2.50" of rain in 60-90min. Significant flows were measured along East Fork Cave Creek, Arizona Canal Diversion Channel (ACDC), and Skunk Creek.
- According to the NWS Phoenix WFO, Sky Harbor Airport registered only 0.21" of rain during the month (0.70" below normal) good for twenty-first driest on record. The average high temperature of 107.5°F was eleventh hottest on record and 96.7°F mean temperature was seventh hottest on record. Four daily heat records were tied during month, but no new precipitation records.



August Recap/Notable Events:

- A large meso-scale convective complex moved northwest across southcentral AZ during the early morning hours on August 4th. This system brought anywhere from 1.00"-2.00" of rain during morning rush hour across most of northcentral Phoenix. Large flows were noted along the ACDC from the Phoenix North Mountain Preserve northwest through its confluence with Skunk Creek. Figure 4 above shows gage adjusted radar rainfall amounts from the event.
- Widespread t-storm activity around the peripheries of Maricopa County brought torrential rainfall and flooding during the afternoon and evening of August 12. Of note, 1.50"-3.00" of rain fell from the far east Valley north into Fountain Hills and Scottsdale. Running washes and impoundments behind areas dams were noted in Fountain Hills while underpasses were flooded out along the northern reaches of the Loop 101 near Scottsdale Airport. Indian Bend Wash experienced its largest runoff event of the summer with large flows along its entire reach from Sweetwater Ave southeast to where it empties into Tempe Town Lake.
- According to the NWS Phoenix WFO, Sky Harbor Airport registered 0.91" of rain during the month good for fifty-eighth wettest on record. The average high temperature of 103.5°F was fiftieth coldest and mean temperature of 93.3°F was twenty-eighth coldest on record respectively. No daily precipitation or heat records were set during the month.

September Recap/Notable Events:

- Moisture shed from Hurricane Kay arrived across southcentral AZ on September 10th leading to widespread areas of 1.00"-2.50" of rain across southwestern portions of the County. Noteworthy runoff events were recorded along Waterman Wash and Rainbow Wash. On the evening of the 11th a line of severe storms moved north out of Pinal county into the eastern half of the County. These storms brought heavy rains and damaging wind gusts. Sky Harbor registered a 76mph wind gust and many other Valley areas observing 60+mph gusts leaving thousands without power.
- According to the NWS Phoenix WFO, Sky Harbor Airport registered 0.79" of rain for the month good for forty-fourth wettest on record. The mean temperature of 91.1°F was sixth warmest and 80.5°F average low temperature was second hottest on record. Two daily heat records were set in September.

MSP Issued Products Recap:

A total of two hundred thirteen forecast zone-specific messages were issued by the MSP spread across thirty-five different days during the length of the monsoon season. Table 1, below, shows the monthly break down by forecast zone of messages issued including season totals.

TABLE 1: MSP Messages Issued - 2022 Monsoon Season					
Forecast Zone	June	July	August	September	Total
Gila Bend	0	3	5	1	9

TABLE 1: MSP Messages Issued - 2022 Monsoon Season					
Forecast Zone	June	July	August	September	Total
Gila River	0	3	4	2	9
Palo Verde	0	0	7	1	8
Rainbow Valley	1	4	4	2	11
West Valley	1	4	9	2	16
Northwest Valley	0	4	8	2	14
Upper Centennial	1	1	10	2	14
Wickenburg	0	1	13	2	16
New River/Cave Creek	0	5	11	2	18
Phoenix North	0	5	7	1	13
Phoenix South	1	4	9	1	15
Scottsdale North	0	5	7	2	14
Scottsdale South	0	5	9	1	15
East Valley	1	7	6	2	16
Southeast Valley	1	3	4	4	12
Lower Salt River Lakes	0	0	1	0	1
Superstition	0	4	7	1	12
All Zones	6	58	121	28	213

Of the two hundred thirteen Messages issued, one hundred seventy-seven were Message-1 Alerts, seventeen were Message-2 Flash Flood Watches, nineteen were Message-3 Flash Flood Warnings, and zero Message-4 Cancel. Table 2, below, shows the monthly break down by forecast zone of Lake Alerts issued including season totals. Forty-seven Lake Alert statements were issued for the County Lakes Program including Lake Pleasant, Bartlett Lake, Saguaro Lake, Canyon Lake, Apache Lake, and Horseshoe Lake. The Alert Operation Center (AOC) was not activated during this monsoon season as none of the rain events ended up posing any serious threat to county/city dams or District flood control facilities.

TABLE 2: MSP Lake Alerts Issued - 2022 Monsoon Season					
Recreational Zone	June	July	August	September	Total
Lake Pleasant	1	3	8	1	13
Horseshoe Lake	0	0	2	0	2
Bartlett Lake	1	3	3	1	8
Saguaro Lake	2	2	3	2	9
Canyon Lake	2	2	3	2	9
Apache Lake	1	2	2	1	6
All Zones	7	12	21	7	47

MSP VERIFICATION METRICS AND CRITERIA

Several key verification metrics and a clear set of operational based criteria were adopted in order to conduct a thorough and complete verification of MSP products issued during the 2022 monsoon season. This chapter is broken down into five sections: Outlooks, Messages, Lake Alerts, and Storm Total Precipitation. Each section discusses the verification metrics used and the criteria followed to compute the statistics displayed in the summary chapter sections. A list of frequently used terms including definitions and acronyms as used throughout this report is listed below.

Observed Rainfall: the amounts of total rainfall gathered from either ALERT rain gages, gage corrected radar estimations, or local storm reports (LSRs).

Operationally Significant Event (OSE): a rain event within a MSP forecast zone with observed rainfall equal or greater than 0.50".

Hit: considered a correct forecast.

Miss: considered an incorrect forecast.

Correct Negative: considered a correct forecast ex. no rain forecast and no rain observed.

Forecast Accuracy: a measure of the ability to correctly forecast daily rainfall potential. Given in percent and calculated using Equation 1 below:

$$(1) \text{ Forecast Accuracy} = \left(\frac{\text{Correct Forecasts}}{\text{Total Forecasts}} \right) \times 100$$

Probability of Detection (POD): a measure of the ability to correctly discriminate heavy rain days (OSEs) from non-rain/minor rain days. Given in percent and calculated using Equation 2 below:

$$(2) \text{ POD} = \left(\frac{\text{OSEs Correctly Detected}}{\text{Total OSEs}} \right) \times 100$$

False Alarm: occurs when an OSE is forecast for a location but does not occur.

False Alarm Rate: measures the number of false alarms compared to forecast days i.e. over-forecasting. Given in percent and calculated using the Equation 3 below:

$$(3) \text{ FAR} = \left(\frac{\text{False Alarms}}{\text{Total Forecasts}} \right) \times 100$$

Threat Score: measures the fraction of observed and/or forecast events that were correctly predicted. TS can be thought of as forecast accuracy when correct negatives have been removed from consideration. Given in percent and calculated using Equation 4 below.

$$(4) \quad TS = \left(\frac{Hits}{Hits + Misses + False\ Alarms} \right) \times 100$$

Percent Error: a measure of relative error given in percent. Calculated using Equation 4 below:

$$(5) \quad \% \text{ Error} = \left(\frac{Forecast - Observed}{Observed} \right) \times 100$$

Quantitative Precipitation Forecast (QPF): forecast zone or basin specific rainfall forecast including a rainfall amount given in inches and/or intensity.

in percent, that rainfall that could occur within a forecast zone or basin, usually given in conjunction with a QPF.

Gage Adjusted Quantitative Precipitation Estimate (GAQPE): radar estimated rainfall total, product provided by WDT Inc.

Lead Time: the amount of time between when the forecast statement was issued/valid and the onset of the event (observable).

Qualifying Event: an issued statement/QPF that counts in the verification process.

The following five sections explain the development of verification statistics as tabulated in Appendix A-E.

OUTLOOKS:

Forecast Accuracy:

Either a hit or a miss was selected for each day. A hit was assigned when observed rainfall met or exceeded the QPF. A miss was assigned when rainfall was observed and no QPF was made or if observed rainfall failed to reasonably meet the QPF. In some cases, a hit was assigned when the QPF was not reasonably met by observed rainfall. In these cases, the probability of occurrence was 30% or less and the QPF was below the OSE threshold. Values were then populated for each forecast zone and all zones combined. Forecast accuracy was then calculated by month.

Probability of Detection:

A dash was assigned to all days when observed rainfall was below the OSE threshold. On days when observed rainfall met or exceeded the OSE threshold either a hit or a miss was assigned. A hit was selected when the observed rainfall reasonably met the QPF. A miss was assigned when observed rainfall greatly exceeded the QPF or if no QPF was issued. Values were then populated for each forecast zone and all zones combined. A probability of detection was calculated by month and season total.

False Alarm Rate:

False alarms were denoted by an “x”. A false alarm was assigned on days where the observed rainfall failed to meet the OSE threshold, yet the QPF called for an OSE with a high probability of occurrence. The two relationships below outline the above criteria.

*Probability $\geq 40\%$ and QPF ≥ 0.50 ” **AND** Observed Rain < 0.50 ”*
*Probability = 30% and QPF ≥ 1.00 ” **AND** Observed Rain < 0.50 ”*

Values were then populated for each forecast zone and all zones combined. False alarm rate was then calculated by month and season total.

Threat Score:

Similar to Forecast Accuracy, a Threat Score or Critical Success Index was calculated. Threat score is only concerned with forecasts that count (days with observable rain) and assumes correct negatives are not important. Values were populated for each forecast zone and all zones combined for the length of the season.

Tables containing all of the raw data used in generating the verification metrics discussed above for the MSP daily Outlooks can be found in [Appendix A](#).

MESSAGES:Forecast Accuracy:

A hit was assigned if a rain, stream, or dam alarm was triggered during the valid period of the issued Message and/or if observed rainfall reasonably met the QPF during the valid period. Conversely a miss was assigned if neither of these two criteria were met. Values were then populated for each forecast zone and all zones combined. Forecast accuracy was then calculated by month and season total.

Lead Time:

Lead time was calculated for each issued Message when possible. Time was measured from Message issuance to the first ALERT alarm triggered (rain, stream, or impoundment).

Tables containing all of the raw data used in generating the verification metrics discussed above for the MSP Messages can be found in [Appendix B](#).

LAKE ALERTS:Forecast Accuracy:

A hit was assigned if any of the following observations occurred during the valid period of the issued Lake Alert: lightning within the recreational area boundary, wind > 30 mph, or hail/heavy rain. Conversely a miss was assigned if none of these three criteria were observed. Values were then populated for each recreational zone and all zones combined. Forecast accuracy was then calculated by month and season total.

Lead Time:

Lead time was calculated for each issued Lake Alert when possible. Time was measured from the Lake Alert issuance to the first observation (lightning within the recreational area boundary, wind > 30mph, or hail/heavy rain).

Tables containing all of the raw data used in generating the verification metrics discussed above for the MSP Lake Alerts can be found in [Appendix C](#).

STORM TOTAL PRECIPITATION:**Forecast Accuracy:**

Only message statements where a QPF storm total precipitation amount was provided were evaluated. Observational data used for this verification included Maricopa County ALERT rain gages, local storm reports, and/or radar GAQPE. Either a hit or a miss was selected for each qualifying event. A hit was assigned if the percent error was less than or equal to 25%. Conversely a miss was assigned if the percent error was greater than 25%. Values were then populated for each forecast zone and all zones combined. Forecast accuracy was then calculated by month and season.

Tables containing all of the raw data used in generating the verification metrics discussed above for the MSP Messages can be found in [Appendix E](#).

OUTLOOK VERIFICATION

Table 3, below, shows the Outlook verification seasonal totals for each Forecast Zone (FZ). Complete data tables for each FZ, separated by month, can be viewed in [Appendix A](#): Table A-1. Overall, Outlook forecast accuracy during the length of the monsoon season for all FZs combined was 79.3%. Forecast accuracy remained at or above the 75% threshold for fifteen of the seventeen FZs. Furthermore, six FZs accuracy was above 80% with Palo Verde coming in the highest at 91.7%. An early start to the monsoon onset and very wet June, August, and September similar to 2021 likely assisted in lowering the overall forecast accuracy for each of the FZs.

TABLE 3: MSP Weather Outlook Verification - SEASON TOTALS, 2022							
Forecast Zone	Accurate Forecasts	AOF (%)	Sig. Events Detected	POD (%)	False Alarms	FAR (%)	TS (%)
Gila Bend	81/108	75%	31/38	81.6%	8/108	7.4%	63.9%
Gila River	84/108	74.1%	19/25	76%	2/108	1.9%	71.4%
Palo Verde	99/108	91.7%	23/28	82.1%	4/108	3.7%	86%
Rainbow Valley	92/108	85.2%	19/26	73.1%	2/108	1.9%	80.2%
West Valley	89/108	82.4%	24/32	75%	2/108	1.9%	76.9%
Northwest Valley	90/108	83.3%	24/28	85.7%	1/108	0.9%	78.9%
Upper Centennial	85/108	78.7%	27/34	79.4%	1/108	0.9%	73.3%
Wickenburg	81/108	75%	18/24	75%	5/108	4.6%	66%
New River/Cave Creek	82/108	75.9%	23/28	82.1%	3/108	2.8%	68.5%
Phoenix North	89/108	82.4%	14/17	82.4%	4/108	3.7%	75.3%
Phoenix South	88/108	81.5%	15/19	79%	2/108	1.9%	75.8%
Scottsdale North	81/108	75%	16/23	69.6%	4/108	3.7%	66.7%
Scottsdale South	81/108	75%	11/16	68.8%	3/108	2.8%	67.4%
East Valley	85/108	78.7%	14/18	77.8%	2/108	1.9%	72.5%
Southeast Valley	83/108	76.9%	16/25	64%	3/108	2.8%	69.6%
Lower Salt River Lakes	80/108	74.1%	25/29	86.2%	10/108	9.3%	61.6%
Superstition	86/108	79.6%	21/25	84%	9/108	8.3%	68.4%
All Zones	1456/1836	79.3%	350/445	78.7%	65/1836	3.5%	71.8%

The next metric computed was probability of detection. This metric was quite important because it distinguished how well MSP forecasters detected operationally significant events. Operationally significant events were defined as having 0.50" of rainfall or more. The POD during the length of the monsoon season for all FZs combined was 78.7%. In general, a POD of over 50% is considered sufficient and over 75% excellent in the forecast community. Thirteen out of the seventeen FZs were at or above the 75% accuracy threshold with the remaining four remaining well above the 50% accuracy threshold. The next metric included in Table 3 was False Alarm Rate (FAR). It is important to keep track of how often MSP forecasters predicted an operationally significant day that did not occur. Too many false alarms

can degrade user confidence in the forecasts. In general, a FAR below 50% is sufficient and below 25% is considered excellent within the forecast community. The overall FAR for all zones during the length of the monsoon season was exceptional at 3.5% with only three of the forecast zones exceeding 5%.

The final metric included in Table 2 was Threat Score (TS). The monsoon season officially runs from June 15th through September 30th of each year, yet the operational season (active weather days) tends to be much shorter beginning sometime in early July and finishing by mid-September. TS is thought to serve as a better metric for overall forecast skill as it removes correct negatives that are not important when computing forecast accuracy i.e. dry days before and after the active monsoon season. This year nineteen dry days were removed from 108-day total length of the season. Overall, forecast skill was very good at 71.8% for all FZs over the length of the active season. Six of the seventeen FZs met or exceeded the 75% accuracy threshold, while the remaining three FZs remained above 60%.

MESSAGE VERIFICATION

The MSP messages carry a higher priority threat-wise than the daily outlooks. These statements (Alerts, Watches, and Warnings) serve as the most critical products issued by the MSP during the monsoon season to our clients. A high level of accuracy is required when forecasting these types of events as the information they provide is directly applicable to the potential or imminent flooding situation. All of the messages issued fall under the category of operationally significant events.

Table 4, on the next page, shows the issued message verification broken down by FZ and month. Complete data tables for each FZ can be viewed in [Appendix B](#): Tables B-1, B-2, and B-3. There were two hundred six qualifying messages (updates and M-4s not included) issued over the length of the season. Forecast accuracy for all FZs combined, over the length of the season, was exceptional at 96.1%. Sixteen out of seventeen FZs met or exceeded the 75% accuracy threshold with fourteen exceeding 90%. The lowest accuracy was observed at Lower Salt River Lakes at 0%, but there was only one message issued on the season.

Overall, the area experienced a back to back very active and wetter than normal Monsoons. As a result, the total number of qualifying messages issued on the season (206) significantly exceed the seasonal average of one hundred thirty-nine (based on MSP Verification Reports since 2012). With the extra early onset, six messages were issued during the month of June with four of them coming on the 26th. Fifty-eight messages were issued across eleven operationally significant days. The start of the month remained quieter than normal with the first messages of the season issued on the evening of July 13th for portions of the southeast Valley. July 24th through July 31st was the most active multi-day period with forty-six messages issued all of which verified. Overall, forecast accuracy for the month across all zones was very good at 94.8%.

August was the busiest month with one hundred sixteen messages issued spread out across fifteen operationally significant days. Remarkably, forecast accuracy for the month across all FZs combined improved to 96.6%. 56% of the messages issued (65) for the month came during a very active nine day stretch spanning the 18th through the 21st. All but one of those messages verified.

September saw a sharp decrease in the total number of messages issued to twenty-six, but overall forecast accuracy for the month remained excellent at 96.2%. Issued messages were spread across seven operationally significant days. September 11th was the busiest day of the month with ten messages issued. All ten verified.

Lead time was the final metric included for message statement verification this year. The average lead time (data in [Appendix B](#), Table B-3) for all M-1 Alerts combined over the length of the monsoon season was just over twenty-six minutes. The average lead time for M-2 Flash Flood Watches was just over twenty hours.

TABLE 4: MSP Issued Statements Verification, broken down by month and Forecast Zone - Monsoon Season 2022

	June		July		August		September		Season Totals	
Forecast Zone	Correct Statements	AOF (%)	Correct Statements	AOF (%)	Correct Statements	AOF (%)	Correct Statements	AOF (%)	Correct Statements	AOF (%)
Gila Bend	0/0	n/a	3/3	100%	5/5	100%	1/1	100%	9/9	100%
Gila River	0/0	n/a	3/3	100%	4/4	100%	2/2	100%	9/9	100%
Palo Verde	0/0	n/a	0/0	n/a	7/7	100%	1/1	100%	8/8	100%
Rainbow Valley	1/1	100%	4/4	100%	4/4	100%	2/2	100%	11/11	100%
West Valley	1/1	100%	4/4	100%	8/8	100%	1/1	100%	14/14	100%
Northwest Valley	0/0	n/a	4/4	100%	7/7	100%	1/1	100%	12/12	100%
Upper Centennial	1/1	100%	1/1	100%	10/10	100%	2/2	100%	14/14	100%
Wickenburg	0/0	n/a	1/1	100%	13/13	100%	2/2	100%	16/16	100%
New River/Cave Creek	0/0	n/a	5/5	100%	10/10	100%	2/2	100%	17/17	100%
Phoenix North	0/0	n/a	4/5	80%	7/7	100%	1/1	100%	12/13	92.3%
Phoenix South	1/1	100%	4/4	100%	8/9	88.9%	1/1	100%	14/15	93.3%
Scottsdale North	0/0	n/a	5/5	100%	7/7	100%	2/2	100%	14/14	100%
Scottsdale South	0/0	n/a	4/5	80%	6/7	85.7%	1/1	100%	11/13	84.6%
East Valley	1/1	100%	7/7	100%	5/6	83.3%	2/2	100%	14/16	87.5%
Southeast Valley	1/1	100%	3/3	100%	4/4	100%	3/4	75%	11/12	91.7%
Lower Salt River Lakes	0/0	n/a	0/0	n/a	0/1	0%	0/0	n/a	0/1	0%
Superstition	0/0	n/a	3/4	75%	7/7	100%	1/1	100%	11/12	91.7%
All Zones	6/6	100%	55/58	94.8%	112/116	96.6%	25/26	96.2%	198/206	96.1%

LAKE ALERT VERIFICATION

Weather guidance is provided to Maricopa County lakes/reservoirs and the recreational zones which encompass them in the form of lake alerts. These statements are issued as needed to inform staff/personnel of approaching adverse weather conditions with an emphasis on wind gusts and lightning activity and then to a lesser degree hail/heavy rainfall. A high level of accuracy is required when forecasting these types of events as lake alerts are considered warnings to the recreational community (staff, boaters, hikers, and campers).

Table 5, below, shows the issued lake alert verification broken down by recreational zone and month. Complete data tables for each recreational zone can be viewed in [Appendix C](#): Table C-1. There were forty-seven lake alerts issued over the length of the season with the majority of them occurring in July and August with thirty-three. Only two statements were issued for the Horseshoe Lake recreational zone for the entire season due to a lack of water in the reservoir. Forecast accuracy for the recreational zones combined, over the length of the season, was 87.2%. All six zones met or exceeded the 75% accuracy threshold with three coming in above 90% accuracy. As stated earlier, 50% accuracy is considered sufficient and 75% and above is considered excellent within the forecast community. The average lead time (not shown) for all lakes/reservoirs combined over the length of the monsoon season was just over twelve minutes.

TABLE 5: MSP Lake Alerts Issued - 2022 Monsoon Season										
	June		July		August		September		Season Totals	
Recreational Zone	Correct Alerts	AOF (%)	Correct Alerts	AOF (%)	Correct Alerts	AOF (%)	Correct Alerts	AOF (%)	Correct Alerts	AOF (%)
Lake Pleasant	1/1	100%	2/3	66.7%	8/8	100%	1/1	100%	12/13	92.3%
Horseshoe Lake	0/0	n/a	0/0	n/a	2/2	100%	0/0	n/a	2/2	100%
Bartlett Lake	1/1	100%	2/3	66.7%	2/3	66.7%	1/1	100%	6/8	75%
Saguaro Lake	2/2	100%	2/2	100%	1/3	33.3%	2/2	100%	7/9	77.8%
Canyon Lake	2/2	100%	1/2	50%	3/3	100%	2/2	100%	8/9	88.9%
Apache Lake	1/1	100%	2/2	100%	2/2	100%	1/1	100%	6/6	100%
All Zones	7/7	100%	9/12	75%	18/21	81%	7/7	100%	41/47	87.2%

QPF STORM TOTAL PRECIPITATION VERIFICATION

The MSP has placed added emphasis on including QPF information within message statements, specifically M-1 Alerts. These messages are normally issued before the onset of rain events and precede warning issuance in order to maximize lead time for affected locations. Providing STP that will likely accompany thunderstorms moving through a FZ is intended to help clients make well-informed and proactive decisions.

Figure 6, below, is a scatter plot depicting forecast versus observed storm total precipitation. An accurate forecast will have points on or near the solid black diagonal line. Two black dashed lines were also included that show the “+/-” 25 percent error thresholds used in the verification process (discussed in the [MSP Verification Metrics and Criteria](#) section). All events that fall between the upper and lower thresholds were considered hits. There were one hundred sixty-nine qualifying message events that counted towards the verification of the STP forecasts and one hundred fifty-seven events fell within the error threshold.

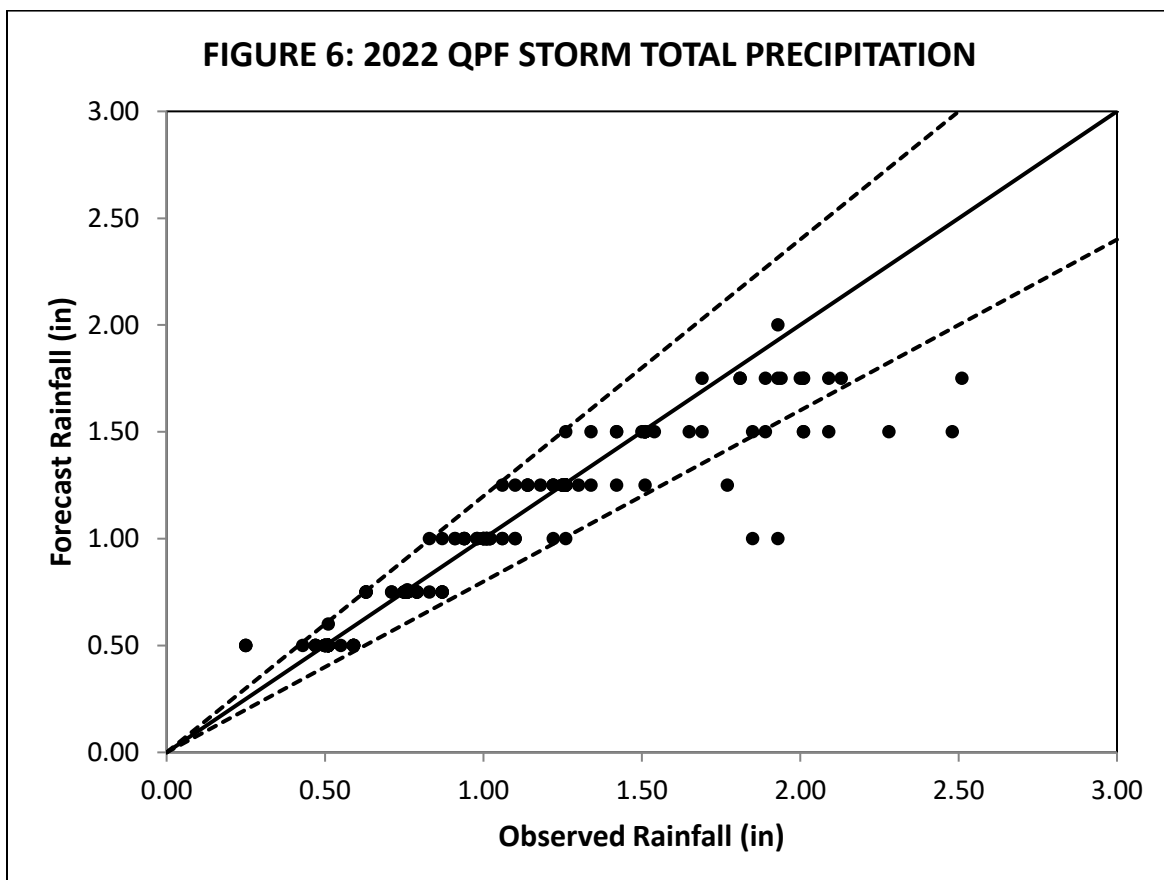


Table 7, on the next page, shows the issued message verification broken down by FZ and month. Complete data tables for each FZ can be viewed in [Appendix E: Table E-1](#). Forecast accuracy for all FZs combined, over the length of the season, was 92.9%. Figure 6 above clearly shows that the majority of missed events over the course of the monsoon tended to be

under-forecast (forecast rainfall value < observed rainfall value) by the MSP. There were six qualifying events in June all of which verified. Accuracy in July came in at 92% across fifty qualifying events spread over eleven storm days. There were no events in Palo Verde and Lower Salt River Lakes FZs. Of the remaining fifteen zones, twelve stayed at or above the 75% accuracy threshold. Accuracy in August actually improved to 94.3% across eighty-eight events spread over fifteen storm days. There were no events in the Lower Salt River Lakes FZ. Of the remaining sixteen zones, all of them stayed at or above 75% accuracy threshold. The five misses for the month were spread evenly across five FZs. Accuracy in September dropped slightly to 92% across twenty-five events spread across seven storm days. Forecast accuracy was 100% at fourteen of the sixteen FZs with qualifying events. New River/Cave Creek had the lowest accuracy for the month at 50%.

It is important to remember observed storm total rainfall data is typically gathered from either ALERT rain gages or provided from local storm reports. In either case, accurate measurements of peak rainfall are contingent upon a thunderstorm rain core directly passing over a gage site. In this case, gage adjusted radar rainfall estimates (e.g. GAQPE) were used to fill in the gaps that would otherwise be missed in the FZs.

TABLE 7: QPF Storm Total Precipitation Verification - Monsoon Season 2022

	June		July		August		September		Season Totals	
Forecast Zone	Correct QPF	AOF (%)	Correct QPF	AOF (%)	Correct QPF	AOF (%)	Correct QPF	AOF (%)	Correct QPF	AOF (%)
Gila Bend	0/0	n/a	1/2	50%	3/4	75%	1/1	100%	5/7	71.4%
Gila River	0/0	n/a	1/2	50%	3/3	100%	2/2	100%	6/7	85.7%
Palo Verde	0/0	n/a	0/0	n/a	6/6	100%	1/1	100%	7/7	100%
Rainbow Valley	1/1	100%	2/3	66.7%	3/3	100%	2/2	100%	8/9	88.9%
West Valley	1/1	100%	4/4	100%	7/7	100%	1/1	100%	13/13	100%
NW Valley	0/0	n/a	4/4	100%	6/6	100%	1/1	100%	11/11	100%
Upper Centennial	1/1	100%	0/1	100%	8/8	100%	2/2	100%	11/12	91.7%
Wickenburg	0/0	n/a	1/1	100%	8/9	88.9	0/1	0%	9/11	81.8%
New River/Cave Creek	0/0	n/a	3/3	100%	6/6	100%	1/2	50%	10/11	90.9%
Phoenix North	0/0	n/a	4/4	100%	5/6	83.3	1/1	100%	10/11	90.9%
Phoenix South	1/1	100%	4/4	100%	7/8	87.5	1/1	100%	13/14	92.9%
Scottsdale North	0/0	n/a	5/5	100%	5/5	100%	2/2	100%	12/12	100%
Scottsdale South	0/0	n/a	4/5	80%	4/5	80%	1/1	100%	9/11	81.8%
East Valley	1/1	100%	6/6	100%	4/4	100%	2/2	100%	13/13	100%
Southeast Valley	1/1	100%	3/3	100%	3/3	100%	4/4	100%	11/11	100%
Lower Salt River Lakes	0/0	n/a	0/0	n/a	0/0	n/a	0/0	n/a	0/0	n/a
Superstition	0/0	n/a	3/3	100%	5/5	100%	1/1	100%	9/9	100%
All Zones	6/6	100%	45/50	92%	83/88	94.3%	23/25	92%	157/169	92.9%

SUMMARY

The Flood Warning Branch of the FCDMC operates a year-round Meteorological Services Program (MSP) that's purpose is to provide detailed weather forecasts and support to county, city, and other local agencies encompassing Maricopa County and its contributing watersheds. In particular, during the length of the monsoon season, it is the specific the goal of the MSP to reduce response time for emergency managers by providing timely and accurate weather information, primarily regarding the potential for flood-producing rainfall. This report provides a compiled set of verification statistics based on products issued by the MSP during the length of the 2022 monsoon season. Outlooks, Messages, Lake Alerts, and QPF Storm Total Precipitation were the four products analyzed in this report.

Verification of daily outlooks was conducted using four metrics: forecast accuracy, probability of detection, false alarm rate, and threat score. When comparing all forecast zones combined over the length of the monsoon season, forecast accuracy was 79.3%, probability of detection was 78.7%, the false alarm rate was 3.5%, and the Threat Score was 71.8%. All metrics fell into the “excellent” category except for Threat Score, which was still considered “satisfactory” when equating these results with accepted values within the forecast community.

Verification of messages was conducted using forecast accuracy. When comparing all forecast zones combined over the length of the monsoon season, forecast accuracy was 96.1%. Any value of over 75% is considered “excellent” within the forecast community. Forecast skill was consistent across July (94.8%) and August (96.6%) with over one hundred seventy-four qualifying messages combined. September saw a sharp decreased in the total number of messages issued to twenty-six, but overall forecast accuracy for the month remained very high at 96.2%. The average lead time for all M-1 Alerts over the length of the Monsoon season was twenty-six minutes. The average lead time for M-2 Flash Flood Watches was just over twenty hours. Both lead time metrics were above average when compared with previous years.

Verification of lake alerts was conducted using forecast accuracy. When comparing all forecast zones combined over the length of the monsoon season, forecast accuracy was 87.2% spread across forty-seven events. It's worth noting again that only two lake alerts were issued for Horseshoe Lake this monsoon season as the reservoir remained mostly empty through the summer months. The average lead time for all lakes/reservoirs combined over the length of the season was just over twelve minutes, which is dropped from last summer and lower than average when compared with previous years.

Verification of QPF storm total precipitation was conducted using forecast accuracy. Forecast accuracy was determined using computed percent error when looking at forecasts versus observational data sets. When comparing all forecast zones combined over the length of the monsoon season, forecast accuracy was 92.9%. Eight of the twelve missed events resulted from under-predicting storm total rainfall amounts, which showed a clear bias that was last present in 2021.

TABLE 8: Historic Monsoon Season Verification Comparison										
	Outlooks				Messages		Lake Alerts		QPF STP	
Year	AOF	POD	FAR	TS	Events	AOF	Events	AOF	Events	AOF
2012	79.1%	79.6%	8.9%	n/a	102	86.3%	n/a	n/a	n/a	n/a
2013	79.8%	78.7%	6.2%	n/a	137	88.0%	56	89.3%	54	72.2%
2014	77.7%	76.9%	7.1%	67.4%	263	80.2%	57	84.2%	76	72.4%
2015	74.8%	60.3%	2.8%	67.9%	118	75.4%	40	95%	56	82.1%
2016	84.9%	78%	2.6%	77.5%	112	90.2%	46	82.6%	53	88.7%
2017	83.1%	77.9%	1.8%	72.4%	111	86.5%	53	90.6%	67	93.1%
2018	86.1%	82.2%	1.6%	75.6%	129	89.9%	41	82.9%	110	84.5%
2019	90.1%	72.9%	0.7%	80.9%	78	92.3%	18	83.3%	46	80.4%
2020	92.4%	67.1%	0.4%	84.2%	54	92.6%	17	82.4%	36	97.2%
2021	83.0%	85.5%	3.5%	72.5%	219	92.7%	32	87.5%	122	82.8%
2022	79.3%	78.7%	3.5%	71.8%	206	96.6%	47	87.2%	169	92.9%
AVG	82.8%	76.2%	3.6%	74.5%	139.0	88.3%	41	86.5%	78.9	84.6%

Table 8, above, was included to add more historical perspective in the verification process. Verification metrics for Outlooks, Messages, Lake Alerts, and QPF STP were included for all previous years. Most Outlook forecast metrics worsened in 2022 when compared to 2020-2018. However, 2022 was very similar to 2021 in that it was much more active from an operational perspective (operationally significant events, storm days, products issued). Furthermore, these products were in line or better than the long term average.

Forecast skill for issued messages has continued to improve since the 2017 season and was the highest value since we've been keeping records. This was even more impressive when viewing the significant rise in qualifying events (similar to what was seen in 2021) from recent years and the longer term average. Regarding issued messages, this was the third busiest season only falling short of 2014 and 2021. Forecast accuracy for Lake Alerts worsened slightly from the previous year but still came in above the longer term average of 86.5%, while also showing a jump in total number of issued alerts. STP skill came well above the long term average. This is even more impressive noting this very active season had more than double the average number of qualifying events. STP saw the largest number of qualifying events this summer and forecast skill still came in well above the 75% threshold.

When all was said and done, the 2022 monsoon season was considered well above normal in terms of active days and rainfall. The season also recorded the third most number of products issued by the MSP. It is hoped that this report will serve as quantifiable tool used to evaluate forecast performance on a year to year basis. This report will be continued in subsequent years focusing not only the present year's statistical data but will also serve as a historical comparison to measure future year's performance.

APPENDIX A: MSP OUTLOOKS - VERIFICATION TABLES

TABLE A-1: This table shows the raw verification data of MSP issued precipitation forecasts contained in the daily Outlooks for the 2022 monsoon season. The valid period for rainfall each day is from 2PM same day through 12PM the following day. The table is broken down by date and MSP Forecast Zone. For brevity two Forecast Zones are included for each day. The columns from left to right are defined as follows:

Prob. – Percent probability of measurable rain within the Forecast Zone from 0% to 100% over the period.

QPF – Total forecast rainfall in inches within the Forecast Zone over the period.

ALERT – Peak total observed ALERT gage rainfall value in inches within the Forecast Zone over the period.

GAQPE – Radar rainfall estimate (see [Verification Metrics and Criteria](#) section for more details).

AOF – Forecast accuracy, assigned an “h” for a hit and “m” for a miss.

POD – Probability of detection, assigned an “h” for a hit, “m” for a miss, or “-” for non-significant rainfall.

FA – False alarms, assigned an “x”.

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
	Gila Bend							Gila River						
06/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.11-0.25	m	-	-
06/18/22	0	0.00	0.00	0.05-0.10	m	-	-	10	0.10	0.04	0.11-0.25	h	-	-
06/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/20/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/22	10	0.10	0.00	0.00	h	-	-	10	0.10	0.00	0.00	h	-	-
06/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/23/22	30	0.25	0.20	0.76-1.00	m	m	-	30	0.25	0.16	0.11-0.25	h	-	-
06/24/22	10	0.10	0.00	0.05-0.10	h	-	-	10	0.10	0.20	1.26-1.50	m	m	-
06/25/22	30	0.50	0.00	0.26-0.50	h	-	-	10	0.10	0.00	0.05-0.10	h	-	-
06/26/22	30	0.75	0.31	1.26-1.50	h	h	-	30	0.30	0.00	0.76-1.00	m	m	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
06/27/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/28/22	10	0.25	0.00	0.76-1.00	m	m	-	0	0.00	0.00	0.00	h	-	-
06/29/22	20	0.75	0.12	1.51-2.00	h	h	-	20	0.40	0.00	0.51-0.75	h	m	-
06/30/22	0	0.00	0.00	0.51-0.75	m	m	-	0	0.00	0.00	0.00	h	-	-
16 days					12	3/5	0					13	0/3	0
07/01/22	0	0.00	0.00	0.76-1.00	m	m	-	0	0.00	0.00	0.00	h	-	-
07/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/04/22	0	0.00	0.00	0.00	h	-	-	10	0.10	0.00	0.05-0.10	h	-	-
07/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/09/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/11/22	0	0.00	0.00	0.05-0.10	m	-	-	0	0.00	0.00	0.05-0.10	m	-	-
07/12/22	30	0.50	0.00	1.01-1.25	m	h	-	0	0.00	0.00	0.00	h	-	-
07/13/22	30	0.50	0.00	0.26-0.50	h	-	-	20	0.25	0.00	1.26-1.50	m	m	-
07/14/22	30	1.00	0.00	0.26-0.50	h	-	X	20	0.50	0.16	0.26-0.50	h	-	-
07/15/22	30	1.00	0.00	0.26-0.50	m	-	X	20	0.75	0.00	0.00	m	-	-
07/16/22	40	1.00	0.00	0.00	m	-	X	20	0.50	0.00	0.00	m	-	-
07/17/22	30	1.00	0.04	0.26-0.50	m	-	X	20	0.25	0.16	0.26-0.50	h	-	-
07/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/22	10	0.50	0.00	0.11-0.25	h	-	-	0	0.00	0.00	0.11-0.25	m	-	-
07/21/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/22/22	10	0.10	0.00	0.11-0.25	h	-	-	0	0.00	0.00	0.26-0.50	m	-	-
07/23/22	10	0.75	0.75	0.51-0.75	h	h	-	10	0.50	0.00	0.51-0.75	h	h	-
07/24/22	30	1.00	0.20	1.01-1.25	h	h	-	30	1.00	0.00	0.26-0.50	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
07/25/22	20	0.75	0.24	0.51-0.75	h	h	-	20	2.00	0.16	2.01-2.50	h	h	-
07/26/22	30	0.75	0.00	0.26-0.50	h	-	-	10	0.75	0.28	0.26-0.50	h	-	-
07/27/22	30	0.75	0.00	0.51-0.75	h	h	-	10	2.00	0.24	2.01-2.50	h	h	-
07/28/22	30	0.75	0.00	0.51-0.75	h	h	-	30	1.25	0.04	1.01-1.25	h	h	-
07/29/22	30	2.50	0.20	2.01-2.51	h	h	-	40	1.00	0.00	0.00	m	-	X
07/30/22	50	0.75	0.43	0.51-0.75	h	h	-	40	1.25	1.02	1.26-1.50	h	h	-
07/31/22	50	1.50	1.42	2.51-3.00	h	h	-	30	0.75	0.00	0.00	m	-	X
31 days					25	9/10	4					22	5/6	2
08/01/22	10	0.50	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.04	0.11-0.25	m	-	-
08/03/22	50	0.50	0.75	0.51-0.75	h	h	-	30	0.50	0.35	1.01-1.25	h	h	-
08/04/22	0	0.00	0.00	0.51-0.75	m	m	-	0	0.00	0.00	0.00	h	-	-
08/05/22	0	0.00	0.00	-	h	-	-	0	0.00	0.00	-	h	-	-
08/06/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.11-0.25	m	-	-
08/07/22	40	0.75	0.00	0.00	m	-	X	20	0.50	0.00	0.05-0.10	m	-	-
08/08/22	40	1.00	0.00	0.51-0.75	h	h	-	20	0.50	0.31	1.51-2.00	h	h	-
08/09/22	30	0.75	0.00	0.76-1.00	h	h	-	0	0.00	0.00	0.00	h	-	-
08/10/22	20	0.50	0.00	0.05-0.10	m	-	-	20	0.50	0.00	0.00	m	-	-
08/11/22	0	0.00	0.00	0.51-0.75	m	m	-	0	0.00	0.00	0.00	h	-	-
08/12/22	40	1.25	0.20	2.01-2.50	h	h	-	20	0.75	0.00	0.11-0.25	m	-	-
08/13/22	30	0.75	0.00	0.51-0.75	h	h	-	10	0.75	0.00	0.51-0.75	h	h	-
08/14/22	30	1.25	1.22	1.51-2.00	h	h	-	20	1.25	0.20	1.01-1.25	h	h	-
08/15/22	20	0.25	0.00	0.00	m	-	-	10	0.25	0.00	0.00	h	-	-
08/16/22	30	1.25	0.00	0.26-0.50	m	-	X	20	0.25	0.00	0.00	m	-	-
08/17/22	30	1.50	0.39	0.76-1.00	h	h	-	20	0.50	0.00	1.26-1.50	m	h	-
08/18/22	40	1.25	0.75	1.01-1.25	h	h	-	40	0.75	0.04	0.76-1.00	h	h	-
08/19/22	50	2.25	0.75	3.01-4.00	h	h	-	40	1.50	0.12	1.26-1.50	h	h	-
08/20/22	50	1.50	0.79	2.01-2.50	h	h	-	50	1.50	0.00	1.01-1.25	h	h	-
08/21/22	30	1.25	0.51	1.51-2.00	h	h	-	20	0.75	0.08	0.26-0.50	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
08/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/23/22	40	1.25	0.00	0.26-0.50	m	-	X	20	0.50	0.00	0.05-0.10	m	-	-
08/24/22	50	1.50	0.00	0.51-0.75	h	h	-	20	0.50	0.00	0.76-1.00	h	h	-
08/25/22	20	0.50	0.00	0.00	m	-	-	0	0.00	0.08	0.26-0.50	m	-	-
08/26/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/27/22	20	1.00	0.00	1.26-1.50	h	h	-	20	1.00	0.00	1.01-1.25	h	h	-
08/28/22	10	0.50	0.00	0.51-0.75	h	h	-	0	0.00	0.00	0.00	h	-	-
08/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/31/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
31 days					22	14/16	3					22	10/10	0
09/01/22	10	0.10	0.08	0.11-0.25	h	-	-	0	0.00	0.12	0.76-1.00	m	m	-
09/02/22	40	0.50	0.00	0.00	m	-	X	10	0.25	0.00	0.26-0.50	h	-	-
09/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/08/22	20	0.25	0.00	0.00	m	-	-	0	0.00	0.00	0.00	h	-	-
09/09/22	40	1.00	0.47	1.51-2.00	h	h	-	50	1.00	0.47	0.76-1.00	h	h	-
09/10/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.00	h	-	-
09/11/22	10	0.10	0.24	1.01-1.25	m	m	-	30	0.50	0.59	0.76-1.00	h	h	-
09/12/22	20	0.25	0.00	0.00	m	-	-	30	0.25	0.00	0.26-0.50	h	-	-
09/13/22	0	0.00	0.00	0.05-0.10	m	-	-	0	0.00	0.00	0.00	h	-	-
09/14/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
09/19/22	20	0.25	0.08	0.11-0.25	h	-	-	20	0.25	0.00	0.11-0.25	h	-	-
09/20/22	30	0.75	0.08	0.51-0.75	h	h	-	20	0.50	0.08	0.51-0.75	h	h	-
09/21/22	50	2.00	2.05	2.01-2.50	h	h	-	40	0.50	0.20	0.51-0.75	h	h	-
09/22/22	30	0.75	0.00	1.51-2.00	h	h	-	0	0.00	0.00	0.00	h	-	-
09/23/22	0	0.00	0.00	0.51-0.75	m	m	-	0	0.00	0.00	1.26-1.50	m	m	-
09/24/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/25/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/27/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/28/22	30	0.50	0.12	1.01-1.25	m	h	-	10	0.25	0.24	0.51-0.75	m	m	-
09/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
30 days					22	5/7	1					27	4/6	0
	Palo Verde							Rainbow Valley						
06/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.11-0.25	m	-	-
06/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/20/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/22	10	0.10	0.00	0.00	h	-	-	10	0.10	0.00	0.00	h	-	-
06/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/23/22	10	0.25	0.00	0.11-0.25	h	-	-	20	0.25	0.08	0.51-0.75	m	m	-
06/24/22	10	0.10	0.00	0.00	h	-	-	10	0.10	0.00	0.11-0.25	h	-	-
06/25/22	20	0.33	0.04	0.51-0.75	h	m	-	10	0.25	0.00	0.26-0.50	h	-	-
06/26/22	30	0.40	0.16	0.51-0.75	h	m	-	30	0.40	0.31	0.76-1.00	h	m	-
06/27/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/28/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
06/29/22	30	0.50	0.55	0.76-1.00	h	h	-	20	0.40	0.71	0.75-1.00	h	m	-
06/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
16 days					16	1/3	0					14	0/3	0
07/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.04	0.11-0.25	m	-	-
07/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/09/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/11/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.11-0.25	m	-	-
07/12/22	20	0.25	0.00	0.11-0.25	h	-	-	0	0.00	0.00	0.00	h	-	-
07/13/22	0	0.00	0.00	0.00	h	-	-	20	0.25	0.04	0.11-0.25	h	-	-
07/14/22	20	0.50	0.16	0.11-0.25	h	-	-	20	0.50	0.28	0.26-0.50	h	-	-
07/15/22	20	0.75	0.00	0.00	m	-	-	20	0.75	0.00	0.00	m	-	-
07/16/22	30	0.75	0.71	1.26-1.50	h	h	-	30	0.75	0.16	0.26-0.50	h	-	-
07/17/22	30	1.00	0.04	0.51-0.75	h	h	-	10	0.25	0.24	0.51-0.75	h	m	-
07/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.26-0.50	m	-	-
07/21/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/22/22	0	0.00	0.04	0.11-0.25	m	-	-	0	0.00	0.00	0.26-0.50	m	-	-
07/23/22	0	0.00	0.79	0.76-1.00	m	m	-	0	0.00	0.24	0.51-0.75	m	-	-
07/24/22	50	1.25	0.16	0.26-0.50	m	-	X	50	1.25	0.87	1.26-1.50	h	h	-
07/25/22	20	2.00	1.26	1.51-2.00	h	h	-	20	2.00	0.20	1.51-2.00	h	h	-
07/26/22	20	0.75	0.28	0.26-0.50	h	-	-	10	0.75	0.00	0.26-0.50	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
07/27/22	20	0.75	0.31	0.51-0.75	h	h	-	10	0.75	0.12	0.51-0.75	h	h	-
07/28/22	30	1.25	0.98	1.26-1.50	h	h	-	30	0.75	0.28	0.26-0.50	h	-	-
07/29/22	40	1.00	0.00	0.11-0.26	m	-	X	40	1.00	0.39	1.26-1.51	h	h	-
07/30/22	40	0.75	0.24	0.51-0.75	h	h	-	30	2.00	0.16	3.01-4.00	h	h	-
07/31/22	30	1.00	0.83	1.01-1.25	h	h	-	30	1.00	0.00	0.00	m	-	X
31 days					26	7/8	2					24	5/6	1
08/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.11-0.25	m	-	-
08/03/22	40	0.75	0.47	0.76-1.00	h	h	-	40	0.75	0.67	1.01-1.25	h	h	-
08/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/05/22	0	0.00	0.00	-	h	-	-	0	0.00	0.00	-	h	-	-
08/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/07/22	30	0.50	0.59	0.51-0.75	h	h	-	30	0.50	0.00	0.76-1.00	h	h	-
08/08/22	30	0.75	0.04	0.26-0.50	h	-	-	20	0.50	0.43	1.26-1.50	h	h	-
08/09/22	10	0.75	0.47	0.76-1.00	h	h	-	10	0.25	0.00	0.11-0.25	h	-	-
08/10/22	10	0.75	0.08	0.26-0.50	h	-	-	10	0.50	0.00	0.26-0.50	h	-	-
08/11/22	0	0.00	0.35	0.26-0.50	m	-	-	0	0.00	0.00	0.00	h	-	-
08/12/22	30	1.25	0.51	1.01-1.25	h	h	-	30	1.00	0.00	0.51-0.75	h	h	-
08/13/22	10	0.75	0.04	0.51-0.75	h	h	-	10	0.75	0.00	0.51-0.75	h	h	-
08/14/22	30	2.00	1.54	2.01-2.50	h	h	-	20	2.00	0.59	2.01-2.50	h	h	-
08/15/22	10	0.25	0.00	0.00	h	-	-	10	0.25	0.00	0.00	h	-	-
08/16/22	10	0.25	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-
08/17/22	30	1.00	0.00	0.26-0.50	h	-	X	20	0.50	0.00	0.11-0.25	h	-	-
08/18/22	30	1.25	1.10	1.26-1.50	h	h	-	30	0.75	0.28	0.76-1.00	h	h	-
08/19/22	40	2.25	0.93	2.51-3.00	h	h	-	40	2.25	0.04	2.51-3.00	h	h	-
08/20/22	50	0.75	0.28	0.51-0.75	h	h	-	50	0.75	0.98	0.51-0.75	h	h	-
08/21/22	30	1.25	0.08	0.51-0.75	h	h	-	30	1.00	0.12	0.51-0.75	h	h	-
08/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/23/22	20	0.50	0.00	0.51-0.75	h	h	-	30	0.50	0.00	0.11-0.25	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
08/24/22	40	1.00	0.00	0.51-0.75	h	h	-	30	0.75	0.00	0.05-0.10	m	-	X
08/25/22	10	0.33	0.00	0.00	h	-	-	10	0.33	0.00	0.11-0.25	h	-	-
08/26/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/27/22	20	0.25	0.00	0.11-0.25	h	-	-	20	1.00	0.00	1.01-1.25	h	h	-
08/28/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/31/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
31 days					30	12/12	1					28	11/11	1
09/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.26-0.50	m	-	-
09/02/22	30	0.50	0.08	0.26-0.50	h	-	-	20	0.33	0.20	0.26-0.50	h	-	-
09/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/08/22	10	0.10	0.00	0.00	h	-	-	10	0.10	0.00	0.00	h	-	-
09/09/22	40	1.00	1.14	1.26-1.50	h	h	-	40	1.00	1.02	2.51-3.00	h	h	-
09/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/11/22	10	0.10	0.83	1.01-1.25	m	m	-	10	0.10	0.24	0.76-1.00	m	m	-
09/12/22	10	0.50	0.00	0.51-0.75	h	h	-	20	0.25	0.04	0.11-0.25	h	-	-
09/13/22	0	0.00	0.00	0.00	h	-	-	10	0.10	0.00	0.05-0.10	h	-	-
09/14/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/19/22	20	0.10	0.00	0.05-0.10	h	-	-	20	0.25	0.08	0.26-0.50	h	-	-
09/20/22	20	0.75	0.63	1.26-1.50	h	h	-	20	0.50	0.47	0.76-1.00	h	h	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
09/21/22	50	0.50	0.04	0.11-0.25	m	-	X	40	0.50	0.24	0.51-0.75	h	h	-
09/22/22	0	0.00	0.00	0.00	h	-	-	10	0.25	0.00	0.11-0.25	h	-	-
09/23/22	0	0.00	0.04	1.01-1.25	m	m	-	0	0.00	0.00	0.00	h	-	-
09/24/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/25/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/22	0	0.00	0.00	0.00	h	-	-	10	0.25	0.16	0.76-1.00	m	m	-
09/27/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/28/22	0	0.00	0.00	0.00	h	-	-	10	0.25	0.35	1.01-1.25	m	m	-
09/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
30 days					27	3/5	1					26	3/6	0
	West Valley							Northwest Valley						
06/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/18/22	10	0.10	0.00	0.05-0.10	h	-	-	10	0.15	0.00	0.05-0.10	h	-	-
06/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/20/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/22	10	0.10	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/23/22	10	0.25	0.04	0.26-0.50	h	-	-	10	0.25	0.20	0.26-0.50	h	-	-
06/24/22	10	0.10	0.20	0.51-0.75	m	m	-	10	0.10	0.98	2.01-2.50	m	m	-
06/25/22	10	0.30	0.31	0.51-0.75	h	m	-	10	0.30	0.04	0.26-0.50	h	-	-
06/26/22	30	0.30	0.47	0.76-1.00	h	m	-	30	0.40	0.75	1.01-1.25	h	m	-
06/27/22	0	0.00	0.00	0.00	h	-	-	20	0.10	0.00	0.00	h	-	-
06/28/22	0	0.00	0.00	0.00	h	-	-	10	0.10	0.00	0.00	h	-	-
06/29/22	30	0.50	0.35	0.51-0.75	h	h	-	40	0.80	0.63	1.26-1.50	h	h	-
06/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
16 days					15	1/4	0					15	1/3	0
07/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.05-0.10	m	-	-
07/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/04/22	0	0.00	0.04	0.11-0.25	m	-	-	0	0.00	0.00	0.00	h	-	-
07/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/09/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/11/22	0	0.00	0.00	0.05-0.10	m	-	-	0	0.00	0.00	0.00	h	-	-
07/12/22	20	0.25	0.00	0.11-0.25	h	-	-	30	0.25	0.00	0.11-0.25	h	-	-
07/13/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.11-0.25	m	-	-
07/14/22	20	0.50	0.31	0.26-0.50	h	-	-	30	0.75	0.12	0.51-0.75	h	h	-
07/15/22	10	0.50	0.00	0.00	h	-	-	10	0.75	0.00	0.00	m	-	-
07/16/22	30	0.50	0.47	0.51-0.75	h	h	-	30	0.75	0.39	0.76-1.00	h	h	-
07/17/22	20	0.50	0.67	1.01-1.25	h	h	-	20	0.75	0.83	1.26-1.50	h	h	-
07/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.11-0.25	m	-	-
07/21/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.05-0.10	m	-	-
07/22/22	0	0.00	0.35	0.51-0.75	m	m	-	0	0.00	0.00	0.11-0.25	m	-	-
07/23/22	0	0.00	0.35	0.51-0.75	m	m	-	0	0.00	0.00	0.00	h	-	-
07/24/22	50	1.25	0.24	0.51-0.75	h	h	-	50	1.25	0.00	0.00	m	-	X
07/25/22	30	2.00	1.69	2.01-2.50	h	h	-	30	2.00	1.54	1.51-2.00	h	h	-
07/26/22	20	1.25	0.59	1.26-1.50	h	h	-	30	1.25	0.59	1.26-1.50	h	h	-
07/27/22	20	2.00	1.22	2.51-3.00	h	h	-	30	2.00	1.22	2.51-3.00	h	h	-
07/28/22	30	1.25	0.51	2.01-2.50	h	h	-	40	1.25	0.31	1.51-2.00	h	h	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
07/29/22	30	1.00	0.24	0.51-0.75	h	h	-	30	1.00	0.00	0.51-0.75	h	h	-
07/30/22	30	0.75	0.24	0.26-0.50	h	-	-	40	1.25	0.87	1.51-2.00	h	h	-
07/31/22	20	0.50	0.00	0.11-0.25	h	-	-	20	0.50	0.04	0.11-0.25	h	-	-
31 days					26	8/10	0					24	9/9	1
08/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/02/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.00	h	-	-
08/03/22	40	0.75	0.98	1.26-1.50	h	h	-	40	1.00	0.59	1.01-1.25	h	h	-
08/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/05/22	0	0.00	0.00	-	h	-	-	0	0.00	0.00	-	h	-	-
08/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/07/22	20	0.50	1.42	1.51-2.00	m	h	-	30	0.50	1.42	1.51-2.00	m	h	-
08/08/22	20	0.50	0.43	0.51-0.75	h	h	-	30	1.00	0.16	0.51-0.75	h	h	-
08/09/22	10	0.25	0.08	0.00	h	-	-	10	0.25	0.08	0.11-0.25	h	-	-
08/10/22	10	0.50	1.02	3.01-4.00	m	h	-	30	0.75	0.79	1.26-1.50	h	h	-
08/11/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.05-0.10	m	-	-
08/12/22	20	1.00	0.00	0.00	m	-	X	30	1.00	0.16	0.26-0.50	h	-	-
08/13/22	10	0.25	0.12	0.26-0.50	h	-	-	20	0.25	0.00	0.00	m	-	-
08/14/22	30	0.75	0.63	1.01-1.25	h	h	-	30	1.25	1.10	1.51-2.00	h	h	-
08/15/22	10	0.25	0.00	0.00	h	-	-	10	0.25	0.00	0.00	h	-	-
08/16/22	10	0.25	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-
08/17/22	30	0.75	0.59	0.51-0.75	h	h	-	40	1.00	0.16	0.26-0.50	h	-	-
08/18/22	40	2.00	0.43	1.51-2.00	h	h	-	40	0.75	0.28	0.51-0.75	h	h	-
08/19/22	40	0.75	0.47	0.51-0.75	h	h	-	50	0.75	0.59	0.76-1.00	h	h	-
08/20/22	50	1.50	1.10	1.51-2.00	h	h	-	70	1.50	1.22	1.26-1.50	h	h	-
08/21/22	20	1.00	0.31	0.51-0.75	h	h	-	30	1.00	0.31	0.76-1.00	h	h	-
08/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/23/22	20	0.50	0.47	2.01-2.50	m	h	-	30	1.00	0.51	0.26-0.50	h	h	-
08/24/22	30	0.75	0.00	0.00	m	-	X	40	1.00	0.39	0.26-0.50	h	-	-
08/25/22	0	0.00	0.00	0.51-0.75	m	m	-	0	0.00	0.00	0.26-0.50	m	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
08/26/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.28	0.11-0.25	m	-	-
08/27/22	20	1.00	1.18	1.51-2.00	h	h	-	30	1.00	1.18	1.51-2.00	h	h	-
08/28/22	0	0.00	0.00	0.00	h	-	-	10	0.25	0.00	0.00	h	-	-
08/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/31/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
31 days					24	12/13	2					25	11/11	0
09/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/02/22	10	0.33	0.16	0.11-0.25	h	-	-	20	0.33	0.00	0.05-0.10	m	-	-
09/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/09/22	50	1.00	0.83	0.76-1.00	h	h	-	50	0.75	0.43	0.76-1.00	h	h	-
09/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/11/22	20	0.25	1.06	1.01-1.25	m	m	-	20	0.25	0.51	0.76-1.00	m	m	-
09/12/22	20	0.25	0.04	0.00	m	-	-	20	0.25	0.04	0.11-0.25	h	-	-
09/13/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/14/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/19/22	20	0.25	0.00	0.11-0.25	m	-	-	20	0.10	0.00	0.11-0.25	h	-	-
09/20/22	20	0.75	1.73	1.51-2.00	m	h	-	30	0.75	1.30	1.26-1.50	h	h	-
09/21/22	40	0.50	0.51	0.51-0.75	h	h	-	50	0.50	0.55	0.51-0.75	h	h	-
09/22/22	10	0.25	0.04	0.11-0.25	h	-	-	10	0.10	0.00	0.05-0.10	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
09/23/22	0	0.00	0.12	0.26-0.50	m	-	-	0	0.00	0.00	0.26-0.50	m	-	-
09/24/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/25/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/22	10	0.25	0.16	0.51-0.75	m	m	-	0	0.00	0.00	0.00	h	-	-
09/27/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/28/22	10	0.25	0.00	0.26-0.50	h	-	-	10	0.25	0.00	1.01-1.25	m	m	-
09/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
30 days					24	3/5	0					26	3/5	0
	Upper Centennial							Wickenburg						
06/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/20/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/23/22	10	0.25	0.43	1.01-1.25	m	m	-	10	0.25	0.63	0.76-1.00	m	m	-
06/24/22	20	0.10	0.47	0.76-1.00	m	m	-	20	0.25	0.04	0.51-0.75	m	m	-
06/25/22	10	0.30	0.04	1.51-2.00	m	m	-	10	0.10	0.00	0.00	h	-	-
06/26/22	30	0.75	0.51	1.25-1.50	h	h	-	30	0.75	0.24	0.26-0.50	h	-	-
06/27/22	30	0.25	0.00	0.00	m	-	-	30	0.25	0.00	0.00	m	-	-
06/28/22	10	0.10	0.00	0.00	h	-	-	10	0.10	0.00	0.00	h	-	-
06/29/22	40	1.00	1.14	3.01-4.00	h	h	-	40	1.00	0.83	1.01-1.25	h	h	-
06/30/22	0	0.00	0.00	0.51-0.75	m	m	-	0	0.00	0.00	0.11-0.25	m	-	-
16 days					11	2/6	0					12	1/3	0
07/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
07/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/09/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/11/22	10	0.10	0.00	0.00	h	-	-	10	0.10	0.00	0.05-0.10	h	-	-
07/12/22	30	0.25	0.00	0.11-0.25	h	-	-	30	0.25	0.00	0.11-0.25	h	-	-
07/13/22	0	0.00	0.31	1.01-1.25	m	m	-	0	0.00	0.08	0.51-0.75	m	m	-
07/14/22	20	0.50	0.00	0.05-0.10	m	-	-	20	0.50	0.00	0.11-0.25	h	-	-
07/15/22	10	0.50	0.00	0.00	h	-	-	10	0.50	0.00	0.00	h	-	-
07/16/22	30	1.00	0.20	0.51-0.75	h	h	-	30	1.00	0.12	0.11-0.25	m	-	X
07/17/22	30	1.00	0.16	0.26-0.50	h	-	-	20	0.75	0.75	0.76-1.00	h	h	-
07/18/22	10	0.75	0.00	0.00	h	-	-	10	0.75	0.00	0.00	h	-	-
07/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/21/22	0	0.00	0.00	0.26-0.50	m	-	-	0	0.00	0.00	0.00	h	-	-
07/22/22	0	0.00	0.04	0.26-0.50	m	-	-	0	0.00	0.04	0.11-0.25	m	-	-
07/23/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.05-0.10	m	-	-
07/24/22	50	1.25	0.12	0.11-0.25	m	-	X	50	1.25	0.28	0.11-0.25	m	-	X
07/25/22	30	1.25	0.63	1.01-1.25	h	h	-	30	2.00	1.54	1.51-2.00	h	h	-
07/26/22	30	2.00	0.87	2.01-2.50	h	h	-	30	0.75	0.43	0.11-0.25	m	-	X
07/27/22	30	2.00	2.52	2.51-3.00	h	h	-	30	1.25	0.83	1.01-1.25	h	h	-
07/28/22	40	1.25	0.91	1.26-1.50	h	h	-	40	0.75	0.63	0.26-0.50	h	h	-
07/29/22	30	1.00	0.28	1.01-1.26	h	h	-	30	1.00	0.04	0.11-0.26	m	-	X
07/30/22	40	0.75	0.31	1.01-1.25	h	h	-	40	0.75	0.63	0.51-0.75	h	h	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
07/31/22	20	0.50	0.51	1.51-2.00	m	h	-	20	0.50	0.00	0.05-0.11	m	-	-
31 days					24	8/9	1					23	5/6	4
08/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/03/22	40	1.00	1.06	1.51-2.00	h	h	-	40	1.00	1.22	1.01-1.25	h	h	-
08/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.26-0.50	m	-	-
08/05/22	0	0.00	0.00	-	h	-	-	0	0.00	0.00	-	h	-	-
08/06/22	0	0.00	0.00	0.26-0.50	m	-	-	0	0.00	0.00	0.00	h	-	-
08/07/22	40	0.50	0.91	0.51-0.75	h	h	-	40	0.75	0.39	0.51-0.75	h	h	-
08/08/22	30	1.00	0.00	0.76-1.00	h	h	-	30	1.00	0.04	0.26-0.50	h	-	-
08/09/22	20	0.25	0.00	0.11-0.25	h	-	-	20	0.25	0.00	0.00	m	-	-
08/10/22	30	1.25	0.28	0.51-0.75	h	h	-	30	1.25	0.75	1.26-1.50	h	h	-
08/11/22	0	0.00	0.00	0.26-0.50	m	-	-	0	0.00	0.28	0.11-0.25	m	-	-
08/12/22	40	0.75	2.05	2.51-3.00	m	h	-	40	1.00	0.28	0.26-0.50	h	-	-
08/13/22	20	0.25	0.00	0.26-0.50	h	-	-	20	0.25	0.31	0.26-0.50	h	-	-
08/14/22	30	0.75	0.20	0.51-0.75	h	h	-	30	0.75	0.31	0.76-1.00	h	h	-
08/15/22	20	0.25	0.00	0.00	m	-	-	20	0.25	0.00	0.00	m	-	-
08/16/22	20	0.25	0.00	0.00	m	-	-	20	0.25	0.00	0.00	m	-	-
08/17/22	40	1.00	0.75	1.26-1.50	h	h	-	40	1.00	2.09	2.51-3.00	h	h	-
08/18/22	40	1.25	1.14	1.51-2.00	h	h	-	40	1.25	0.87	1.26-1.50	h	h	-
08/19/22	50	1.50	0.79	2.01-2.50	h	h	-	60	1.50	1.18	1.26-1.50	h	h	-
08/20/22	70	1.50	0.98	2.01-2.50	h	h	-	70	1.50	1.50	1.51-2.00	h	h	-
08/21/22	40	1.00	0.43	1.51-2.00	h	h	-	40	1.00	0.39	0.51-0.75	h	h	-
08/22/22	0	0.00	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-
08/23/22	30	1.00	0.75	2.01-2.50	h	h	-	30	1.00	0.39	0.51-0.75	h	h	-
08/24/22	50	1.00	0.75	1.26-1.50	h	h	-	50	1.00	0.00	0.05-0.10	m	-	X
08/25/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.76-1.00	m	m	-
08/26/22	0	0.00	0.00	0.26-0.50	m	-	-	0	0.00	0.08	0.26-0.50	m	-	-
08/27/22	30	0.50	0.00	0.51-0.75	h	h	-	30	0.25	0.00	0.11-0.25	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
08/28/22	10	0.25	0.00	0.00	h	-	-	10	0.25	0.00	0.00	h	-	-
08/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.12	0.26-0.50	m	-	-
08/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/31/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
31 days					24	14/14	0					21	10/11	1
09/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/02/22	30	0.75	1.02	1.01-1.25	h	h	-	30	0.75	1.97	2.01-2.50	m	h	-
09/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/09/22	60	0.25	0.24	0.11-0.25	h	-	-	60	0.25	0.04	0.05-0.10	m	-	-
09/10/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.00	h	-	-
09/11/22	20	0.25	0.98	1.51-2.00	m	m	-	20	0.25	1.02	1.01-1.25	m	m	-
09/12/22	10	0.25	0.00	0.05-0.10	h	-	-	20	0.25	0.08	0.05-0.10	h	-	-
09/13/22	10	0.25	0.00	0.11-0.25	h	-	-	0	0.00	0.00	0.00	h	-	-
09/14/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/19/22	20	0.25	0.04	0.11-0.25	h	-	-	20	0.10	0.00	0.05-0.10	h	-	-
09/20/22	30	0.75	0.91	1.51-2.00	h	h	-	30	0.75	0.63	0.76-1.00	h	h	-
09/21/22	50	0.50	0.12	0.11-0.25	m	-	-	50	0.50	0.12	0.11-0.25	m	-	-
09/22/22	30	0.75	0.63	1.51-2.00	h	h	-	30	0.25	0.04	0.05-0.10	h	-	-
09/23/22	0	0.00	1.69	2.01-2.50	m	m	-	0	0.00	0.00	1.51-2.00	m	m	-
09/24/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
09/25/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/27/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/28/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
30 days					26	3/5	0					25	2/4	0
	New River/Cave Creek							Phoenix North						
06/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/22	10	0.10	0.00	0.05-0.10	h	-	-	0	0.00	0.00	0.00	h	-	-
06/18/22	20	0.20	0.12	0.26-0.50	h	-	-	20	0.25	0.00	0.05-0.10	m	-	-
06/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/20/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/23/22	30	0.25	0.35	0.76-1.00	m	m	-	30	0.25	0.39	0.51-0.75	m	m	-
06/24/22	30	0.33	0.24	0.76-1.00	m	m	-	20	0.25	0.08	0.05-0.10	m	-	-
06/25/22	20	0.30	0.16	0.11-0.25	h	-	-	10	0.10	0.00	0.00	h	-	-
06/26/22	30	0.75	0.59	0.76-1.00	h	h	-	30	0.40	0.04	0.26-0.50	h	-	-
06/27/22	20	0.25	0.00	0.11-0.25	h	-	-	0	0.00	0.00	0.00	h	-	-
06/28/22	10	0.25	0.00	0.05-0.10	h	-	-	10	0.10	0.00	0.00	h	-	-
06/29/22	40	0.40	0.24	0.26-0.50	h	-	-	30	0.20	0.00	0.05-0.10	h	-	-
06/30/22	20	0.50	0.00	0.00	m	-	-	10	0.40	0.00	0.00	h	-	-
16 days					13	1/3	0					13	0/1	0
07/01/22	0	0.00	0.39	0.26-0.50	m	-	-	0	0.00	0.00	0.26-0.50	m	-	-
07/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
07/04/22	20	0.10	0.00	0.00	m	-	-	0	0.00	0.00	0.00	h	-	-
07/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/09/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/11/22	10	0.25	0.00	0.26-0.50	h	-	-	0	0.00	0.00	0.05-0.10	m	-	-
07/12/22	30	0.25	0.00	0.05-0.10	m	-	-	20	0.10	0.00	0.05-0.10	h	-	-
07/13/22	0	0.00	0.16	1.26-1.50	m	m	-	0	0.00	0.00	0.05-0.10	m	-	-
07/14/22	30	0.75	0.04	0.11-0.25	m	-	X	20	0.75	0.28	0.26-0.50	h	-	-
07/15/22	20	0.75	0.00	0.00	m	-	-	20	0.75	0.00	0.00	m	-	-
07/16/22	30	1.00	0.35	0.51-0.75	h	h	-	30	0.75	0.08	0.26-0.50	h	-	-
07/17/22	20	0.50	0.28	0.76-1.00	h	h	-	10	0.25	0.20	0.26-0.50	h	-	-
07/18/22	10	0.75	0.00	0.00	m	-	-	0	0.00	0.00	0.00	h	-	-
07/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.05-0.10	m	-	-
07/21/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/22/22	0	0.00	0.16	0.11-0.25	m	-	-	0	0.00	0.00	0.05-0.11	m	-	-
07/23/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.05-0.10	m	-	-
07/24/22	50	1.50	0.00	0.00	m	-	X	50	1.25	0.00	0.00	m	-	X
07/25/22	30	2.00	2.28	2.51-3.00	h	h	-	30	2.00	1.97	2.01-2.50	h	h	-
07/26/22	30	2.00	0.71	1.51-2.00	h	h	-	20	0.75	0.20	0.26-0.50	h	-	-
07/27/22	30	1.25	0.94	1.51-2.00	h	h	-	20	1.25	0.94	1.26-1.50	h	h	-
07/28/22	30	1.25	1.06	1.01-1.25	h	h	-	30	1.25	1.06	0.76-1.00	h	h	-
07/29/22	50	1.00	0.00	0.00	m	-	X	40	1.00	0.00	0.00	m	-	X
07/30/22	30	2.00	1.50	1.51-2.00	h	h	-	30	2.00	2.13	2.01-2.50	h	h	-
07/31/22	20	0.75	0.00	0.00	m	-	-	10	0.50	0.00	0.00	h	-	-
31 days					19	7/8	3					22	4/4	2

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
08/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/03/22	50	0.50	0.08	0.11-0.25	h	-	-	30	0.50	1.81	1.51-2.00	m	h	-
08/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/05/22	0	0.00	0.00	-	h	-	-	0	0.00	0.00	-	h	-	-
08/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/07/22	50	1.00	0.16	0.26-0.50	h	-	-	40	0.75	0.00	0.11-0.25	m	-	X
08/08/22	30	1.00	0.71	1.01-1.25	h	h	-	30	0.50	0.67	0.51-0.75	h	h	-
08/09/22	10	0.25	0.04	0.26-0.50	h	-	-	10	0.25	0.00	0.05-0.10	h	-	-
08/10/22	30	1.00	0.16	0.26-0.50	h	-	-	10	0.75	0.00	0.00	h	-	-
08/11/22	0	0.00	0.55	1.26-1.50	m	m	-	0	0.00	0.00	0.00	h	-	-
08/12/22	50	1.00	2.24	2.51-3.00	m	h	-	40	1.00	1.73	1.51-2.00	h	h	-
08/13/22	20	0.25	0.00	0.26-0.50	h	-	-	10	0.25	0.31	0.26-0.50	h	-	-
08/14/22	40	2.00	1.73	2.51-3.00	h	h	-	30	0.75	0.04	0.26-0.50	h	-	-
08/15/22	20	0.25	0.00	0.00	m	-	-	10	0.25	0.00	0.00	h	-	-
08/16/22	20	0.25	0.00	0.00	m	-	-	20	0.25	0.00	0.00	m	-	-
08/17/22	50	1.25	1.02	1.26-1.50	h	h	-	40	0.75	0.00	0.11-0.25	m	-	X
08/18/22	60	2.00	2.40	2.01-2.50	h	h	-	50	1.25	1.22	1.51-2.00	h	h	-
08/19/22	60	2.25	1.57	2.51-3.00	h	h	-	50	1.50	0.59	1.51-2.00	h	h	-
08/20/22	70	1.50	0.83	1.26-1.50	h	h	-	60	0.75	0.39	0.76-1.00	h	h	-
08/21/22	50	1.00	0.98	1.26-1.50	h	h	-	40	1.00	0.20	0.26-0.50	h	-	-
08/22/22	20	0.25	0.00	0.00	m	-	-	0	0.00	0.00	0.00	h	-	-
08/23/22	40	1.25	0.24	0.76-1.00	h	h	-	30	0.75	0.47	0.51-0.75	h	h	-
08/24/22	50	1.00	0.24	0.76-1.00	h	h	-	40	0.75	0.20	0.26-0.50	h	-	-
08/25/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.00	h	-	-
08/26/22	20	0.75	0.16	0.26-0.50	h	-	-	10	0.50	0.20	0.11-0.25	h	-	-
08/27/22	40	0.25	0.00	0.00	m	-	-	20	0.25	0.00	0.00	m	-	-
08/28/22	10	0.25	0.00	0.05-0.10	m	-	-	0	0.00	0.00	0.00	h	-	-
08/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
08/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/31/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
31 days					23	10/11	0					26	7/7	2
09/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/02/22	40	0.75	0.87	1.51-2.00	h	h	-	20	0.33	0.00	0.11-0.25	h	-	-
09/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/09/22	70	0.25	0.43	0.26-0.50	h	-	-	70	0.50	0.55	0.51-0.75	h	h	-
09/10/22	10	0.50	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/11/22	60	1.00	0.75	0.75-1.00	h	h	-	60	0.75	0.83	0.76-1.00	h	h	-
09/12/22	30	0.25	0.16	0.26-0.50	h	-	-	30	0.25	0.08	0.11-0.25	h	-	-
09/13/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/14/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/19/22	20	0.25	0.04	0.11-0.25	h	-	-	20	0.25	0.00	0.11-0.25	h	-	-
09/20/22	30	0.75	0.43	0.51-0.75	h	h	-	20	0.50	0.31	0.51-0.75	h	h	-
09/21/22	60	0.50	0.55	0.51-0.75	h	h	-	50	0.50	0.35	0.26-0.50	h	-	-
09/22/22	30	0.25	0.00	0.00	m	-	-	10	0.10	0.08	0.05-0.10	h	-	-
09/23/22	20	0.50	1.85	2.01-2.50	m	h	-	0	0.00	0.12	0.51-0.75	m	m	-
09/24/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/25/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/22	0	0.00	0.00	0.00	h	-	-	10	0.25	0.12	0.26-0.50	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
09/27/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/28/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/22	20	0.15	0.08	.11-0.25	h	-	-	20	0.25	0.00	0.11-0.25	h	-	-
30 days	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
	0							0.00						
06/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/22	30	0.25	0.31	0.51-0.75	m	m	-	30	0.25	0.12	0.51-0.75	m	m	-
06/17/22	10	0.10	0.20	0.26-0.50	m	-	-	20	0.25	0.35	0.76-1.00	m	m	-
06/18/22	10	0.10	0.00	0.00	h	-	-	20	0.10	0.00	0.00	m	-	-
06/19/22	30	0.30	1.02	1.51-2.00	m	m	-	30	0.75	0.08	0.26-0.50	h	-	-
06/20/22	0	0.00	0.00	0.00	h	-	-	20	0.10	0.00	0.05-0.10	h	-	-
06/21/22	0	0.00	0.00	0.00	h	-	-	10	0.25	0.00	0.00	h	-	-
06/22/22	20	0.20	0.04	0.26-0.50	h	-	-	30	0.30	0.04	0.11-0.25	h	-	-
06/23/22	10	0.30	0.00	0.00	h	-	-	10	0.40	0.00	0.00	h	-	-
06/24/22					13	0/2	0					13	0/2	0
06/25/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.16	0.26-0.50	m	-	-
06/26/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/27/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/28/22	10	0.10	0.00	0.05-0.10	h	-	-	0	0.00	0.00	0.00	h	-	-
06/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
16 days	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/02/22	20	0.15	0.08	.11-0.25	h	-	-	20	0.25	0.00	0.11-0.25	h	-	-
07/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
07/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/09/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/11/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.11-0.25	m	-	-
07/12/22	0	0.00	0.00	0.00	h	-	-	30	0.25	0.00	0.05-0.10	m	-	-
07/13/22	10	0.10	0.00	0.11-0.25	h	-	-	10	0.10	0.24	0.11-0.25	h	-	-
07/14/22	20	0.50	0.43	0.76-1.00	h	h	-	20	0.75	0.00	0.11-0.25	m	-	-
07/15/22	10	0.50	0.00	0.00	h	-	-	20	0.75	0.00	0.11-0.25	m	-	-
07/16/22	20	0.50	0.00	0.26-0.50	h	-	-	30	0.75	0.94	1.26-1.50	h	h	-
07/17/22	10	0.25	0.51	0.51-0.75	m	m	-	10	0.25	0.35	0.51-0.75	m	m	-
07/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.05-0.10	m	-	-
07/21/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/22/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.05-0.10	m	-	-
07/23/22	0	0.00	0.16	0.26-0.50	m	-	-	0	0.00	0.00	0.00	h	-	-
07/24/22	40	1.00	0.00	0.11-0.25	m	-	X	50	1.25	0.00	0.00	m	-	X
07/25/22	20	2.00	0.63	1.51-2.00	h	h	-	30	0.75	0.04	0.11-0.25	m	-	X
07/26/22	10	0.75	0.16	0.11-0.25	m	-	-	20	0.75	0.28	0.76-1.00	h	h	-
07/27/22	10	1.25	1.77	1.26-1.50	h	h	-	20	1.25	1.50	1.51-2.00	h	h	-
07/28/22	20	1.25	0.87	1.26-1.50	h	h	-	30	1.25	0.20	1.26-1.50	h	h	-
07/29/22	50	1.00	0.00	0.00	m	-	X	50	1.00	0.00	0.00	m	-	X
07/30/22	30	1.25	1.02	1.51-2.00	h	h	-	30	2.00	1.93	2.01-2.50	h	h	-
07/31/22	10	0.50	0.04	0.00	m	-	-	20	0.50	0.04	0.11-0.25	h	-	-
31 days					22	5/6	2					20	5/6	3
08/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/02/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.05-0.10	m	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
08/03/22	30	0.50	1.81	1.51-2.00	m	h	-	30	0.25	0.04	0.11-0.25	h	-	-
08/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/05/22	0	0.00	0.00	-	h	-	-	0	0.00	0.00	-	h	-	-
08/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.11-0.25	m	-	-
08/07/22	20	0.50	0.00	0.00	m	-	-	30	0.75	0.00	0.26-0.50	h	-	-
08/08/22	20	0.50	0.75	0.76-1.00	h	h	-	30	0.75	1.57	1.26-1.50	h	h	-
08/09/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/10/22	10	0.50	0.00	0.00	h	-	-	20	0.75	0.00	0.00	m	-	-
08/11/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/12/22	20	0.75	0.04	0.11-0.25	m	-	-	30	1.00	3.11	2.01-2.50	m	h	-
08/13/22	10	0.75	0.31	0.51-0.75	h	h	-	10	0.75	0.39	0.76-1.00	h	h	-
08/14/22	20	0.75	0.39	1.01-1.25	h	h	-	30	0.75	0.20	1.01-1.25	h	h	-
08/15/22	10	0.25	0.00	0.00	h	-	-	10	0.25	0.00	0.00	h	-	-
08/16/22	10	0.25	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-
08/17/22	30	0.50	0.16	0.11-0.25	h	-	-	40	1.00	0.00	0.51-0.75	h	h	-
08/18/22	40	1.25	0.94	1.51-2.00	h	h	-	40	1.25	1.22	1.51-2.00	h	h	-
08/19/22	40	0.75	0.20	0.76-1.00	h	h	-	40	2.25	1.50	2.51-3.00	h	h	-
08/20/22	50	0.75	0.55	1.01-1.25	h	h	-	60	0.75	0.00	0.11-0.25	m	-	X
08/21/22	20	0.75	0.28	0.51-0.75	h	h	-	30	1.00	0.63	1.01-1.25	h	h	-
08/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/23/22	20	0.50	0.12	0.26-0.50	h	-	-	40	0.75	0.71	0.76-1.00	h	h	-
08/24/22	20	0.50	0.00	0.11-0.25	h	-	-	40	0.75	0.31	0.51-0.75	h	h	-
08/25/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.16	0.11-0.25	m	-	-
08/26/22	0	0.00	0.00	0.00	h	-	-	10	0.50	0.00	0.05-0.10	m	-	-
08/27/22	20	0.25	0.08	0.26-0.50	h	-	-	30	0.25	0.00	0.00	m	-	-
08/28/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/31/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
31 days					26	8/8	0					22	10/10	1
09/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/02/22	10	0.25	0.00	0.11-0.25	h	-	-	20	0.33	0.08	0.76-1.00	m	m	-
09/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/09/22	60	1.00	0.63	0.76-1.00	h	h	-	60	0.25	0.12	0.26-0.50	h	-	-
09/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/11/22	50	0.50	0.87	1.51-2.00	m	h	-	60	0.75	0.98	0.76-1.00	h	h	-
09/12/22	30	0.25	0.24	0.26-0.50	h	-	-	40	0.25	0.08	0.11-0.25	h	-	-
09/13/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/14/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/19/22	20	0.25	0.00	0.11-0.25	h	-	-	20	0.25	0.00	0.11-0.25	h	-	-
09/20/22	20	0.25	0.24	0.26-0.50	h	-	-	20	0.50	0.04	0.26-0.50	h	-	-
09/21/22	40	0.50	0.16	0.26-0.50	h	-	-	50	0.50	0.08	0.26-0.50	h	-	-
09/22/22	10	0.25	0.04	0.11-0.25	h	-	-	10	0.25	0.12	0.11-0.25	h	-	-
09/23/22	0	0.00	0.04	0.11-0.25	m	-	-	0	0.00	0.24	0.76-1.00	m	m	-
09/24/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/25/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/22	10	0.25	0.16	0.11-0.25	h	-	-	10	0.25	0.04	0.51-0.75	m	m	-
09/27/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/28/22	10	0.25	0.20	0.76-1.00	m	m	-	10	0.25	0.35	0.51-0.75	m	m	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
09/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
30 days					27	2/3	0					26	1/5	0
	Scottsdale South							East Valley						
06/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.04	0.11-0.25	m	-	-
06/18/22	20	0.15	0.08	0.11-0.25	h	-	-	20	0.35	0.43	0.26-0.50	h	-	-
06/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/20/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/23/22	30	0.25	0.20	.26-0.50	h	-	-	30	0.25	0.08	0.11-0.25	h	-	-
06/24/22	10	0.10	0.28	0.51-0.75	m	m	-	10	0.25	0.28	0.26-0.50	h	-	-
06/25/22	10	0.10	0.00	0.00	h	-	-	10	0.10	0.00	0.00	h	-	-
06/26/22	30	0.30	0.59	0.76-1.00	m	m	-	30	0.40	0.31	0.26-0.50	h	-	-
06/27/22	0	0.00	0.00	0.00	h	-	-	10	0.10	0.00	0.00	h	-	-
06/28/22	0	0.00	0.00	0.00	h	-	-	10	0.10	0.00	0.00	h	-	-
06/29/22	20	0.10	0.08	0.11-0.25	h	-	-	30	0.20	0.12	0.26-0.50	h	-	-
06/30/22	10	0.30	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
16 days					14	0/2	0					15	0/0	0
07/01/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
07/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/09/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/11/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.11-0.25	m	-	-
07/12/22	0	0.00	0.00	0.00	h	-	-	20	0.10	0.00	0.00	m	-	-
07/13/22	10	0.10	0.08	0.26-0.50	m	-	-	20	0.25	1.26	1.51-2.00	m	m	-
07/14/22	20	0.50	0.04	0.05-0.10	m	-	-	20	0.50	0.51	1.01-1.25	h	h	-
07/15/22	10	0.50	0.00	0.00	h	-	-	20	0.75	0.00	0.05-0.10	m	-	-
07/16/22	20	0.50	0.00	0.11-0.25	h	-	-	30	0.50	0.00	0.11-0.25	h	-	-
07/17/22	10	0.25	1.42	1.51-2.00	m	m	-	10	0.25	1.38	1.26-1.50	m	m	-
07/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/21/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/22/22	0	0.00	0.08	0.11-0.25	m	-	-	0	0.00	0.08	0.11-0.25	m	-	-
07/23/22	0	0.00	0.00	0.00	h	-	-	10	0.50	0.00	0.26-0.50	h	-	-
07/24/22	40	1.00	0.04	0.05-0.10	m	-	X	30	1.00	0.04	0.11-0.25	m	-	X
07/25/22	20	0.75	0.16	0.51-0.75	h	h	-	20	1.25	0.79	0.76-1.00	h	h	-
07/26/22	10	0.75	0.04	0.00	m	-	-	10	0.75	0.43	0.76-1.00	h	h	-
07/27/22	10	0.75	0.79	0.51-0.75	h	h	-	10	0.75	0.00	0.26-0.50	h	-	-
07/28/22	20	0.75	0.04	0.51-0.76	h	h	-	20	0.75	0.08	0.51-0.76	h	h	-
07/29/22	50	1.00	0.08	0.00	m	-	X	50	1.00	0.00	0.00	m	-	X
07/30/22	30	1.25	0.63	1.51-2.00	h	h	-	30	1.25	0.08	1.26-1.50	h	h	-
07/31/22	10	0.50	0.00	0.11-0.25	h	-	-	20	0.75	0.12	0.00	m	-	-
31 days					23	4/5	2					22	5/7	2
08/01/22	0	0.00	0.08	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/02/22	0	0.00	0.00	0.05-0.10	m	-	-	0	0.00	0.04	0.11-0.25	m	-	-
08/03/22	30	0.50	0.26	1.26-1.50	m	h	-	30	0.50	0.51	0.51-0.75	h	h	-
08/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
08/05/22	0	0.00	0.12	-	m	-	-	0	0.00	0.00	-	h	-	-
08/06/22	0	0.00	0.12	0.05-0.10	m	-	-	0	0.00	0.04	0.11-0.25	m	-	-
08/07/22	20	0.50	0.00	0.00	m	-	-	20	0.50	0.00	0.00	m	-	-
08/08/22	20	0.50	0.20	0.51-0.75	h	h	-	30	0.75	0.43	0.76-1.00	h	h	-
08/09/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/10/22	10	0.50	0.04	0.00	m	-	-	20	0.75	0.00	0.00	m	-	-
08/11/22	0	0.00	0.04	0.05-0.10	m	-	-	0	0.00	0.00	0.00	h	-	-
08/12/22	20	0.75	2.64	2.51-3.00	m	h	-	20	0.75	1.22	1.01-1.25	h	h	-
08/13/22	10	0.75	0.35	0.51-0.75	h	h	-	10	0.25	0.28	0.26-0.50	h	-	-
08/14/22	20	0.75	0.04	0.05-0.10	m	-	-	20	0.75	0.08	0.26-0.50	h	-	-
08/15/22	10	0.25	0.00	0.00	h	-	-	10	0.25	0.00	0.00	h	-	-
08/16/22	10	0.25	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-
08/17/22	30	0.50	0.00	0.05-0.10	m	-	-	30	0.75	0.16	0.11-0.25	m	-	-
08/18/22	40	0.75	0.12	0.11-0.25	m	-	X	40	2.00	1.10	2.01-2.50	h	h	-
08/19/22	50	0.75	0.63	1.01-1.25	h	h	-	40	1.50	0.51	1.51-2.00	h	h	-
08/20/22	50	0.75	0.00	0.26-0.50	h	-	-	50	1.50	0.16	1.51-2.00	h	h	-
08/21/22	20	0.75	0.63	1.01-1.25	h	h	-	20	0.75	0.51	0.51-0.75	h	h	-
08/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/23/22	20	0.50	0.20	0.11-0.25	h	-	-	30	0.75	0.20	0.26-0.50	h	-	-
08/24/22	20	0.50	0.31	0.11-0.25	h	-	-	20	0.50	0.12	0.26-0.50	h	-	-
08/25/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/26/22	0	0.00	0.04	0.11-0.25	m	-	-	0	0.00	0.00	0.05-0.10	m	-	-
08/27/22	20	0.25	0.00	0.00	m	-	-	20	0.25	0.04	0.26-0.50	h	-	-
08/28/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/29/22	0	0.00	0.04	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/31/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
31 days					18	6/6	1					24	7/7	0
09/01/22	0	0.00	0.00	0.00	h	-	-	10	0.05	0.20	0.26-0.50	m	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
09/02/22	10	0.25	0.00	0.00	h	-	-	10	0.33	0.08	0.26-0.50	h	-	-
09/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/09/22	60	0.50	0.50	0.26-0.50	h	-	-	50	0.50	0.47	0.51-0.75	h	h	-
09/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/11/22	50	0.50	1.02	1.51-2.00	m	h	-	40	0.50	1.10	1.51-2.00	m	h	-
09/12/22	30	0.25	0.00	0.00	m	-	-	30	0.25	0.04	0.05-0.10	m	-	-
09/13/22	0	0.00	0.00	0.00	h	-	-	10	0.25	0.51	0.51-0.75	m	m	-
09/14/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/17/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/18/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/19/22	20	0.10	0.00	0.05-0.10	h	-	-	20	0.10	0.00	0.05-0.10	h	-	-
09/20/22	20	0.25	0.12	0.11-0.25	h	-	-	20	0.50	0.28	0.26-0.50	h	-	-
09/21/22	40	0.50	0.12	0.26-0.50	h	-	-	40	0.50	0.20	0.26-0.50	h	-	-
09/22/22	0	0.00	0.00	0.00	h	-	-	10	0.10	0.04	0.05-0.10	h	-	-
09/23/22	0	0.00	0.04	0.51-0.75	m	m	-	0	0.00	0.24	0.76-1.00	m	m	-
09/24/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/25/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/26/22	10	0.25	0.04	0.51-0.75	m	m	-	0	0.00	0.00	0.00	h	-	-
09/27/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/28/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.11-0.25	m	-	-
09/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
09/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
30 days					26	1/3	0					24	2/4	0
	Southeast Valley							Lower Salt River Lakes						
06/15/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/16/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/17/22	10	0.05	0.16	0.51-0.75	m	m	-	10	0.10	0.83	0.76-1.00	m	m	-
06/18/22	30	0.35	0.35	0.76-1.00	m	m	-	30	0.60	0.39	0.51-0.75	h	h	-
06/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/20/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/21/22	0	0.00	0.00	0.00	h	-	-	30	0.25	0.00	0.00	m	-	-
06/22/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
06/23/22	30	0.25	0.20	0.26-0.50	h	-	-	30	0.25	0.00	0.11-0.25	h	-	-
06/24/22	20	0.10	0.31	0.51-0.75	m	m	-	30	0.33	0.16	0.26-0.50	h	-	-
06/25/22	10	0.10	0.00	0.05-0.10	h	-	-	20	0.30	0.00	0.11-0.25	h	-	-
06/26/22	30	0.40	1.30	1.26-1.50	m	m	-	30	0.50	0.59	3.01-4.00	m	h	-
06/27/22	10	0.10	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-
06/28/22	10	0.10	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-
06/29/22	30	0.20	0.00	0.26-0.50	h	-	-	40	1.00	0.35	1.51-2.00	h	h	-
06/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
16 days					12	0/4	0					11	3/4	0
07/01/22	0	0.00	0.00	0.11-0.25	m	-	-	0	0.00	0.00	0.00	h	-	-
07/02/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/04/22	0	0.00	0.00	0.05-0.10	m	-	-	30	0.25	0.00	0.26-0.50	h	-	-
07/05/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/06/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/07/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/08/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/09/22	10	0.10	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
07/10/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/11/22	10	0.10	0.08	0.11-0.25	h	-	-	20	0.25	0.00	0.11-0.25	h	-	-
07/12/22	20	0.10	0.00	0.00	m	-	-	30	0.25	0.00	0.11-0.25	h	-	-
07/13/22	20	0.25	0.00	0.26-0.50	h	-	-	30	0.25	0.00	0.05-0.10	m	-	-
07/14/22	20	0.50	0.51	1.01-1.25	h	h	-	20	0.75	0.47	1.51-2.00	m	h	-
07/15/22	20	1.00	0.00	0.05-0.10	m	-	-	20	1.25	0.83	1.51-2.00	h	h	-
07/16/22	20	0.50	0.00	0.00	m	-	-	40	1.00	0.39	0.51-0.75	h	h	-
07/17/22	10	0.25	0.20	0.51-0.75	m	m	-	20	0.50	0.00	0.11-0.25	h	-	-
07/18/22	0	0.00	0.00	0.00	h	-	-	20	0.75	0.00	0.00	m	-	-
07/19/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
07/20/22	10	0.35	0.00	0.05-0.10	m	-	-	10	0.50	0.00	0.00	h	-	-
07/21/22	0	0.00	0.00	0.00	h	-	-	10	0.50	0.00	0.00	h	-	-
07/22/22	10	0.10	0.04	0.11-0.25	h	-	-	10	0.10	0.04	0.11-0.25	h	-	-
07/23/22	10	0.50	0.55	0.76-1.00	h	h	-	10	0.75	0.00	0.00	h	-	-
07/24/22	30	1.00	0.00	0.11-0.25	m	-	X	30	1.00	0.00	0.00	m	-	X
07/25/22	20	0.75	0.00	0.11-0.25	m	-	-	30	0.75	0.04	0.51-0.75	h	h	-
07/26/22	20	1.25	0.24	1.26-1.50	h	h	-	30	0.75	0.31	0.11-0.25	m	-	X
07/27/22	20	0.75	0.31	0.26-0.50	h	-	-	30	1.25	0.08	1.51-2.00	h	h	-
07/28/22	30	0.75	0.08	0.26-0.50	h	-	-	40	2.00	0.39	1.51-2.00	h	h	-
07/29/22	50	1.00	0.00	0.00	m	-	X	50	1.00	0.00	0.00	m	-	X
07/30/22	40	1.25	0.87	1.01-1.25	h	h	-	40	2.00	0.63	2.01-2.50	h	h	-
07/31/22	20	0.75	0.00	0.00	m	-	-	30	1.25	0.00	0.11-0.25	m	-	X
31 days					20	4/5	2					23	7/7	4
08/01/22	0	0.00	0.00	0.00	h	-	-	10	0.50	0.00	0.00	h	-	-
08/02/22	0	0.00	0.08	0.26-0.50	m	-	-	10	0.50	0.08	0.11-0.25	h	-	-
08/03/22	30	0.50	0.63	1.01-1.25	h	h	-	50	0.25	0.12	0.11-0.26	h	-	-
08/04/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/05/22	0	0.00	0.00	-	h	-	-	0	0.00	0.00	-	h	-	-
08/06/22	0	0.00	0.04	0.26-0.50	m	-	-	0	0.00	0.16	0.11-0.25	m	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
08/07/22	20	0.50	0.00	0.26-0.50	h	-	-	30	0.75	0.00	0.11-0.25	m	-	X
08/08/22	30	0.75	0.67	1.51-2.00	m	h	-	40	1.00	1.26	2.01-2.50	h	h	-
08/09/22	0	0.00	0.00	0.00	h	-	-	40	0.75	0.00	0.00	m	-	X
08/10/22	20	0.75	0.00	0.26-0.50	h	-	-	30	1.25	0.00	0.00	m	-	X
08/11/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.04	0.51-0.75	m	m	-
08/12/22	20	0.75	0.59	1.01-1.25	h	h	-	30	1.00	0.51	0.76-1.00	h	h	-
08/13/22	10	0.25	0.00	0.26-0.50	h	-	-	20	0.75	0.31	1.01-1.25	h	h	-
08/14/22	20	0.75	0.94	0.50-0.75	h	h	-	30	0.75	0.00	0.05-0.10	m	-	X
08/15/22	10	0.25	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-
08/16/22	20	0.25	0.00	0.00	m	-	-	30	1.00	0.00	0.00	m	-	X
08/17/22	30	0.75	0.43	1.26-1.50	h	h	-	50	1.25	0.20	1.51-2.00	h	h	-
08/18/22	40	0.75	0.59	0.75-1.00	h	h	-	60	2.00	1.54	1.51-2.00	h	h	-
08/19/22	40	2.25	1.02	2.01-2.50	h	h	-	60	0.75	0.00	0.76-1.00	h	h	-
08/20/22	50	1.50	0.16	1.01-1.25	h	h	-	60	2.50	0.08	2.51-3.00	h	h	-
08/21/22	20	0.75	0.24	1.01-1.25	h	h	-	30	1.00	0.00	0.11-0.25	m	-	X
08/22/22	0	0.00	0.00	0.00	h	-	-	20	0.25	0.00	0.00	m	-	-
08/23/22	30	0.75	0.00	0.00	m	-	X	40	1.00	0.00	0.51-0.75	h	h	-
08/24/22	20	0.50	0.00	0.26-0.50	h	-	-	40	1.00	0.43	1.26-1.50	h	h	-
08/25/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/26/22	0	0.00	0.00	0.00	h	-	-	10	0.50	0.04	0.26-0.50	h	-	-
08/27/22	20	0.25	0.31	0.51-0.75	m	m	-	20	0.25	0.00	0.00	m	-	-
08/28/22	0	0.00	0.00	0.00	h	-	-	10	0.50	0.00	0.00	h	-	-
08/29/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.05-0.10	m	-	-
08/30/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
08/31/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-
31 days					25	9/10	1					19	9/10	6
09/01/22	10	0.05	0.20	0.51-0.75	m	m	-	10	0.10	0.12	0.51-0.75	m	m	-
09/02/22	20	0.33	0.12	0.26-0.50	h	-	-	30	0.50	0.00	1.01-1.25	h	h	-
09/03/22	0	0.00	0.00	0.00	h	-	-	0	0.00	0.00	0.00	h	-	-

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022

	Forecast Zone Data				Verification				Forecast Zone Data				Verification		
Date	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA		Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
09/04/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/05/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/06/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/07/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/08/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/09/22	40	0.75	0.59	0.76-1.00	h	h	-		40	1.00	0.35	1.01-1.25	h	h	-
09/10/22	0	0.00	0.00	0.00	h	-	-		10	0.50	0.00	0.00	h	-	-
09/11/22	50	0.75	1.26	1.51-2.00	m	h	-		60	1.00	0.55	1.01-1.25	h	h	-
09/12/22	30	0.25	0.20	0.11-0.25	h	-	-		50	1.25	0.04	1.01-1.25	h	h	-
09/13/22	0	0.00	0.00	0.00	h	-	-		20	0.10	0.00	0.05-0.10	h	-	-
09/14/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/15/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/16/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/17/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/18/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/19/22	20	0.25	0.00	0.11-0.25	h	-	-		20	0.25	0.04	0.11-0.25	h	-	-
09/20/22	20	0.50	0.20	0.51-0.75	h	h	-		30	0.50	0.31	0.51-0.75	h	h	-
09/21/22	40	0.50	0.12	0.26-0.50	h	-	-		60	0.50	0.28	0.51-0.75	h	h	-
09/22/22	0	0.00	0.00	0.00	h	-	-		20	0.25	0.00	0.00	m	-	-
09/23/22	0	0.00	0.87	0.76-1.00	m	m	-		10	0.33	0.20	2.01-2.50	m	m	-
09/24/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/25/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/26/22	0	0.00	0.00	0.00	h	-	-		10	0.25	0.00	0.05-0.10	h	-	-
09/27/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/28/22	10	0.25	0.83	1.51-2.00	m	m	-		10	0.25	0.00	0.26-0.50	h	-	-
09/29/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
09/30/22	0	0.00	0.00	0.00	h	-	-		0	0.00	0.00	0.00	h	-	-
30 days					26	3/6	0						27	6/8	0

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
	Superstition													
06/15/22	0	0.00	0.00	0.00	h	-	-							
06/16/22	0	0.00	0.00	0.00	h	-	-							
06/17/22	10	0.10	0.83	1.51-2.00	m	m	-							
06/18/22	30	0.60	0.43	0.76-1.00	h	h	-							
06/19/22	0	0.00	0.00	0.00	h	-	-							
06/20/22	0	0.00	0.00	0.00	h	-	-							
06/21/22	30	0.25	0.00	0.00	m	-	-							
06/22/22	0	0.00	0.00	0.00	h	-	-							
06/23/22	30	0.25	0.08	0.11-0.25	h	-	-							
06/24/22	30	0.33	0.28	0.26-0.50	h	-	-							
06/25/22	20	0.10	0.00	0.05-0.10	h	-	-							
06/26/22	30	0.40	0.35	0.51-0.75	h	m	-							
06/27/22	20	0.25	0.00	0.00	m	-	-							
06/28/22	10	0.25	0.00	0.00	h	-	-							
06/29/22	40	1.00	0.12	0.76-1.00	h	h	-							
06/30/22	0	0.00	0.00	0.00	h	-	-							
16 days					13	2/4	0							
07/01/22	0	0.00	0.00	0.00	h	-	-							
07/02/22	0	0.00	0.00	0.00	h	-	-							
07/03/22	0	0.00	0.00	0.00	h	-	-							
07/04/22	30	0.10	0.00	0.05-0.10	h	-	-							
07/05/22	0	0.00	0.00	0.00	h	-	-							
07/06/22	0	0.00	0.00	0.00	h	-	-							
07/07/22	0	0.00	0.00	0.00	h	-	-							
07/08/22	0	0.00	0.00	0.00	h	-	-							
07/09/22	20	0.25	0.00	0.00	m	-	-							
07/10/22	0	0.00	0.00	0.00	h	-	-							
07/11/22	10	0.10	0.00	0.11-0.25	h	-	-							

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
07/12/22	30	0.10	0.00	0.00	m	-	-							
07/13/22	20	0.25	0.20	0.11-0.25	h	-	-							
07/14/22	20	0.75	0.28	0.76-1.00	h	h	-							
07/15/22	20	1.25	0.20	0.26-0.50	m	-	-							
07/16/22	40	1.00	0.39	0.51-0.75	h	h	-							
07/17/22	20	0.50	0.00	0.11-0.25	h	-	-							
07/18/22	10	0.75	0.00	0.00	h	-	-							
07/19/22	0	0.00	0.00	0.00	h	-	-							
07/20/22	10	0.50	0.00	0.00	h	-	-							
07/21/22	10	0.50	0.00	0.00	h	-	-							
07/22/22	10	0.10	0.12	0.11-0.25	h	-	-							
07/23/22	10	0.50	0.12	0.26-0.50	h	-	-							
07/24/22	40	1.25	0.00	0.00	m	-	X							
07/25/22	30	0.75	0.04	0.11-0.25	m	-	X							
07/26/22	30	0.75	0.39	0.26-0.50	h	-	-							
07/27/22	30	1.25	0.94	2.01-2.50	h	h	-							
07/28/22	40	2.00	2.48	1.51-2.00	h	h	-							
07/29/22	50	1.00	0.00	0.00	m	-	X							
07/30/22	40	0.75	0.20	0.51-0.75	h	h	-							
07/31/22	30	1.00		0.51-0.75	h	h	-							
31 days					25	6/6	3							
08/01/22	10	0.25	0.00	0.00	h	-	-							
08/02/22	10	0.25	0.00	0.26-0.50	h	-	-							
08/03/22	40	0.75	0.75	1.01-1.25	h	h	-							
08/04/22	0	0.00	0.00	0.00	h	-	-							
08/05/22	0	0.00	0.00	-	h	-	-							
08/06/22	0	0.00	0.08	0.11-0.25	m	-	-							
08/07/22	20	0.75	0.00	0.05-0.10	m	-	-							
08/08/22	30	1.00	0.63	1.01-1.25	h	h	-							

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
08/09/22	30	0.75	0.00	0.00	m	-	X							
08/10/22	30	1.00	0.00	0.00	m	-	X							
08/11/22	0	0.00	0.35	0.26-0.50	m	-	-							
08/12/22	20	1.00	1.97	2.01-2.50	h	h	-							
08/13/22	20	0.75	0.28	0.76-1.00	h	h	-							
08/14/22	30	0.75	0.00	0.26-0.50	h	-	-							
08/15/22	20	0.25	0.00	0.00	m	-	-							
08/16/22	30	1.00	0.00	0.00	m	-	X							
08/17/22	40	1.00	0.55	1.01-1.25	h	h	-							
08/18/22	50	1.25	0.63	1.01-1.25	h	h	-							
08/19/22	60	2.25	2.01	2.51-3.00	h	h	-							
08/20/22	60	1.50	0.91	1.26-1.50	h	h	-							
08/21/22	20	1.00	0.08	0.11-0.25	m	-	X							
08/22/22	20	0.25	0.00	0.00	m	-	-							
08/23/22	40	1.25	0.43	0.51-0.75	h	h	-							
08/24/22	30	1.00	0.24	0.11-0.25	m	-	X							
08/25/22	0	0.00	0.00	0.00	h	-	-							
08/26/22	10	0.50	0.00	0.00	h	-	-							
08/27/22	20	1.00	1.10	1.26-1.50	h	h	-							
08/28/22	0	0.00	0.00	0.00	h	-	-							
08/29/22	0	0.00	0.00	0.00	h	-	-							
08/30/22	0	0.00	0.00	0.00	h	-	-							
08/31/22	0	0.00	0.00	0.00	h	-	-							
31 days					21	10/10	5							
09/01/22	10	0.10	0.51	0.76-1.00	m	m	-							
09/02/22	20	0.50	0.24	0.26-0.50	h	-	-							
09/03/22	0	0.00	0.00	0.00	h	-	-							
09/04/22	0	0.00	0.00	0.00	h	-	-							
09/05/22	0	0.00	0.00	0.00	h	-	-							

TABLE A-1: MSP Outlooks Issued, Daily Verification Table - Monsoon Season 2022														
Date	Forecast Zone Data				Verification			Forecast Zone Data				Verification		
	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA	Prob. (%)	QPF (in)	ALERT (in)	GAQPE (in)	AOF	POD	FA
09/06/22	0	0.00	0.00	0.00	h	-	-							
09/07/22	0	0.00	0.00	0.00	h	-	-							
09/08/22	0	0.00	0.00	0.00	h	-	-							
09/09/22	40	0.50	0.35	0.51-0.75	h	h	-							
09/10/22	0	0.00	0.00	0.00	h	-	-							
09/11/22	50	1.00	0.87	1.26-1.50	h	h	-							
09/12/22	40	0.50	0.24	0.26-0.50	h	-	-							
09/13/22	20	0.25	0.31	0.26-0.50	h	-	-							
09/14/22	0	0.00	0.00	0.00	h	-	-							
09/15/22	0	0.00	0.00	0.00	h	-	-							
09/16/22	0	0.00	0.00	0.00	h	-	-							
09/17/22	0	0.00	0.00	0.00	h	-	-							
09/18/22	0	0.00	0.00	0.00	h	-	-							
09/19/22	20	0.25	0.00	0.11-0.25	h	-	-							
09/20/22	30	0.50	0.39	0.51-0.75	h	h	-							
09/21/22	60	0.50	0.04	0.11-0.25	m	-	X							
09/22/22	10	0.10	0.04	0.05-0.10	h	-	-							
09/23/22	0	0.00	1.06	1.26-1.50	m	m	-							
09/24/22	0	0.00	0.00	0.00	h	-	-							
09/25/22	0	0.00	0.00	0.00	h	-	-							
09/26/22	10	0.25	0.04	0.11-0.25	h	-	-							
09/27/22	0	0.00	0.00	0.00	h	-	-							
09/28/22	10	0.25	0.00	0.11-0.25	h	-	-							
09/29/22	0	0.00	0.00	0.00	h	-	-							
09/30/22	0	0.00	0.00	0.00	h	-	-							
30 days					27	3/5	1							

TABLE A-2: This table shows the verification data of MSP issued precipitation forecasts contained in the daily Outlooks for the 2022 Monsoon Season. It is a monthly tally of the data contained in Table A-1. The table is broken down by month and MSP Forecast Zone. The columns from left to right are defined as follows:

Accurate Forecasts – Number of correct forecasts days out of total days in the month.

Accuracy – Accuracy of forecasts in percent.

Op. Sig. Events Detected – Number of operationally significant days detected correctly.

POD – Probability of detection in percent.

False Alarms – Number of false alarms that month.

FAR – False alarm rate in percent.

TABLE A-2: MSP Weather Outlook Verification – Monsoon Season 2022						
Forecast Zone	Accurate Forecasts	AOF (%)	Sig. Events Detected	POD (%)	False Alarms	FAR (%)
JUNE						
Gila Bend	12/16	75%	3/5	60%	0/16	0%
Gila River	13/16	81.3%	0/3	0%	0/16	0%
Palo Verde	16/16	100%	1/3	33.3%	0/16	0%
Rainbow Valley	14/16	87.5%	0/3	0%	0/16	0%
West Valley	15/16	93.8%	1/3	25%	0/16	0%
Northwest Valley	15/16	93.8%	1/3	33.3%	0/16	0%
Upper Centennial	11/16	68.8%	2/6	33.3%	0/16	0%
Wickenburg	12/16	75%	1/3	33.3%	0/16	0%
New River/Cave Creek	13/16	81.3%	1/3	33.3%	0/16	0%
Phoenix North	13/16	81.3%	0/1	0%	0/16	0%
Phoenix South	13/16	81.3%	0/2	0%	0/16	0%
Scottsdale North	13/16	81.3%	0/2	0%	0/16	0%
Scottsdale South	14/16	87.5%	0/2	0%	0/16	0%
East Valley	15/16	93.8%	0/0	n/a	0/16	0%
Southeast Valley	12/16	75%	0/4	0%	0/16	0%
Lower Salt River Lakes	11/16	68.8%	3/4	75%	0/16	0%

TABLE A-2: MSP Weather Outlook Verification – Monsoon Season 2022						
Forecast Zone	Accurate Forecasts	AOF (%)	Sig. Events Detected	POD (%)	False Alarms	FAR (%)
Superstition	13/16	81.3%	2/4	50%	0/16	0%
All Zones	225/272	82.7%	15/52	28.9%	0/272	0%
JULY						
Gila Bend	25/31	80.6%	9/10	90%	4/31	12.9%
Gila River	22/31	71%	5/6	83.3%	2/31	6.5%
Palo Verde	26/31	83.9%	7/8	87.5%	2/31	6.5%
Rainbow Valley	24/31	77.4%	5/6	83.3%	1/31	3.2%
West Valley	26/31	83.9%	8/10	80%	0/31	0%
Northwest Valley	24/31	77.4%	9/9	100%	1/31	3.2%
Upper Centennial	24/31	77.4%	8/9	88.9%	1/31	3.2%
Wickenburg	23/31	74.2%	5/6	83.3%	4/31	12.9%
New River/Cave Creek	19/31	61.3%	7/8	87.5%	3/31	9.7%
Phoenix North	22/31	71%	4/4	100%	2/31	6.5%
Phoenix South	22/31	71%	5/6	83.3%	2/31	6.5%
Scottsdale North	20/31	64.5%	5/6	83.3%	3/31	9.7%
Scottsdale South	23/31	74.2%	4/5	80%	2/31	6.5%
East Valley	22/31	71%	5/7	71.4%	2/31	6.5%
Southeast Valley	20/31	64.5%	4/5	80%	2/31	6.5%
Lower Salt River Lakes	23/31	74.2%	7/7	100%	4/31	12.9%
Superstition	25/31	80.6%	6/6	100%	3/31	9.7%
All Zones	390/527	74.0%	103/118	87.3%	36/527	6.8%
AUGUST						
Gila Bend	22/31	71%	14/16	87.5%	3/31	9.7%
Gila River	22/31	71%	10/10	100%	0/31	0%
Palo Verde	30/31	96.8%	12/12	100%	1/31	3.2%
Rainbow Valley	28/31	90.3%	11/11	100%	1/31	3.2%
West Valley	24/31	77.4%	12/13	92.3%	2/31	6.5%
Northwest Valley	25/31	80.6%	11/11	100%	0/31	0%
Upper Centennial	24/31	77.4%	14/14	100%	0/31	0%

TABLE A-2: MSP Weather Outlook Verification – Monsoon Season 2022						
Forecast Zone	Accurate Forecasts	AOF (%)	Sig. Events Detected	POD (%)	False Alarms	FAR (%)
Wickenburg	21/31	67.7%	10/11	90.9%	1/31	3.2%
New River/Cave Creek	23/31	74.2%	10/11	90.9%	0/31	0%
Phoenix North	26/31	83.9%	7/7	100%	2/31	6.5%
Phoenix South	26/31	83.9%	8/8	100%	0/31	0%
Scottsdale North	22/31	71%	10/10	100%	1/31	3.2%
Scottsdale South	18/31	58.1%	6/6	100%	1/31	3.2%
East Valley	24/31	77.4%	7/7	100%	0/31	0%
Southeast Valley	25/31	80.6%	9/10	90%	1/31	3.2%
Lower Salt River Lakes	19/31	61.3%	9/10	90%	6/31	19.4%
Superstition	21/31	67.7%	10/10	100%	5/31	16.1%
All Zones	400/527	75.9%	180/187	96.3%	24/527	4.6%
SEPTEMBER						
Gila Bend	22/30	73.3%	5/7	71.4%	1/30	3.3%
Gila River	27/30	90%	4/6	66.7%	0/30	0%
Palo Verde	27/30	90%	3/5	60%	1/30	3.3%
Rainbow Valley	26/30	86.7%	3/6	50%	0/30	0%
West Valley	24/30	80%	3/5	60%	0/30	0%
Northwest Valley	26/30	86.7%	3/5	60%	0/30	0%
Upper Centennial	26/30	86.7%	3/5	60%	0/30	0%
Wickenburg	25/30	83.3%	2/4	50%	0/30	0%
New River/Cave Creek	27/30	90%	5/6	83.3%	0/30	0%
Phoenix North	28/30	93.3%	3/5	60%	0/30	0%
Phoenix South	27/30	90%	2/3	66.7%	0/30	0%
Scottsdale North	26/30	86.7%	1/5	20%	0/30	0%
Scottsdale South	26/30	86.7%	1/3	33.3%	0/30	0%
East Valley	24/30	80%	2/4	50%	0/30	0%
Southeast Valley	26/30	86.7%	3/6	50%	0/30	0%
Lower Salt River Lakes	27/30	90%	6/8	75%	0/30	0%
Superstition	27/30	90%	3/5	60%	1/30	3.3%
All Zones	441/510	86.5%	52/88	59.1%	3/510	0.1%

APPENDIX B: MSP MESSAGES - VERIFICATION TABLES

TABLE B-1: This table shows each of the individual MSP Statements issued during the 2022 Monsoon season including the detailed forecast rainfall information. The table is broken down by date and MSP Message. The columns from left to right are defined as follows:

Statement Details – Message information including date, time issued in local standard time, Forecast Zone, Message type, and issuing forecaster. Data is pulled directly from issued Message.

Forecast Rain – Rain information including forecast rainfall intensity and storm total precipitation where applicable. Data is pulled directly from issued Message. It is important to note that not all issued Messages contain forecast rainfall information (noted by an “N/A” in the table).

TABLE B-1: MSP Statements Issued - Monsoon Season 2022							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
06/26/22	17:07	Phoenix South	1	Henz	Now-7pm	-	0.50-1.00
06/26/22	17:10	East Valley	1	Henz	Now-7pm	-	0.50-1.00
06/26/22	17:10	Southeast Valley	1	Henz	Now-7pm	-	0.50-1.00
06/26/22	18:00	West Valley	1	Henz	Now-8pm	-	0.50-1.00
06/29/22	14:23	Rainbow Valley	1	Henz	Now-430pm	-	0.50-0.75/1.00-1.25
06/29/22	18:15	Upper Centennial	1	Waters	Now-7pm	-	0.50-0.75/1.00-1.50
07/13/22	19:50	Gila River	1	Waters	Now-9pm	-	-
07/13/22	20:45	East Valley	1	Waters	Now-10pm	-	0.50-0.75/1.00-1.25
07/16/22	17:32	Superstition	1	Henz	Now-7pm	-	0.50-0.75/1.25
07/16/22	18:05	Scottsdale North	1	Henz	Now-745pm	-	0.50-0.75/1.25
07/16/22	18:05	Scottsdale South	1	Henz	Now-745pm	-	0.50-0.75/1.25
07/16/22	19:00	New River/Cave Creek	1	Henz	Now-830pm	-	0.50-0.75/1.25
07/17/22	20:40	East Valley	1	Henz	Now-10pm	-	0.50-0.75/1.00-1.25
07/17/22	20:40	Scottsdale South	1	Henz	Now-10pm	-	0.50-0.75/1.00-1.25
07/17/22	20:53	East Valley	3	Henz	Now-1045pm	-	-
07/17/22	21:05	Phoenix North	1	Henz	Now-1030pm	-	0.75-1.00/1.25-1.50
07/17/22	21:05	Phoenix South	1	Henz	Now-1030pm	-	0.75-1.00/1.25-1.50
07/17/22	22:30	Wickenburg	1	Henz	Now-12am	-	0.50-1.00/1.25

TABLE B-1: MSP Statements Issued - Monsoon Season 2022

Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
07/24/22	18:10	Southeast Valley	1	Waters	Now-8am	-	0.25-0.50/0.75
07/24/22	6:45	Phoenix South	1	Waters	Now-830am	-	0.25-0.50/0.75
07/24/22	6:45	West Valley	1	Waters	Now-830am	-	0.25-0.50/0.75
07/24/22	6:45	Rainbow Valley	1	Waters	Now-830am	-	0.25-0.50/0.75
07/25/22	6:57	Rainbow Valley	1	Henz	Now-9am	-	0.50-0.75/1.25-1.75
07/25/22	7:25	West Valley	1	Henz	Now-930am	-	0.50-0.75/1.25-1.75
07/25/22	10:38	Rainbow Valley	1	Henz	Now-1pm	-	-
07/25/22	20:27	East Valley	1	Henz	Now-10pm	-	0.50-0.75/1.25-1.75
07/25/22	23:09	New River/Cave Creek	1	Henz	Now-1230am	-	0.50-0.75/1.25-1.75
07/25/22	23:44	New River/Cave Creek	3	Henz	Now-2am	-	-
07/26/22	0:18	West Valley	1	Henz	Now-2am	-	0.50-0.75/1.25-1.75
07/26/22	0:18	Northwest Valley	1	Henz	Now-2am	-	0.50-0.75/1.25-1.75
07/26/22	0:24	Phoenix North	1	Henz	Now-2am	-	0.60-0.90/1.25-1.75
07/27/22	5:58	Southeast Valley	1	Henz	Now-8am	-	0.50-0.75/1.25-1.75
07/27/22	5:58	East Valley	1	Henz	Now-8am	-	0.50-0.75/1.25-1.75
07/27/22	11:29	Northwest Valley	1	Waters	Now-1pm	-	0.50-0.75/1.25-1.75
07/27/22	13:02	Scottsdale North	1	Henz	Now-230pm	-	0.50-0.75/1.25-1.75
07/28/22	7:50	Northwest Valley	1	Waters	Now-9am	-	0.50-0.75/1.00-1.50
07/28/22	7:50	West Valley	1	Waters	Now-9am	-	0.50-0.75/1.00-1.50
07/28/22	9:20	Upper Centennial	1	Waters	Now-11am	-	0.50-0.75/1.00-1.50
07/28/22	10:30	Scottsdale South	1	Waters	Now-12pm	-	0.50-0.75/1.00-1.50
07/28/22	10:30	Scottsdale North	1	Waters	Now-12pm	-	0.50-0.75/1.00-1.50
07/28/22	10:45	Gila River	1	Waters	Now-12pm	-	0.50-0.75/1.00-1.25
07/28/22	11:31	Phoenix South	1	Waters	Now-1pm	-	0.50-0.75/1.00-1.50
07/28/22	11:40	Superstition	1	Waters	Now-2pm	-	0.50-0.75/1.00-1.50
07/28/22	12:20	Scottsdale North	1	Waters	Now-230pm	-	0.50-0.75/1.00-1.50
07/28/22	12:20	Scottsdale South	1	Waters	Now-230pm	-	0.50-0.75/1.00-1.50
07/28/22	12:20	East Valley	1	Waters	Now-230pm	-	0.50-0.75/1.00-1.50
07/28/22	13:28	Superstition	3	Waters	Now-3pm	-	-

TABLE B-1: MSP Statements Issued - Monsoon Season 2022							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
07/29/22	6:49	Phoenix North	1	Waters	Now-8am	-	0.50-0.75/1.00-1.50
07/29/22	12:30	Gila Bend	1	Waters	Now-3pm	-	0.50-0.75/1.00-1.50
07/29/22	13:50	Gila Bend	3	Waters	Now-4pm	-	-
07/30/22	16:38	Rainbow Valley	1	Henz	Now-630pm	-	0.50-0.75/1.25-1.75
07/30/22	16:46	Superstition	1	Henz	Now-630pm	-	0.50-0.75/1.25-1.75
07/30/22	17:06	Southeast Valley	1	Henz	Now-7pm	-	0.50-0.75/1.25-1.75
07/30/22	17:10	Gila River	1	Henz	Now-7pm	-	0.50-0.75/1.25-1.75
07/30/22	17:20	East Valley	1	Henz	Now-7pm	-	0.50-0.75/1.25-1.75
07/30/22	17:34	Phoenix South	1	Henz	Now-730pm	-	0.50-0.75/1.25-1.75
07/30/22	17:53	Scottsdale North	1	Henz	Now-8pm	-	0.50-0.75/1.25-1.75
07/30/22	17:53	Scottsdale South	1	Henz	Now-8pm	-	0.50-0.75/1.25-1.75
07/30/22	18:05	Northwest Valley	1	Henz	Now-8pm	-	0.50-0.75/1.25-1.75
07/30/22	18:14	Phoenix North	1	Henz	Now-830pm	-	0.50-0.75/1.25-1.75
07/30/22	18:42	Phoenix North	3	Henz	Now-9pm	-	-
07/30/22	18:47	New River/Cave Creek	1	Henz	Now-9pm	-	0.50-0.75/1.50-2.25
07/30/22	19:07	New River/Cave Creek	3	Henz	Now-10pm	-	-
07/31/22	14:19	Gila Bend	1	Henz	Now-4pm	-	0.50-0.75/1.25-1.75
08/03/22	8:51	Southeast Valley	1	Waters	Now-10am	-	0.25-0.50/0.75
08/04/22	4:37	Phoenix North	1	Henz	Now-6am	-	0.50-0.75/1.25-1.75
08/04/22	4:40	Scottsdale South	1	Henz	Now-630am	-	0.50-0.75/1.25-1.75
08/04/22	4:48	Phoenix South	1	Henz	Now-630am	-	0.50-0.75/1.25-1.75
08/04/22	5:05	Northwest Valley	1	Henz	Now-7am	-	0.50-1.00/1.25-1.75
08/04/22	5:05	West Valley	1	Henz	Now-7am	-	0.50-1.00/1.25-1.75
08/04/22	5:23	Wickenburg	1	Henz	Now-730am	-	0.50-1.00/1.50-2.00
08/07/22	18:55	Northwest Valley	1	Waters	Now-745pm	-	0.50-0.75/1.00-1.50
08/07/22	17:35	New River/Cave Creek	1	Waters	Now-8pm	-	0.50-0.75/1.00-1.50
08/07/22	17:35	Phoenix North	1	Waters	Now-8pm	-	0.50-0.75/1.00-1.50
08/07/22	19:45	West Valley	1	Waters	Now-830pm	-	0.50-0.75/1.00-1.50
08/09/22	1:40	Scottsdale North	1	Henz	Now-3am	-	0.50-0.75/1.00-1.50

TABLE B-1: MSP Statements Issued - Monsoon Season 2022

Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
08/10/22	15:15	Upper Centennial	1	Waters	Now-5pm	-	0.50-0.75/1.00-1.50
08/10/22	15:15	Wickenburg	1	Waters	Now-5pm	-	0.50-0.75/1.00-1.50
08/10/22	16:53	West Valley	1	Waters	Now-6pm	-	0.50-0.75/1.00-1.50
08/10/22	17:47	West Valley	1U	Waters	Now-6pm	-	-
08/10/22	18:10	Northwest Valley	1	Waters	Now-730pm	-	0.50-0.75/1.00-1.50
08/12/22	12:19	Gila Bend	1	Waters	Now-3pm	-	0.50-0.75/1.00-1.50
08/12/22	13:30	Rainbow Valley	1	Waters	Now-4pm	-	0.50-0.75/1.00-1.50
08/12/22	14:45	Superstition	1	Waters	Now-430pm	-	0.75-1.00/1.25-1.75
08/12/22	14:54	East Valley	1	Waters	Now-430pm	-	0.50-0.75/1.00-1.50
08/12/22	15:17	Scottsdale North	1	Waters	Now-5pm	-	0.50-0.75/1.00-1.50
08/12/22	15:17	Scottsdale South	1	Waters	Now-5pm	-	0.50-0.75/1.00-1.50
08/12/22	15:17	New River/Cave Creek	1	Waters	Now-5pm	-	0.50-0.75/1.00-1.50
08/12/22	15:45	New River/Cave Creek	3	Waters	Now-6pm	-	-
08/12/22	15:45	Scottsdale North	3	Waters	Now-6pm	-	-
08/12/22	15:45	Scottsdale South	3	Waters	Now-6pm	-	-
08/12/22	15:45	East Valley	3	Waters	Now-6pm	-	-
08/12/22	15:45	Superstition	3	Waters	Now-6pm	-	-
08/12/22	15:58	Phoenix South	1	Waters	Now-6pm	-	0.50-0.75/1.00-1.50
08/12/22	16:45	Palo Verde	1	Waters	Now-6pm	-	0.50-0.75/1.00-1.50
08/12/22	17:24	Upper Centennial	1	Waters	Now-8pm	-	0.50-0.75/1.00-1.50
08/12/22	19:22	Scottsdale South	3U	Waters	Now-12am	-	-
08/13/22	19:52	Palo Verde	1	Henz	Now-930pm	-	0.50-0.75/1.00-1.25
08/14/22	15:15	Wickenburg	1	Henz	Now-5pm	-	.50-0.75/1.25-1.75
08/14/22	15:21	New River/Cave Creek	1	Henz	Now-5pm	-	.50-0.75/1.25-1.75
08/14/22	15:32	Northwest Valley	1	Henz	Now-530pm	-	.50-0.75/1.25-1.75
08/14/22	16:22	West Valley	1	Henz	Now-615pm	-	.50-0.75/1.25-1.75
08/14/22	16:22	Rainbow Valley	1	Henz	Now-630pm	-	.50-0.75/1.25-1.75
08/14/22	17:05	Phoenix South	1	Henz	Now-645pm	-	.50-0.75/1.25-1.75
08/14/22	17:05	Gila River	1	Henz	Now-645pm	-	.50-0.75/1.25-1.75

TABLE B-1: MSP Statements Issued - Monsoon Season 2022

Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
08/14/22	17:10	Gila Bend	1	Henz	Now-7pm	-	.50-0.75/1.25-1.75
08/14/22	18:07	Palo Verde	1	Henz	Now-830pm	-	.50-0.75/1.25-1.75
08/17/22	14:02	Wickenburg	1	Henz	Now-4pm	-	.50-0.75/1.25-1.50
08/17/22	15:16	Wickenburg	3	Henz	Now-6pm	-	-
08/17/22	15:40	West Valley	1	Henz	Now-530pm	-	.50-0.75/1.25-1.75
08/17/22	18:26	Southeast Valley	1	Henz	Now-8pm	-	.50-0.75/1.25-1.75
08/18/22	12:11	Gila Bend	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Gila River	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Rainbow Valley	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	West Valley	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Northwest Valley	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Palo Verde	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Upper Centennial	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Wickenburg	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	New River/Cave Creek	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Phoenix North	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Phoenix South	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Scottsdale North	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Scottsdale South	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	East Valley	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Southeast Valley	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Superstition	2	Henz	Now-8am 8/21	-	-
08/18/22	12:11	Lower Salt River Lakes	2	Henz	Now-8am 8/21	-	-
08/18/22	16:40	Wickenburg	1	Henz	Now-630pm	-	.50-0.75/1.25-1.75
08/18/22	16:40	Upper Centennial	1	Henz	Now-730pm	-	.50-0.75/1.25-1.75
08/18/22	17:28	New River/Cave Creek	1	Henz	Now-730pm	-	.50-0.75/1.25-1.75
08/18/22	17:31	Scottsdale North	1	Henz	Now-730pm	-	.50-0.75/1.25-1.75
08/18/22	17:59	Superstition	1	Henz	Now-745pm	-	.50-0.75/1.25-1.75
08/18/22	18:27	Phoenix North	1	Henz	Now-815pm	-	0.75-1.00/1.50-2.00

TABLE B-1: MSP Statements Issued - Monsoon Season 2022

Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
08/18/22	18:51	Palo Verde	1	Henz	Now-815pm	-	0.75-1.00/1.50-2.00
08/18/22	18:56	New River/Cave Creek	3	Henz	Now-10pm	-	-
08/18/22	20:47	Phoenix South	1	Henz	Now-1015pm	-	0.50-0.75/1.00-1.25
08/19/22	14:00	Superstition	1	Waters	Now-4pm	-	0.50-1.00/1.25-1.50
08/19/22	14:30	East Valley	1	Waters	Now-430pm	-	0.50-1.00/1.25-1.50
08/19/22	14:30	Southeast Valley	1	Waters	Now-430pm	-	0.50-1.00/1.25-1.50
08/19/22	15:45	Scottsdale North	1	Waters	Now-5pm	-	0.50-1.00/1.25-1.50
08/19/22	16:00	Gila River	1	Waters	Now-530pm	-	0.50-1.00/1.25-1.50
08/19/22	16:13	Scottsdale South	1	Waters	Now-530pm	-	0.50-1.00/1.25-1.50
08/19/22	16:13	Scottsdale South	1U	Waters	Now-7pm	-	-
08/19/22	17:15	Gila Bend	1	Waters	Now-9pm	-	0.50-1.00/1.25-1.50
08/19/22	17:03	New River/Cave Creek	3	Waters	Now-9pm	-	-
08/19/22	17:52	Phoenix North	1	Waters	Now-7pm	-	0.50-1.00/1.25-1.50
08/19/22	17:52	Phoenix South	1	Waters	Now-7pm	-	0.50-1.00/1.25-1.50
08/19/22	18:10	Northwest Valley	1	Waters	Now-730pm	-	0.50-1.00/1.25-1.50
08/19/22	18:35	Wickenburg	1	Waters	Now-830pm	-	0.50-1.00/1.25-1.50
08/19/22	19:03	Wickenburg	3	Waters	Now-10pm	-	-
08/19/22	19:31	Palo Verde	1	Waters	Now-9pm	-	0.50-1.00/1.25-1.50
08/19/22	19:31	Upper Centennial	1	Waters	Now-9pm	-	0.50-1.00/1.25-1.50
08/19/22	20:18	Upper Centennial	3	Waters	Now-12am	-	-
08/20/22	11:40	Superstition	1	Waters	Now-130pm	-	0.50-1.00/1.25-1.50
08/20/22	18:22	Wickenburg	1	Waters	Now-830pm	-	0.75-1.00/1.25-1.75
08/20/22	19:30	Northwest Valley	1	Waters	Now-9pm	-	0.50-1.00/1.25-1.50
08/20/22	20:12	New River/Cave Creek	1	Waters	Now-10pm	-	0.50-1.00/1.25-1.50
08/20/22	20:27	West Valley	1	Waters	Now-10pm	-	0.50-1.00/1.25-1.50
08/20/22	21:03	Phoenix North	1	Waters	Now 10:30	-	0.50-1.00/1.25-1.50
08/20/22	21:10	Northwest Valley	1U	Waters	Now-1030pm	-	-
08/20/22	21:26	Phoenix South	1	Waters	Now-11pm	-	0.50-1.00/1.25-1.50
08/20/22	21:36	Rainbow Valley	1	Waters	Now-1130pm	-	0.50-1.00/1.25-1.50

TABLE B-1: MSP Statements Issued - Monsoon Season 2022

Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
08/20/22	22:08	Gila River	1	Waters	Now-1130pm	-	0.50-0.75/1.00-1.50
08/20/22	22:15	Upper Centennial	1	Waters	Now-12am	-	0.50-0.75/1.00-1.50
08/20/22	22:26	Gila Bend	1	Waters	Now-12am	-	0.50-0.75/1.00-1.50
08/21/22	3:30	Wickenburg	3	Waters	Now-6am	-	-
08/21/22	4:10	Palo Verde	1	Waters	Now-6am	-	0.50-0.75/1.00-1.50
08/21/22	17:00	New River/Cave Creek	1	Waters	Now-8pm	-	0.50-0.75/1.00-1.50
08/21/22	17:15	Scottsdale North	1	Waters	Now-8pm	-	0.50-0.75/1.00-1.50
08/21/22	17:49	New River/Cave Creek	1U	Waters	Now-9pm	-	-
08/21/22	17:55	Scottsdale South	1	Waters	Now-9pm	-	0.50-0.75/1.00-1.50
08/21/22	18:15	Phoenix South	1	Waters	Now-830pm	-	0.50-0.75/1.00-1.50
08/21/22	18:15	East Valley	1	Waters	Now-830pm	-	0.50-0.75/1.00-1.50
08/21/22	19:18	Upper Centennial	1	Waters	Now-10pm	-	0.50-0.75/1.00-1.25
08/21/22	19:18	Wickenburg	1	Waters	Now-10pm	-	0.50-0.75/1.00-1.25
08/23/22	15:37	Superstition	1	Henz	Now-515pm	-	0.50-1.00/1.25-1.50
08/23/22	16:30	East Valley	1	Henz	Now-615pm	-	0.50-1.00/1.25-1.50
08/23/22	16:42	Scottsdale South	1	Henz	Now-630pm	-	0.50-1.00/1.25-1.50
08/23/22	17:07	Phoenix North	1	Henz	Now-7pm	-	0.50-0.75/1.00-1.25
08/23/22	17:07	Phoenix South	1	Henz	Now-7pm	-	0.50-0.75/1.00-1.25
08/23/22	17:07	West Valley	1	Henz	Now-7pm	-	0.50-0.75/1.00-1.25
08/23/22	17:12	Wickenburg	1	Henz	Now-7pm	-	0.50-0.75/1.25-1.50
08/23/22	17:14	Upper Centennial	1	Henz	Now-7pm	-	0.50-0.75/1.25-1.50
08/24/22	18:04	Upper Centennial	1	Henz	Now-8pm	-	0.50-0.75/1.25-1.50
09/02/22	15:50	Scottsdale North	1	Waters	Now-5pm	-	0.33-0.50/0.75-1.00
09/02/22	18:05	Wickenburg	1	Waters	Now-730pm	-	0.33-0.50/0.75-1.00
09/02/22	18:15	Southeast Valley	1	Waters	Now-730pm	-	0.33-0.50/0.75-1.00
09/02/22	18:38	Upper Centennial	1	Waters	Now-8pm	-	0.33-0.50/0.75-1.00
09/02/22	18:50	Wickenburg	3	Waters	Now-9pm	-	-
09/09/22	18:05	Palo Verde	1	Waters	Now-7pm	-	0.33-0.50/0.75-1.00
09/09/22	17:40	Rainbow Valley	1	Waters	Now-9pm	-	0.50-0.75/1.00-1.50

TABLE B-1: MSP Statements Issued - Monsoon Season 2022							
Statement Details						Forecast Rain	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Intensity (in/min)	STP (in)
09/11/22	19:54	Gila River	1	Waters	Now-10pm	-	0.33-0.50/0.75-1.00
09/11/22	19:54	Southeast Valley	1	Waters	Now-10pm	-	0.33-0.50/0.75-1.00
09/11/22	20:39	Phoenix South	1	Waters	Now-10pm	-	0.33-0.50/0.75-1.00
09/11/22	20:39	Scottsdale South	1	Waters	Now-10pm	-	0.33-0.50/0.75-1.00
09/11/22	20:39	East Valley	1	Waters	Now-10pm	-	0.33-0.50/0.75-1.00
09/11/22	20:39	Superstition	1	Waters	Now-10pm	-	0.33-0.50/0.75-1.00
09/11/22	20:49	Rainbow Valley	1	Waters	Now-10:30pm	-	0.33-0.50/0.75-1.00
09/11/22	21:37	Phoenix North	1	Waters	Now-11pm	-	0.33-0.50/0.75-1.00
09/11/22	21:37	Scottsdale North	1	Waters	Now-11pm	-	0.33-0.50/0.75-1.00
09/11/22	22:11	New River/Cave Creek	1	Waters	Now-12am	-	0.33-0.50/0.75-1.00
09/21/22	7:06	Northwest Valley	1	Henz	Now-10am	-	0.75-1.50/2.25
09/21/22	7:06	West Valley	1	Henz	Now-10am	-	0.75-1.50/2.25
09/21/22	10:21	Northwest Valley	1U	Henz	Now-1pm	-	-
09/21/22	10:21	West Valley	1U	Henz	Now-1pm	-	-
09/21/22	13:30	Gila Bend	1	Henz	Now-330pm	-	0.75-1.50/2.25
09/22/22	14:45	Upper Centennial	1	Henz	Now-430pm	-	0.75-1.50/2.25
09/23/22	16:44	New River/Cave Creek	1	Waters	Now-10pm	-	0.33-0.50/0.75-1.00
09/23/22	18:18	East Valley	1	Henz	Now-830pm	-	0.50-1.00/1.50
09/23/22	18:18	Southeast Valley	1	Henz	Now-830pm	-	0.50-1.00/1.50
09/28/22	15:14	Southeast Valley	1	Waters	Now-430pm	-	0.50-1.00/1.50
09/28/22	15:52	Gila River	1	Henz	Now-5pm	-	0.50-1.00/1.50

TABLE B-2: This table shows the raw verification data of MSP issued Messages for the 2022 Monsoon Season. The valid period for rainfall for each Message can be found in Table B-1. The table is broken down by date and MSP Message. The columns from left to right are defined as follows:

Statement Details – Statement information including date, Forecast Zone, and Message type.

Forecast Rain – Rain information including forecast rainfall intensity and forecast storm total precipitation where applicable. It is important to note that not all issued statements contain forecast rainfall information (noted by an “n/a” in the table).

Rain Observations – Observed rainfall amounts within the forecast zone including ALERT rain gages, gage adjusted radar rainfall totals, and local storm reports submitted to NWS Phoenix WFO.

Alarms – Triggered alarms on ALERT gage sensors. These alarms are broken down by alarm type including rain, stream, and dam.

Verification – The verification was broken down by rain and by alarm. Hits and misses were assigned based on thresholds previously discussed in the [MSP Verification Metrics and Criteria](#) section of this report.

TABLE B-2: MSP Statements Issued - Monsoon Season 2022											
Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
06/26/22	Phoenix South	1	-	0.50-1.00	1.02	1.51-2.00	1.00	X	-	-	Hit
06/26/22	East Valley	1	-	0.50-1.00	0.35	0.26-0.50	-	-	-	-	Hit
06/26/22	Southeast Valley	1	-	0.50-1.00	0.67	1.01-1.25	0.90	-	-	-	Hit
06/26/22	West Valley	1	-	0.50-1.00	0.47	0.76-1.00	-	-	-	-	Hit
06/29/22	Rainbow Valley	1	-	0.50-0.75/1.00-1.25	0.71	0.76-1.00	-	-	-	-	Hit
06/29/22	Upper Centennial	1	-	0.50-0.75/1.00-1.50	1.14	3.01-4.00	-	-	-	-	Hit
07/13/22	Gila River	1	-	-	0.00	1.26-1.50	-	-	-	-	Hit
07/13/22	East Valley	1	-	0.50-0.75/1.00-1.25	1.26	1.51-2.00	1.18	X	-	-	Hit
07/16/22	Superstition	1	-	0.50-0.75/1.25	0.39	0.26-0.50	-	-	-	-	Miss
07/16/22	Scottsdale North	1	-	0.50-0.75/1.25	0.94	1.26-1.50	-	-	-	-	Hit
07/16/22	Scottsdale South	1	-	0.50-0.75/1.25	0.00	0.11-0.25	-	-	-	-	Miss
07/16/22	New River/Cave Creek	1	-	0.50-0.75/1.25	0.31	0.51-0.75	-	-	-	-	Hit
07/17/22	East Valley	1	-	0.50-0.75/1.00-1.25	1.38	1.26-1.50	-	X	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2022

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
07/17/22	Scottsdale South	1	-	0.50-0.75/1.00-1.25	1.42	1.51-2.00	-	-	X	-	Hit
07/17/22	East Valley	3	-	-	1.38	1.26-1.50	0.94	-	-	-	Hit
07/17/22	Phoenix North	1	-	0.75-1.00/1.25-1.50	0.24	0.51-0.75	-	-	-	-	Miss
07/17/22	Phoenix South	1	-	0.75-1.00/1.25-1.50	0.51	0.51-0.75	-	-	-	-	Hit
07/17/22	Wickenburg	1	-	0.50-1.00/1.25	0.75	0.76-1.00	-	-	-	-	Hit
07/24/22	Southeast Valley	1	-	0.25-0.50/0.75	0.51	0.11-0.25	-	-	-	-	Hit
07/24/22	Phoenix South	1	-	0.25-0.50/0.75	0.16	0.26-0.50	0.60	-	-	-	Hit
07/24/22	West Valley	1	-	0.25-0.50/0.75	0.28	0.51-0.75	-	-	-	-	Hit
07/24/22	Rainbow Valley	1	-	0.25-0.50/0.75	0.20	0.51-0.75	-	-	-	-	Hit
07/25/22	Rainbow Valley	1	-	0.50-0.75/1.25-1.75	0.87	1.26-1.50	0.50	-	-	-	Hit
07/25/22	West Valley	1	-	0.50-0.75/1.25-1.75	0.28	0.51-0.75	-	-	-	-	Hit
07/25/22	Rainbow Valley	1	-	-	0.87	1.51-2.00	-	-	-	-	Hit
07/25/22	East Valley	1	-	0.50-0.75/1.25-1.75	0.79	0.76-1.00	-	-	-	-	Hit
07/25/22	New River/Cave Creek	1	-	0.50-0.75/1.25-1.75	2.13	2.51-3.00	-	-	-	-	Hit
07/25/22	New River/Cave Creek	3	-	-	2.28	2.51-3.00	-	-	-	-	Hit
07/26/22	West Valley	1	-	0.50-0.75/1.25-1.75	0.59	1.26-1.50	1.94	X	X	-	Hit
07/26/22	Northwest Valley	1	-	0.50-0.75/1.25-1.75	0.59	1.26-1.50	-	X	-	-	Hit
07/26/22	Phoenix North	1	-	0.60-0.90/1.25-1.75	0.20	0.51-0.75	-	X	X	-	Hit
07/27/22	Southeast Valley	1	-	0.50-0.75/1.25-1.75	0.16	1.01-1.25	-	-	-	-	Hit
07/27/22	East Valley	1	-	0.50-0.75/1.25-1.75	0.43	1.26-1.50	-	-	-	-	Hit
07/27/22	Northwest Valley	1	-	0.50-0.75/1.25-1.75	0.08	2.01-2.50	-	-	X	-	Hit
07/27/22	Scottsdale North	1	-	0.50-0.75/1.25-1.75	1.30	1.51-2.00	-	X	-	-	Hit
07/28/22	Northwest Valley	1	-	0.50-0.75/1.00-1.50	1.10	2.51-3.00	-	-	-	-	Hit
07/28/22	West Valley	1	-	0.50-0.75/1.00-1.50	1.10	2.51-3.00	-	-	-	-	Hit
07/28/22	Upper Centennial	1	-	0.50-0.75/1.00-1.50	2.28	2.51-3.00	-	X	-	-	Hit
07/28/22	Scottsdale South	1	-	0.50-0.75/1.00-1.50	0.79	0.51-0.75	-	X	X	-	Hit
07/28/22	Scottsdale North	1	-	0.50-0.75/1.00-1.50	1.22	1.51-2.00	-	X	-	-	Hit
07/28/22	Gila River	1	-	0.50-0.75/1.00-1.25	1.77	0.51-0.75	-	-	-	-	Hit
07/28/22	Phoenix South	1	-	0.50-0.75/1.00-1.50	1.26	1.26-1.50	-	X	X	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2022

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
07/28/22	Superstition	1	-	0.50-0.75/1.00-1.50	2.64	1.51-2.00	-	X	X	-	Hit
07/28/22	Scottsdale North	1	-	0.50-0.75/1.00-1.50	0.08	1.26-1.50	-	-	-	-	Hit
07/28/22	Scottsdale South	1	-	0.50-0.75/1.00-1.50	0.00	0.51-0.75	-	-	-	-	Hit
07/28/22	East Valley	1	-	0.50-0.75/1.00-1.50	0.04	0.51-0.75	-	-	-	-	Hit
07/28/22	Superstition	3	-	-	2.64	1.51-2.00	-	X	X	-	Hit
07/29/22	Phoenix North	1	-	0.50-0.75/1.00-1.50	1.06	0.76-1.00	-	-	-	-	Hit
07/29/22	Gila Bend	1	-	0.50-0.75/1.00-1.50	0.20	2.01-2.50	-	-	-	-	Hit
07/29/22	Gila Bend	3	-	-	0.20	2.01-2.50	-	-	-	-	Hit
07/30/22	Rainbow Valley	1	-	0.50-0.75/1.25-1.75	0.12	2.51-3.00	-	-	-	-	Hit
07/30/22	Superstition	1	-	0.50-0.75/1.25-1.75	0.35	0.51-0.75	-	-	-	-	Hit
07/30/22	Southeast Valley	1	-	0.50-0.75/1.25-1.75	0.87	1.01-1.25	-	-	-	-	Hit
07/30/22	Gila River	1	-	0.50-0.75/1.25-1.75	0.98	1.51-2.00	-	-	-	-	Hit
07/30/22	East Valley	1	-	0.50-0.75/1.25-1.75	0.12	1.26-1.50	-	-	-	-	Hit
07/30/22	Phoenix South	1	-	0.50-0.75/1.25-1.75	1.02	1.26-1.51	-	X	-	-	Hit
07/30/22	Scottsdale North	1	-	0.50-0.75/1.25-1.75	1.89	2.01-2.50	-	X	-	-	Hit
07/30/22	Scottsdale South	1	-	0.50-0.75/1.25-1.75	0.59	1.51-2.00	-	-	-	-	Hit
07/30/22	Northwest Valley	1	-	0.50-0.75/1.25-1.75	0.87	1.51-2.00	-	-	-	-	Hit
07/30/22	Phoenix North	1	-	0.50-0.75/1.25-1.75	2.13	2.01-2.50	2.09	X	X	X	Hit
07/30/22	Phoenix North	3	-	-	2.13	2.01-2.50	-	X	X	X	Hit
07/30/22	New River/Cave Creek	1	-	0.50-0.75/1.50-2.25	1.46	1.51-2.00	1.62	X	X	-	Hit
07/30/22	New River/Cave Creek	3	-	-	1.50	1.51-2.00	-	X	X	-	Hit
07/31/22	Gila Bend	1	-	0.50-0.75/1.25-1.75	1.34	2.51-3.00	-	-	-	-	Hit
08/03/22	Southeast Valley	1	-	0.25-0.50/0.75	0.20	0.26-0.50	-	-	-	-	Hit
08/04/22	Phoenix North	1	-	0.50-0.75/1.25-1.75	1.81	1.51-2.00	-	X	X	X	Hit
08/04/22	Scottsdale South	1	-	0.50-0.75/1.25-1.75	1.26	1.26-1.50	-	-	X	-	Hit
08/04/22	Phoenix South	1	-	0.50-0.75/1.25-1.75	1.81	1.51-2.00	-	X	X	-	Hit
08/04/22	Northwest Valley	1	-	0.50-1.00/1.25-1.75	0.59	1.01-1.25	-	-	X	-	Hit
08/04/22	West Valley	1	-	0.50-1.00/1.25-1.75	0.98	1.26-1.50	1.00	-	-	-	Hit
08/04/22	Wickenburg	1	-	0.50-1.00/1.50-2.00	1.22	1.51-2.00	-	X	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2022

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
08/07/22	Northwest Valley	1	-	0.50-0.75/1.00-1.50	0.94	1.51-2.00	-	-	X	-	Hit
08/07/22	New River/Cave Creek	1	-	0.50-0.75/1.00-1.50	0.12	0.51-0.75	-	-	-	-	Hit
08/07/22	Phoenix North	1	-	0.50-0.75/1.00-1.50	0.00	0.11-0.25	-	-	-	-	Hit
08/07/22	West Valley	1	-	0.50-0.75/1.00-1.50	1.22	1.51-2.00	-	-	-	-	Hit
08/09/22	Scottsdale North	1	-	0.50-0.75/1.00-1.50	1.54	1.26-1.50	-	X	-	-	Hit
08/10/22	Upper Centennial	1	-	0.50-0.75/1.00-1.50	0.47	1.26-1.50	-	-	-	-	Hit
08/10/22	Wickenburg	1	-	0.50-0.75/1.00-1.50	0.51	1.26-1.50	-	-	-	-	Hit
08/10/22	West Valley	1	-	0.50-0.75/1.00-1.50	1.02	3.01-4.00	-	-	X	-	Hit
08/10/22	West Valley	1U	-	-	-	-	-	-	-	-	-
08/10/22	Northwest Valley	1	-	0.50-0.75/1.00-1.50	0.79	1.51-2.00	-	-	X	-	Hit
08/12/22	Gila Bend	1	-	0.50-0.75/1.00-1.50	0.20	2.01-2.50	-	-	-	-	Hit
08/12/22	Rainbow Valley	1	-	0.50-0.75/1.00-1.50	0.00	0.51-0.75	-	-	-	-	Hit
08/12/22	Superstition	1	-	0.75-1.00/1.25-1.75	1.93	2.01-3.00	0.86	X	-	-	Hit
08/12/22	East Valley	1	-	0.50-0.75/1.00-1.50	0.63	1.01-1.25	-	X	-	-	Hit
08/12/22	Scottsdale North	1	-	0.50-0.75/1.00-1.50	3.07	2.01-2.50	1.85	X	-	-	Hit
08/12/22	Scottsdale South	1	-	0.50-0.75/1.00-1.50	2.48	2.51-3.00	-	X	X	-	Hit
08/12/22	New River/Cave Creek	1	-	0.50-0.75/1.00-1.50	1.34	1.51-2.00	-	X	X	-	Hit
08/12/22	New River/Cave Creek	3	-	-	1.42	1.51-2.00	-	X	X	-	Hit
08/12/22	Scottsdale North	3	-	-	3.11	2.01-2.50	-	X	-	-	Hit
08/12/22	Scottsdale South	3	-	-	2.60	2.51-3.00	-	X	X	-	Hit
08/12/22	East Valley	3	-	-	2.05	1.01-1.25	-	X	-	-	Hit
08/12/22	Superstition	3	-	-	2.05	2.01-2.50	-	X	-	-	Hit
08/12/22	Phoenix South	1	-	0.50-0.75/1.00-1.50	0.04	0.11-0.25	-	-	-	-	Hit
08/12/22	Palo Verde	1	-	0.50-0.75/1.00-1.50	0.51	1.01-1.25	-	-	-	-	Hit
08/12/22	Upper Centennial	1	-	0.50-0.75/1.00-1.50	1.89	2.01-2.50	-	X	-	-	Hit
08/12/22	Scottsdale South	3U	-	-	-	-	-	-	-	-	-
08/13/22	Palo Verde	1	-	0.50-0.75/1.00-1.25	0.24	0.51-0.75	-	X	-	-	Hit
08/14/22	Wickenburg	1	-	.50-0.75/1.25-1.75	0.98	0.76-1.00	-	X	X	-	Hit
08/14/22	New River/Cave Creek	1	-	.50-0.75/1.25-1.75	1.69	2.51-3.00	-	X	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2022

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
08/14/22	Northwest Valley	1	-	.50-0.75/1.25-1.75	1.10	1.51-2.00	-	-	X	-	Hit
08/14/22	West Valley	1	-	.50-0.75/1.25-1.75	0.63	1.01-1.25	-	-	-	-	Hit
08/14/22	Rainbow Valley	1	-	.50-0.75/1.25-1.75	0.51	2.01-2.50	-	-	-	-	Hit
08/14/22	Phoenix South	1	-	.50-0.75/1.25-1.75	0.31	1.01-1.25	-	-	-	-	Hit
08/14/22	Gila River	1	-	.50-0.75/1.25-1.75	0.20	1.01-1.25	-	-	-	-	Hit
08/14/22	Gila Bend	1	-	.50-0.75/1.25-1.75	1.22	1.51-2.00	-	X	-	-	Hit
08/14/22	Palo Verde	1	-	.50-0.75/1.25-1.75	1.22	2.01-2.50	-	X	X	-	Hit
08/17/22	Wickenburg	1	-	.50-0.75/1.25-1.50	2.09	2.51-3.00	-	X	X	-	Hit
08/17/22	Wickenburg	3	-	-	2.09	2.51-3.00	-	X	X	-	Hit
08/17/22	West Valley	1	-	.50-0.75/1.25-1.75	0.59	0.51-0.75	-	-	-	-	Hit
08/17/22	Southeast Valley	1	-	.50-0.75/1.25-1.75	0.16	1.26-1.50	-	-	-	-	Hit
08/18/22	Gila Bend	2	-	-	-	-	-	X	-	-	Hit
08/18/22	Gila River	2	-	-	-	-	-	-	-	-	Hit
08/18/22	Rainbow Valley	2	-	-	-	-	-	X	-	-	Hit
08/18/22	West Valley	2	-	-	-	-	-	-	X	-	Hit
08/18/22	Northwest Valley	2	-	-	-	-	-	-	X	-	Hit
08/18/22	Palo Verde	2	-	-	-	-	-	X	X	-	Hit
08/18/22	Upper Centennial	2	-	-	-	-	-	-	-	-	Hit
08/18/22	Wickenburg	2	-	-	-	-	-	X	X	-	Hit
08/18/22	New River/Cave Creek	2	-	-	-	-	-	X	X	-	Hit
08/18/22	Phoenix North	2	-	-	-	-	-	X	X	X	Hit
08/18/22	Phoenix South	2	-	-	-	-	-	-	-	-	Hit
08/18/22	Scottsdale North	2	-	-	-	-	-	X	-	-	Hit
08/18/22	Scottsdale South	2	-	-	-	-	-	-	-	-	Hit
08/18/22	East Valley	2	-	-	-	-	-	-	-	-	Hit
08/18/22	Southeast Valley	2	-	-	-	-	-	-	-	-	Hit
08/18/22	Superstition	2	-	-	-	-	-	-	-	-	Hit
08/18/22	Lower Salt River Lakes	2	-	-	-	-	-	-	-	-	Miss
08/18/22	Wickenburg	1	-	.50-0.75/1.25-1.75	0.87	1.26-1.50	-	-	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2022

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
08/18/22	Upper Centennial	1	-	.50-0.75/1.25-1.75	1.14	1.51-2.00	-	-	-	-	Hit
08/18/22	New River/Cave Creek	1	-	.50-0.75/1.25-1.75	2.24	2.01-2.50	-	X	X	-	Hit
08/18/22	Scottsdale North	1	-	.50-0.75/1.25-1.75	1.06	1.51-2.00	-	-	-	-	Hit
08/18/22	Superstition	1	-	.50-0.75/1.25-1.75	0.63	1.01-1.25	0.50	-	-	-	Hit
08/18/22	Phoenix North	1	-	0.75-1.00/1.50-2.00	1.22	1.51-2.00	-	-	X	-	Hit
08/18/22	Palo Verde	1	-	0.75-1.00/1.50-2.00	0.94	1.26-1.50	-	X	-	-	Hit
08/18/22	New River/Cave Creek	3	-	-	2.40	2.01-2.50	-	X	X	-	Hit
08/18/22	Phoenix South	1	-	0.50-0.75/1.00-1.25	0.94	1.51-2.00	-	-	-	-	Hit
08/19/22	Superstition	1	-	0.50-1.00/1.25-1.50	1.42	2.51-3.00	-	-	-	-	Hit
08/19/22	East Valley	1	-	0.50-1.00/1.25-1.50	0.47	1.51-2.00	1.00	-	-	-	Hit
08/19/22	Southeast Valley	1	-	0.50-1.00/1.25-1.50	1.14	2.01-2.50	-	-	-	-	Hit
08/19/22	Scottsdale North	1	-	0.50-1.00/1.25-1.50	1.42	2.51-3.00	1.03	X	-	-	Hit
08/19/22	Gila River	1	-	0.50-1.00/1.25-1.50	0.08	1.26-1.50	-	-	-	-	Hit
08/19/22	Scottsdale South	1	-	0.50-1.00/1.25-1.50	0.63	1.01-1.25	-	-	-	-	Hit
08/19/22	Scottsdale South	1U	-	-	-	-	-	-	-	-	-
08/19/22	Gila Bend	1	-	0.50-1.00/1.25-1.50	0.75	2.01-2.50	-	-	-	-	Hit
08/19/22	New River/Cave Creek	3	-	-	1.57	2.51-3.00	-	X	X	-	Hit
08/19/22	Phoenix North	1	-	0.50-1.00/1.25-1.50	0.59	1.51-2.00	-	-	-	X	Hit
08/19/22	Phoenix South	1	-	0.50-1.00/1.25-1.50	0.16	0.76-1.00	-	-	-	-	Hit
08/19/22	Northwest Valley	1	-	0.50-1.00/1.25-1.50	0.59	0.76-1.00	-	-	-	-	Hit
08/19/22	Wickenburg	1	-	0.50-1.00/1.25-1.50	1.18	1.25-1.50	-	X	X	-	Hit
08/19/22	Wickenburg	3	-	-	1.18	1.25-1.50	-	X	X	-	Hit
08/19/22	Palo Verde	1	-	0.50-1.00/1.25-1.50	1.65	2.51-3.00	-	X	X	-	Hit
08/19/22	Upper Centennial	1	-	0.50-1.00/1.25-1.50	0.75	2.01-2.50	-	-	-	-	Hit
08/19/22	Upper Centennial	3	-	-	0.79	2.01-2.50	-	-	-	-	Hit
08/20/22	Superstition	1	-	0.50-1.00/1.25-1.50	0.91	2.51-3.00	-	-	-	-	Hit
08/20/22	Wickenburg	1	-	0.75-1.00/1.25-1.75	0.51	1.51-2.00	-	-	X	-	Hit
08/20/22	Northwest Valley	1	-	0.50-1.00/1.25-1.50	1.22	1.26-1.50	-	-	X	-	Hit
08/20/22	New River/Cave Creek	1	-	0.50-1.00/1.25-1.50	1.06	1.26-1.50	-	-	-	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2022

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
08/20/22	West Valley	1	-	0.50-1.00/1.25-1.50	0.71	1.51-2.00	-	-	X	-	Hit
08/20/22	Phoenix North	1	-	0.50-1.00/1.25-1.50	0.39	0.76-1.00	-	X	-	-	Hit
08/20/22	Northwest Valley	1U	-	-	-	-	-	-	-	-	-
08/20/22	Phoenix South	1	-	0.50-1.00/1.25-1.50	0.55	1.01-1.25	-	-	-	-	Hit
08/20/22	Rainbow Valley	1	-	0.50-1.00/1.25-1.50	0.98	0.76-1.00	-	X	-	-	Hit
08/20/22	Gila River	1	-	0.50-0.75/1.00-1.50	0.00	0.76-1.00	-	-	-	-	Hit
08/20/22	Upper Centennial	1	-	0.50-0.75/1.00-1.50	0.79	2.01-2.50	-	-	-	-	Hit
08/20/22	Gila Bend	1	-	0.50-0.75/1.00-1.50	0.79	2.01-2.50	-	X	-	-	Hit
08/21/22	Wickenburg	3	-	-	1.14	1.51-2.00	-	X	X	-	Hit
08/21/22	Palo Verde	1	-	0.50-0.75/1.00-1.50	0.31	0.51-0.75	-	-	-	-	Hit
08/21/22	New River/Cave Creek	1	-	0.50-0.75/1.00-1.50	0.98	1.26-1.50	0.50	X	X	-	Hit
08/21/22	Scottsdale North	1	-	0.50-0.75/1.00-1.50	0.63	1.01-1.25	-	-	-	-	Hit
08/21/22	New River/Cave Creek	1U	-	-	-	-	-	-	-	-	-
08/21/22	Scottsdale South	1	-	0.50-0.75/1.00-1.50	0.63	1.01-1.25	-	-	X	-	Hit
08/21/22	Phoenix South	1	-	0.50-0.75/1.00-1.50	0.28	0.51-0.75	-	-	-	-	Hit
08/21/22	East Valley	1	-	0.50-0.75/1.00-1.50	0.51	0.51-0.75	1.04	-	-	-	Hit
08/21/22	Upper Centennial	1	-	0.50-0.75/1.00-1.25	0.28	0.76-1.00	-	-	-	-	Hit
08/21/22	Wickenburg	1	-	0.50-0.75/1.00-1.25	0.31	0.51-0.75	-	-	X	-	Hit
08/23/22	Superstition	1	-	0.50-1.00/1.25-1.50	0.43	0.51-0.75	-	-	-	-	Hit
08/23/22	East Valley	1	-	0.50-1.00/1.25-1.50	0.28	0.26-0.50	-	-	-	-	Miss
08/23/22	Scottsdale South	1	-	0.50-1.00/1.25-1.50	0.20	0.26-0.50	-	-	-	-	Miss
08/23/22	Phoenix North	1	-	0.50-0.75/1.00-1.25	0.47	0.51-0.75	-	-	X	-	Hit
08/23/22	Phoenix South	1	-	0.50-0.75/1.00-1.25	0.08	0.26-0.50	-	-	-	-	Miss
08/23/22	West Valley	1	-	0.50-0.75/1.00-1.25	0.47	2.01-2.50	-	-	-	-	Hit
08/23/22	Wickenburg	1	-	0.50-0.75/1.25-1.50	0.39	0.51-0.75	-	-	-	-	Hit
08/23/22	Upper Centennial	1	-	0.50-0.75/1.25-1.50	0.75	2.01-2.50	-	-	-	-	Hit
08/24/22	Upper Centennial	1	-	0.50-0.75/1.25-1.50	0.71	1.26-1.50	-	-	-	-	Hit
09/02/22	Scottsdale North	1	-	0.33-0.50/0.75-1.00	0.08	0.76-1.00	-	-	-	-	Hit
09/02/22	Wickenburg	1	-	0.33-0.50/0.75-1.00	1.93	2.01-2.50	-	X	X	-	Hit

TABLE B-2: MSP Statements Issued - Monsoon Season 2022

Statement Details			Forecast Rain		Rain Observations (in)			Alarms			Verification
Date	MSP Forecast Zone	Message	Intensity (in/min)	STP (in)	ALERT	GAQPE	LSRs	Rain	Stream	Dam	Hit/Miss
09/02/22	Southeast Valley	1	-	0.33-0.50/0.75-1.00	0.12	0.26-0.50	-	-	-	-	Miss
09/02/22	Upper Centennial	1	-	0.33-0.50/0.75-1.00	1.02	1.01-1.25	-	-	-	-	Hit
09/02/22	Wickenburg	3	-	-	1.93	2.01-2.05	-	X	X	-	Hit
09/09/22	Palo Verde	1	-	0.33-0.50/0.75-1.00	0.20	1.26-1.50	-	-	-	-	Hit
09/09/22	Rainbow Valley	1	-	0.50-0.75/1.00-1.50	0.91	2.51-3.00	-	X	X	-	Hit
09/11/22	Gila River	1	-	0.33-0.50/0.75-1.00	0.59	0.76-1.00	-	-	-	-	Hit
09/11/22	Southeast Valley	1	-	0.33-0.50/0.75-1.00	1.26	1.51-2.00	1.00	-	-	-	Hit
09/11/22	Phoenix South	1	-	0.33-0.50/0.75-1.00	0.87	1.51-2.00	-	-	-	-	Hit
09/11/22	Scottsdale South	1	-	0.33-0.50/0.75-1.00	1.02	1.51-2.00	-	-	-	-	Hit
09/11/22	East Valley	1	-	0.33-0.50/0.75-1.00	1.06	1.51-2.00	-	X	-	-	Hit
09/11/22	Superstition	1	-	0.33-0.50/0.75-1.00	0.83	1.26-1.50	-	X	-	-	Hit
09/11/22	Rainbow Valley	1	-	0.33-0.50/0.75-1.00	0.12	0.76-1.00	-	-	-	-	Hit
09/11/22	Phoenix North	1	-	0.33-0.50/0.75-1.00	0.79	1.01-1.25	0.85	X	X	X	Hit
09/11/22	Scottsdale North	1	-	0.33-0.50/0.75-1.00	0.94	0.76-1.00	-	-	-	-	Hit
09/11/22	New River/Cave Creek	1	-	0.33-0.50/0.75-1.00	0.51	0.76-1.00	-	-	-	-	Hit
09/21/22	Northwest Valley	1	-	0.75-1.50/2.25	1.18	1.26-1.50	-	X	-	-	Hit
09/21/22	West Valley	1	-	0.75-1.50/2.25	1.69	1.51-2.00	-	X	-	-	Hit
09/21/22	Northwest Valley	1U	-	-	-	-	-	-	-	-	-
09/21/22	West Valley	1U	-	-	-	-	-	-	-	-	-
09/21/22	Gila Bend	1	-	0.75-1.50/2.25	1.93	2.01-2.50	-	X	-	-	Hit
09/22/22	Upper Centennial	1	-	0.75-1.50/2.25	0.63	1.51-2.00	-	-	-	-	Hit
09/23/22	New River/Cave Creek	1	-	0.33-0.50/0.75-1.00	1.85	2.01-2.50	-	X	-	-	Hit
09/23/22	East Valley	1	-	0.50-1.00/1.50	0.24	1.01-1.25	-	X	-	-	Hit
09/23/22	Southeast Valley	1	-	0.50-1.00/1.50	0.87	1.01-1.25	-	X	-	-	Hit
09/28/22	Southeast Valley	1	-	0.50-1.00/1.50	0.83	1.51-2.00	-	X	-	-	Hit
09/28/22	Gila River	1	-	0.50-1.00/1.50	0.24	0.51-0.75	-	-	-	-	Hit

TABLE B-3: This table shows the lead time data of MSP issued Messages for the 2022 Monsoon Season. The table is broken down by Statement details and lead time. The columns from left to right are defined as follows:

Statement Details – Statement information including date, issue time, forecast zone, message type, forecaster, and valid time.

Statement Lead time – The first column denotes the time when the first ALERT Alarm (rain, stream, or impoundment) was triggered if any. The second column depicts the calculated lead time based on beginning statement valid time and when the first alarm was triggered.

TABLE B-3: MSP Statement Lead Time - Monsoon Season 2022							
Statement Details						Statement Lead Time	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Alarm Triggered	Lead Time(min)
06/26/22	17:07	Phoenix South	1	Henz	Now-7pm	17:16	9
07/13/22	20:45	East Valley	1	Waters	Now-10pm	20:39	6
07/17/22	20:40	East Valley	1	Henz	Now-10pm	20:43	0
07/17/22	20:40	Scottsdale South	1	Henz	Now-10pm	21:02	22
07/26/22	0:18	West Valley	1	Henz	Now-2am	0:50	32
07/26/22	0:18	Northwest Valley	1	Henz	Now-2am	0:55	37
07/26/22	0:24	Phoenix North	1	Henz	Now-2am	0:32	8
07/27/22	11:29	Northwest Valley	1	Waters	Now-1pm	11:17	0
07/27/22	13:02	Scottsdale North	1	Henz	Now-230pm	13:18	16
07/28/22	9:20	Upper Centennial	1	Waters	Now-11am	10:00	40
07/28/22	10:30	Scottsdale South	1	Waters	Now-12pm	10:22	0
07/28/22	10:30	Scottsdale North	1	Waters	Now-12pm	10:29	0
07/28/22	11:31	Phoenix South	1	Waters	Now-1pm	11:21	0
07/28/22	11:40	Superstition	1	Waters	Now-2pm	12:13	33
07/30/22	17:34	Phoenix South	1	Henz	Now-730pm	17:47	13
07/30/22	17:53	Scottsdale North	1	Henz	Now-8pm	18:32	39
07/30/22	18:14	Phoenix North	1	Henz	Now-830pm	18:20	6
07/30/22	18:47	New River/Cave Creek	1	Henz	Now-9pm	18:56	9
08/04/22	4:37	Phoenix North	1	Henz	Now-6am	4:28	0
08/04/22	4:40	Scottsdale South	1	Henz	Now-630am	4:29	0

TABLE B-3: MSP Statement Lead Time - Monsoon Season 2022

Statement Details						Statement Lead Time	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Alarm Triggered	Lead Time(min)
08/04/22	4:48	Phoenix South	1	Henz	Now-630am	4:10	0
08/04/22	5:05	Northwest Valley	1	Henz	Now-7am	6:51	106
08/04/22	5:23	Wickenburg	1	Henz	Now-730am	5:17	0
08/07/22	18:55	Northwest Valley	1	Waters	Now-745pm	20:55	120
08/09/22	1:40	Scottsdale North	1	Henz	Now-3am	1:51	11
08/10/22	16:53	West Valley	1	Waters	Now-6pm	18:05	72
08/10/22	18:10	Northwest Valley	1	Waters	Now-730pm	19:18	68
08/12/22	14:45	Superstition	1	Waters	Now-430pm	14:37	0
08/12/22	14:54	East Valley	1	Waters	Now-430pm	15:01	7
08/12/22	15:17	Scottsdale North	1	Waters	Now-5pm	15:15	0
08/12/22	15:17	Scottsdale South	1	Waters	Now-5pm	15:43	26
08/12/22	15:17	New River/Cave Creek	1	Waters	Now-5pm	15:08	0
08/13/22	19:52	Palo Verde	1	Henz	Now-930pm	19:58	6
08/14/22	15:15	Wickenburg	1	Henz	Now-5pm	15:57	42
08/14/22	15:21	New River/Cave Creek	1	Henz	Now-5pm	15:13	0
08/14/22	15:32	Northwest Valley	1	Henz	Now-530pm	18:01	153
08/14/22	17:10	Gila Bend	1	Henz	Now-7pm	17:05	0
08/14/22	18:07	Palo Verde	1	Henz	Now-830pm	17:47	0
08/17/22	14:02	Wickenburg	1	Henz	Now-4pm	14:08	6
08/18/22	12:11	Gila Bend	2	Henz	Now-8am 8/21	8/21 12:11	1757
08/18/22	12:11	Gila River	2	Henz	Now-8am 8/21	8/21 12:11	1681
08/18/22	12:11	Rainbow Valley	2	Henz	Now-8am 8/21	8/21 12:11	3455
08/18/22	12:11	West Valley	2	Henz	Now-8am 8/21	8/21 12:11	3386
08/18/22	12:11	Northwest Valley	2	Henz	Now-8am 8/21	8/21 12:11	1812
08/18/22	12:11	Palo Verde	2	Henz	Now-8am 8/21	8/21 12:11	410
08/18/22	12:11	Upper Centennial	2	Henz	Now-8am 8/21	8/21 12:11	322
08/18/22	12:11	Wickenburg	2	Henz	Now-8am 8/21	8/21 12:11	279
08/18/22	12:11	New River/Cave Creek	2	Henz	Now-8am 8/21	8/21 12:11	328
08/18/22	12:11	Phoenix North	2	Henz	Now-8am 8/21	8/21 12:11	386

TABLE B-3: MSP Statement Lead Time - Monsoon Season 2022

Statement Details						Statement Lead Time	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Alarm Triggered	Lead Time(min)
08/18/22	12:11	Phoenix South	2	Henz	Now-8am 8/21	8/21 12:11	526
08/18/22	12:11	Scottsdale North	2	Henz	Now-8am 8/21	8/21 12:11	332
08/18/22	12:11	Scottsdale South	2	Henz	Now-8am 8/21	8/21 12:11	1693
08/18/22	12:11	East Valley	2	Henz	Now-8am 8/21	8/21 12:11	1584
08/18/22	12:11	Southeast Valley	2	Henz	Now-8am 8/21	8/21 12:11	1584
08/18/22	12:11	Superstition	2	Henz	Now-8am 8/21	8/21 12:11	358
08/18/22	17:28	New River/Cave Creek	1	Henz	Now-730pm	17:53	23
08/18/22	18:51	Palo Verde	1	Henz	Now-815pm	18:54	3
08/19/22	15:45	Scottsdale North	1	Waters	Now-5pm	15:59	14
08/19/22	18:35	Wickenburg	1	Waters	Now-830pm	18:55	20
08/19/22	19:31	Palo Verde	1	Waters	Now-9pm	20:21	50
08/20/22	18:22	Wickenburg	1	Waters	Now-830pm	19:33	71
08/20/22	19:30	Northwest Valley	1	Waters	Now-9pm	21:09	99
08/20/22	20:27	West Valley	1	Waters	Now-10pm	22:28	121
08/20/22	21:36	Rainbow Valley	1	Waters	Now-1130pm	22:00	24
08/20/22	22:26	Gila Bend	1	Waters	Now-12am	23:09	43
08/21/22	17:00	New River/Cave Creek	1	Waters	Now-8pm	17:27	27
08/21/22	17:55	Scottsdale South	1	Waters	Now-9pm	18:40	45
08/21/22	19:18	Wickenburg	1	Waters	Now-10pm	20:01	43
08/23/22	17:07	Phoenix North	1	Henz	Now-7pm	18:08	61
09/02/22	18:05	Wickenburg	1	Waters	Now-730pm	18:21	16
09/09/22	17:40	Rainbow Valley	1	Waters	Now-9pm	17:32	0
09/11/22	20:39	East Valley	1	Waters	Now-10pm	21:20	41
09/11/22	20:39	Superstition	1	Waters	Now-10pm	21:31	52
09/11/22	21:37	Phoenix North	1	Waters	Now-11pm	21:54	17
09/21/22	7:06	Northwest Valley	1	Henz	Now-10am	7:37	31
09/21/22	7:06	West Valley	1	Henz	Now-10am	6:56	0
09/21/22	13:30	Gila Bend	1	Henz	Now-330pm	13:29	0
09/23/22	16:44	New River/Cave Creek	1	Waters	Now-10pm	16:05	0

TABLE B-3: MSP Statement Lead Time - Monsoon Season 2022

Statement Details						Statement Lead Time	
Date	LST	MSP Forecast Zone	Message	Forecaster	Valid Time	Alarm Triggered	Lead Time(min)
09/23/22	18:18	East Valley	1	Henz	Now-830pm	18:11	0
09/23/22	18:18	Southeast Valley	1	Henz	Now-830pm	18:11	0
09/28/22	15:14	Southeast Valley	1	Waters	Now-430pm	14:59	15

APPENDIX C: MSP LAKE ALERTS - VERIFICATION TABLES

TABLE C-1: This table shows each of the individual MSP Lake Alerts issued during the 2022 Monsoon season. The table is broken down by statement Details, observations, and verification. The columns from left to right are defined as follows:

Statement Details – Message information including date, time issued in local standard time, lake, issuing forecaster, and valid time. Data is pulled directly from issued Message.

Observations – Rain information including forecast rainfall intensity and storm total precipitation where applicable. Data is pulled directly from issued Message. It is important to note that not all issued Messages contain forecast rainfall information (noted by an “N/A” in the table).

Lead Time – amount of lead time in minutes from when Lake Alert was issued to when first observation occurred.

Verification – Hits and misses were assigned based on thresholds previously discussed in the [MSP Verification Metrics and Criteria](#) section of this report.

TABLE C-1: MSP Lake Alerts Issued - Monsoon Season 2022									
Statement Details					Observations			Lead Time	Verification
Date	LST	Lake	Forecaster	Valid Time	Lightning	Wind > 30mph	Hail/Heavy Rain	1st Obs.	Hit/Miss
06/25/22	16:24	Bartlett	Waters	Now-530pm	X	-	-	0	Hit
06/25/22	16:45	Pleasant	Waters	Now-530pm	X	-	-	0	Hit
06/26/22	14:42	Apache	Henz	Now-430pm	X	X	X	0	Hit
06/26/22	14:42	Canyon	Henz	Now-430pm	X	X	X	8	Hit
06/26/22	14:42	Saguaro	Henz	Now-430pm	X	X	X	13	Hit
06/29/22	16:25	Saguaro	Waters	Now-515pm	X	-	X	0	Hit
06/29/22	16:25	Canyon	Waters	Now-515pm	X	-	X	0	Hit
07/01/22	19:55	Bartlett	Waters	Now-830pm	-	-	-	-	Miss
07/14/22	15:24	Pleasant	Waters	Now-5pm	-	X	-	36	Hit
07/16/22	17:03	Apache	Henz	Now-630pm	X	-	-	11	Hit
07/16/22	17:03	Canyon	Henz	Now-630pm	X	-	-	21	Hit
07/16/22	17:03	Saguaro	Henz	Now-630pm	X	X	-	41	Hit
07/16/22	17:03	Bartlett	Henz	Now-745pm	X	-	X	3	Hit

TABLE C-1: MSP Lake Alerts Issued - Monsoon Season 2022									
Statement Details					Observations			Lead Time	Verification
Date	LST	Lake	Forecaster	Valid Time	Lightning	Wind > 30mph	Hail/Heavy Rain	1st Obs.	Hit/Miss
07/27/22	12:00	Pleasant	Waters	Now-1pm	-	X	X	15	Hit
07/28/22	13:20	Bartlett	Waters	Now-3pm	-	-	X	0	Hit
07/28/22	15:45	Pleasant	Waters	Now-430pm	-	-	-	-	Miss
07/30/22	16:47	Saguaro	Henz	Now-630pm	-	X	X	58	Hit
07/30/22	16:47	Canyon	Henz	Now-630pm	-	-	-	-	Miss
07/30/22	16:47	Apache	Henz	Now-630pm	-	-	X	0	Hit
08/07/22	18:25	Pleasant	Waters	Now-730pm	-	X	-	20	Hit
08/12/22	13:20	Saguaro	Waters	Now-230pm	-	-	-	-	Miss
08/12/22	13:20	Canyon	Waters	Now-230pm	-	-	X	0	Hit
08/12/22	13:20	Apache	Waters	Now-230pm	-	-	X	0	Hit
08/12/22	14:00	Bartlett	Waters	Now-3pm	-	-	X	17	Hit
08/12/22	14:25	Horseshoe	Waters	Now-5pm	X	-	-	0	Hit
08/12/22	16:22	Pleasant	Waters	Now-6pm		X	X	0	Hit
08/14/22	14:54	Pleasant	Henz	Now-430pm	X	X	-	26	Hit
08/17/22	15:31	Pleasant	Henz	Now-5pm	X	X	-	5	Hit
08/17/22	17:20	Apache	Henz	Now-7pm	X	-	X	2	Hit
08/17/22	17:20	Canyon	Henz	Now-7pm	X	-	-	29	Hit
08/17/22	17:20	Saguaro	Henz	Now-7pm	-	-	-	-	Miss
08/18/22	16:57	Horseshoe	Henz	Now-630pm	X	-	-	25	Hit
08/18/22	16:57	Bartlett	Henz	Now-630pm	X	-	X	31	Hit
08/18/22	17:17	Canyon	Henz	Now-7pm	X	-	-	0	hit
08/18/22	17:17	Saguaro	Henz	Now-7pm	X	-	-	29	Hit
08/18/22	18:02	Pleasant	Henz	Now-745pm	-	X	X	75	Hit
08/19/22	17:40	Pleasant	Waters	Now-7pm	-	X	X	5	Hit
08/20/22	20:30	Pleasant	Waters	Now-10pm	-	X	X	0	Hit
08/21/22	16:55	Bartlett	Waters	Now-6pm	-	-	-	-	Miss
08/21/22	18:00	Pleasant	Waters	Now-8pm	-	X	-	15	Hit
09/02/22	15:30	Bartlett	Waters	Now-5pm	X	-	-	0	Hit
09/02/22	15:30	Canyon	Waters	Now-5pm	X	-	-	0	Hit

TABLE C-1: MSP Lake Alerts Issued - Monsoon Season 2022									
Statement Details					Observations			Lead Time	Verification
Date	LST	Lake	Forecaster	Valid Time	Lightning	Wind > 30mph	Hail/Heavy Rain	1st Obs.	Hit/Miss
09/02/22	15:30	Saguaro	Waters	Now-5pm	X	-	-	0	Hit
09/23/22	15:30	Pleasant	Waters	Now-430pm	X	X	X	15	Hit
09/23/22	17:06	Apache	Waters	Now-630pm	X	-	X	0	Hit
09/23/22	17:06	Canyon	Waters	Now-630pm	X	-	X	0	Hit
09/23/22	17:06	Saguaro	Waters	Now-630pm	X	-	X	0	Hit

APPENDIX E: QPF STORM TOTAL PRECIPITATION - VERIFICATION TABLES

TABLE E-1: This table shows each of the individual MSP Lake Alerts issued during the 2022 Monsoon season including the detailed forecast rainfall information. The table is broken down by statement Details, observations, and verification. The columns from left to right are defined as follows:

Statement Details – Message information including date and forecast zone. Data is pulled directly from issued Message.

Peak Storm Total Precipitation – Rain information including forecast (QPF), observed (ALERT), radar estimated (GAQPE), and local storm report total (LSR). Data is pulled directly from issued Message. Observations are gathered the ALERT database, WDT Inc radar products, and NWS local storm reports.

Error – Percent error was calculated based on Equation 4 previously discussed in the [MSP Verification Metrics and Criteria](#) section of this report.

Verification – Hits and misses were assigned based on thresholds previously discussed in the [MSP Verification Metrics and Criteria](#) section of this report.

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2022											
Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
06/26/22	Phoenix South	1.00	1.02	1.51	2.00	-	-1.96	-33.77	-50.00	-	Hit
06/26/22	East Valley	0.50	0.35	0.26	0.50	-	42.86	92.31	0.00	-	Hit
06/26/22	Southeast Valley	1.00	0.67	1.01	1.25	-	49.25	-0.99	-20.00	-	Hit
06/26/22	West Valley	0.75	0.47	0.76	1.00	-	59.57	-1.32	-25.00	-	Hit
06/29/22	Rainbow Valley	0.75	0.71	0.76	1.00	-	5.63	-1.32	-25.00	-	Hit
06/29/22	Upper Centennial	1.25	1.14	3.01	4.00	-	9.65	-58.47	-68.75	-	Hit
07/13/22	East Valley	1.25	1.26	1.51	2.00	1.18	-0.79	-17.22	-37.50	5.93	Hit
07/16/22	Superstition	0.50	0.39	0.26	0.50	-	28.21	92.31	0.00	-	Hit
07/16/22	Scottsdale North	1.25	0.94	1.26	1.50	-	32.98	-0.79	-16.67	-	Hit
07/16/22	Scottsdale South	0.50	0.00	0.11	0.25	-	-	354.55	100.00	-	Miss
07/16/22	New River/Cave Creek	0.50	0.31	0.51	0.75	-	61.29	-1.96	-33.33	-	Hit
07/17/22	East Valley	1.25	1.38	1.26	1.50	-	-9.42	-0.79	-16.67	-	Hit

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2022											
Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
07/17/22	Scottsdale South	1.25	1.42	1.51	2.00	-	-11.97	-17.22	-37.50	-	Hit
07/17/22	Phoenix North	0.75	0.24	0.51	0.75	-	212.50	47.06	0.00	-	Hit
07/17/22	Phoenix South	0.75	0.51	0.51	0.75	-	47.06	47.06	0.00	-	Hit
07/17/22	Wickenburg	1.00	0.75	0.76	1.00	-	33.33	31.58	0.00	-	Hit
07/24/22	Southeast Valley	0.50	0.51	0.11	0.25	-	-1.96	354.55	100.00	-	Hit
07/24/22	Phoenix South	0.50	0.16	0.26	0.50	0.60	212.50	92.31	0.00	-16.67	Hit
07/24/22	West Valley	0.50	0.28	0.51	0.75	-	78.57	-1.96	-33.33	-	Hit
07/24/22	Rainbow Valley	0.50	0.20	0.51	0.75	-	150.00	-1.96	-33.33	-	Hit
07/25/22	Rainbow Valley	0.75	0.87	1.26	1.50	0.50	-13.79	-40.48	-50.00	50.00	Hit
07/25/22	West Valley	0.50	0.28	0.51	0.75	-	78.57	-1.96	-33.33	-	Hit
07/25/22	East Valley	0.75	0.79	0.76	1.00	-	-5.06	-1.32	-25.00	-	Hit
07/25/22	New River/Cave Creek	1.75	2.13	2.51	3.00	-	-17.84	-30.28	-41.67	-	Hit
07/26/22	West Valley	1.75	0.59	1.26	1.50	1.94	196.61	38.89	16.67	-9.79	Hit
07/26/22	Northwest Valley	0.50	0.59	1.26	1.50	-	-15.25	-60.32	-66.67	-	Hit
07/26/22	Phoenix North	0.60	0.20	0.51	0.75	-	200.00	17.65	-20.00	-	Hit
07/27/22	Southeast Valley	1.25	0.16	1.01	1.25	-	681.25	23.76	0.00	-	Hit
07/27/22	East Valley	1.25	0.43	1.26	1.50	-	190.70	-0.79	-16.67	-	Hit
07/27/22	Northwest Valley	1.75	0.08	2.01	2.50	-	2087.50	-12.94	-30.00	-	Hit
07/27/22	Scottsdale North	1.25	1.30	1.51	2.00	-	-3.85	-17.22	-37.50	-	Hit
07/28/22	Northwest Valley	1.00	1.10	2.51	3.00	-	-9.09	-60.16	-66.67	-	Hit
07/28/22	West Valley	1.00	1.10	2.51	3.00	-	-9.09	-60.16	-66.67	-	Hit
07/28/22	Upper Centennial	1.50	2.28	2.51	3.00	-	-34.21	-40.24	-50.00	-	Miss
07/28/22	Scottsdale South	0.75	0.79	0.51	0.75	-	-5.06	47.06	0.00	-	Hit
07/28/22	Scottsdale North	1.50	1.22	1.51	2.00	-	22.95	-0.66	-25.00	-	Hit
07/28/22	Gila River	1.25	1.77	0.51	0.75	-	-29.38	145.10	66.67	-	Miss
07/28/22	Phoenix South	1.50	1.26	1.26	1.50	-	19.05	19.05	0.00	-	Hit
07/28/22	Superstition	1.50	2.64	1.51	2.00	-	-43.18	-0.66	-25.00	-	Hit
07/28/22	Scottsdale North	1.50	0.08	1.26	1.50	-	1775.00	19.05	0.00	-	Hit
07/28/22	Scottsdale South	0.50	0.00	0.51	0.75	-	-	-1.96	-33.33	-	Hit

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2022

Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
07/28/22	East Valley	0.50	0.04	0.51	0.75	-	1150.00	-1.96	-33.33	-	Hit
07/29/22	Phoenix North	1.00	1.06	0.76	1.00	-	-5.66	31.58	0.00	-	Hit
07/29/22	Gila Bend	1.50	0.20	2.01	2.50	-	650.00	-25.37	-40.00	-	Miss
07/30/22	Rainbow Valley	1.75	0.12	2.51	3.00	-	1358.33	-30.28	-41.67	-	Miss
07/30/22	Superstition	0.50	0.35	0.51	0.75	-	42.86	-1.96	-33.33	-	Hit
07/30/22	Southeast Valley	0.75	0.87	1.01	1.25	-	-13.79	-25.74	-40.00	-	Hit
07/30/22	Gila River	1.25	0.98	1.51	2.00	-	27.55	-17.22	-37.50	-	Hit
07/30/22	East Valley	1.25	0.12	1.26	1.50	-	941.67	-0.79	-16.67	-	Hit
07/30/22	Phoenix South	1.25	1.02	1.26	1.50	-	22.55	-0.79	-16.67	-	Hit
07/30/22	Scottsdale North	1.75	1.89	2.01	2.50	-	-7.41	-12.94	-30.00	-	Hit
07/30/22	Scottsdale South	0.50	0.59	1.51	2.00	-	-15.25	-66.89	-75.00	-	Hit
07/30/22	Northwest Valley	0.75	0.87	1.51	2.00	-	-13.79	-50.33	-62.50	-	Hit
07/30/22	Phoenix North	1.75	2.13	2.01	2.50	2.09	-17.84	-12.94	-30.00	-16.27	Hit
07/30/22	New River/Cave Creek	1.50	1.46	1.51	2.00	1.62	2.74	-0.66	-25.00	-7.41	Hit
07/31/22	Gila Bend	1.25	1.34	2.51	3.00	-	-6.72	-50.20	-58.33	-	Hit
08/03/22	Southeast Valley	0.50	0.20	0.26	0.50	-	150.00	92.31	0.00	-	Hit
08/04/22	Phoenix North	1.75	1.81	1.51	2.00	-	-3.31	15.89	-12.50	-	Hit
08/04/22	Scottsdale South	1.25	1.26	1.26	1.50	-	-0.79	-0.79	#VALUE!	-	Hit
08/04/22	Phoenix South	1.75	1.81	1.51	2.00	-	-3.31	15.89	-12.50	-	Hit
08/04/22	Northwest Valley	0.50	0.59	1.01	1.25	-	-15.25	-50.50	-60.00	-	Hit
08/04/22	West Valley	1.00	0.98	1.26	1.50	1.00	2.04	-20.63	-33.33	0.00	Hit
08/04/22	Wickenburg	1.50	1.22	1.51	2.00	-	22.95	-0.66	-25.00	-	Hit
08/07/22	Northwest Valley	1.00	0.94	1.51	2.00	-	6.38	-33.77	-50.00	-	Hit
08/07/22	New River/Cave Creek	0.50	0.12	0.51	0.75	-	316.67	-1.96	-33.33	-	Hit
08/07/22	Phoenix North	0.50	0.00	0.11	0.25	-	-	354.55	100.00	-	Miss
08/07/22	West Valley	1.50	1.22	1.51	2.00	-	22.95	-0.66	-25.00	-	Hit
08/09/22	Scottsdale North	1.50	1.54	1.26	1.50	-	-2.60	19.05	0.00	-	Hit
08/10/22	Upper Centennial	0.50	0.47	1.26	1.50	-	6.38	-60.32	-66.67	-	Hit
08/10/22	Wickenburg	0.50	0.51	1.26	1.50	-	-1.96	-60.32	-66.67	-	Hit

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2022

Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
08/10/22	West Valley	1.00	1.02	3.01	4.00	-	-1.96	-66.78	-75.00	-	Hit
08/10/22	Northwest Valley	0.75	0.79	1.51	2.00	-	-5.06	-50.33	-62.50	-	Hit
08/12/22	Gila Bend	1.50	0.20	2.01	2.50	-	650.00	-25.37	-40.00	-	Miss
08/12/22	Rainbow Valley	0.50	0.00	0.51	0.75	-	-	-1.96	-33.33	-	Hit
08/12/22	Superstition	1.75	1.93	2.01	3.00	0.86	-9.33	-12.94	-41.67	103.49	Hit
08/12/22	East Valley	0.75	0.63	1.01	1.25	-	19.05	-25.74	-40.00	-	Hit
08/12/22	Scottsdale North	1.50	3.07	2.01	2.50	1.85	-51.14	-25.37	-40.00	-18.92	Hit
08/12/22	Scottsdale South	1.50	2.48	2.51	3.00	-	-39.52	-40.24	-50.00	-	Miss
08/12/22	New River/Cave Creek	1.50	1.34	1.25	2.00	-	11.94	19.90	-25.00	-	Hit
08/12/22	Phoenix South	0.50	0.04	0.11	0.25	-	1150.00	354.55	100.00	-	Miss
08/12/22	Palo Verde	0.50	0.51	1.01	1.25	-	-1.96	-50.50	-60.00	-	Hit
08/12/22	Upper Centennial	1.50	1.89	2.01	2.50	-	-20.63	-25.37	-40.00	-	Hit
08/13/22	Palo Verde	0.50	0.24	0.51	0.75	-	108.33	-1.96	-33.33	-	Hit
08/14/22	Wickenburg	0.76	0.98	0.76	1.00	-	-22.45	0.00	-24.00	-	Hit
08/14/22	New River/Cave Creek	1.75	1.69	2.51	3.00	-	3.55	-30.28	-41.67	-	Hit
08/14/22	Northwest Valley	1.25	1.10	1.51	2.00	-	13.64	-17.22	-37.50	-	Hit
08/14/22	West Valley	0.75	0.63	1.01	1.25	-	19.05	-25.74	-40.00	-	Hit
08/14/22	Rainbow Valley	0.50	0.51	2.01	2.50	-	-1.96	-75.12	-80.00	-	Hit
08/14/22	Phoenix South	1.25	0.31	1.01	1.25	-	303.23	23.76	0.00	-	Hit
08/14/22	Gila River	1.25	0.20	1.01	1.25	-	525.00	23.76	0.00	-	Hit
08/14/22	Gila Bend	1.25	1.22	1.51	2.00	-	2.46	-17.22	-37.50	-	Hit
08/14/22	Palo Verde	1.25	1.22	2.01	2.50	-	2.46	-37.81	-50.00	-	Hit
08/17/22	Wickenburg	1.50	2.09	2.50	3.00	-	-28.23	-40.00	-50.00	-	Miss
08/17/22	West Valley	0.50	0.59	0.51	0.75	-	-15.25	-1.96	-33.33	-	Hit
08/17/22	Southeast Valley	1.25	0.16	1.26	1.50	-	681.25	-0.79	-16.67	-	Hit
08/18/22	Wickenburg	0.75	0.87	1.26	1.50	-	-13.79	-40.48	-50.00	-	Hit
08/18/22	Upper Centennial	1.25	1.14	1.51	2.00	-	9.65	-17.22	-37.50	-	Hit
08/18/22	New River/Cave Creek	1.75	2.24	2.01	2.50	-	-21.88	-12.94	-30.00	-	Hit
08/18/22	Scottsdale North	1.25	1.06	1.51	2.00	-	17.92	-17.22	-37.50	-	Hit

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2022

Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
08/18/22	Superstition	0.75	0.63	1.01	1.25	0.50	19.05	-25.74	-40.00	50.00	Hit
08/18/22	Phoenix North	1.00	1.22	1.51	2.00	-	-18.03	-33.77	-50.00	-	Hit
08/18/22	Palo Verde	1.00	0.94	1.26	1.50	-	6.38	-20.63	-33.33	-	Hit
08/18/22	Phoenix South	1.00	0.94	1.51	2.00	-	6.38	-33.77	-50.00	-	Hit
08/19/22	Superstition	1.50	1.42	2.51	3.00	-	5.63	-40.24	-50.00	-	Hit
08/19/22	East Valley	0.50	0.47	1.51	2.00	1.00	6.38	-66.89	-75.00	-50.00	Hit
08/19/22	Southeast Valley	1.25	1.14	2.01	2.50	-	9.65	-37.81	-50.00	-	Hit
08/19/22	Scottsdale North	1.50	1.42	2.51	3.00	1.03	5.63	-40.24	-50.00	45.63	Hit
08/19/22	Gila River	1.25	0.08	1.26	1.50	-	1462.50	-0.79	-16.67	-	Hit
08/19/22	Scottsdale South	1.00	0.63	1.01	1.25	-	58.73	-0.99	-20.00	-	Hit
08/19/22	Gila Bend	0.75	0.75	2.01	2.50	-	0.00	-62.69	-70.00	-	Hit
08/19/22	Phoenix North	0.50	0.59	1.51	2.00	-	-15.25	-66.89	-75.00	-	Hit
08/19/22	Phoenix South	1.00	0.16	0.76	1.00	-	525.00	31.58	0.00	-	Hit
08/19/22	Northwest Valley	0.50	0.59	0.76	1.00	-	-15.25	-34.21	-50.00	-	Hit
08/19/22	Wickenburg	1.25	1.18	1.25	1.50	-	5.93	0.00	-16.67	-	Hit
08/19/22	Palo Verde	1.50	1.65	2.51	3.00	-	-9.09	-40.24	-50.00	-	Hit
08/19/22	Upper Centennial	0.75	0.75	2.01	2.50	-	0.00	-62.69	-70.00	-	Hit
08/20/22	Superstition	1.00	0.91	2.51	3.00	-	9.89	-60.16	-66.67	-	Hit
08/20/22	Wickenburg	1.75	0.51	1.51	2.00	-	243.14	15.89	-12.50	-	Hit
08/20/22	Northwest Valley	1.25	1.22	1.26	1.50	-	2.46	-0.79	-16.67	-	Hit
08/20/22	New River/Cave Creek	1.00	1.06	1.26	1.50	-	-5.66	-20.63	-33.33	-	Hit
08/20/22	West Valley	0.75	0.71	1.51	2.00	-	5.63	-50.33	-62.50	-	Hit
08/20/22	Phoenix North	1.00	0.39	0.76	1.00	-	156.41	31.58	0.00	-	Hit
08/20/22	Phoenix South	0.50	0.55	1.01	1.25	-	-9.09	-50.50	-60.00	-	Hit
08/20/22	Rainbow Valley	1.00	0.98	0.76	1.00	-	2.04	31.58	0.00	-	Hit
08/20/22	Gila River	0.75	0.00	0.76	1.00	-	-	-1.32	-25.00	-	Hit
08/20/22	Upper Centennial	0.75	0.79	2.01	2.50	-	-5.06	-62.69	-70.00	-	Hit
08/20/22	Gila Bend	0.75	0.79	2.01	2.50	-	-5.06	-62.69	-70.00	-	Hit
08/21/22	Palo Verde	0.50	0.31	0.51	0.75	-	61.29	-1.96	-33.33	-	Hit

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2022

Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
08/21/22	New River/Cave Creek	1.00	0.98	1.26	1.50	0.50	2.04	-20.63	-33.33	100.00	Hit
08/21/22	Scottsdale North	1.00	0.63	1.01	1.25	-	58.73	-0.99	-20.00	-	Hit
08/21/22	Scottsdale South	1.00	0.63	1.01	1.25	-	58.73	-0.99	-20.00	-	Hit
08/21/22	Phoenix South	0.50	0.28	0.51	0.75	-	78.57	-1.96	-33.33	-	Hit
08/21/22	East Valley	0.50	0.51	0.51	0.75	1.04	-1.96	-1.96	-33.33	-51.92	Hit
08/21/22	Upper Centennial	0.75	0.28	0.76	1.00	-	167.86	-1.32	-25.00	-	Hit
08/21/22	Wickenburg	0.50	0.31	0.51	0.75	-	61.29	-1.96	-33.33	-	Hit
08/23/22	Superstition	0.50	0.43	0.51	0.75	-	16.28	-1.96	-33.33	-	Hit
08/23/22	East Valley	0.50	0.28	0.26	0.50	-	78.57	92.31	0.00	-	Hit
08/23/22	Scottsdale South	0.50	0.20	0.26	0.50	-	150.00	92.31	0.00	-	Hit
08/23/22	Phoenix North	0.50	0.47	0.51	0.75	-	6.38	-1.96	-33.33	-	Hit
08/23/22	Phoenix South	0.50	0.08	0.26	0.50	-	525.00	92.31	0.00	-	Hit
08/23/22	West Valley	0.50	0.47	2.01	2.50	-	6.38	-75.12	-80.00	-	Hit
08/23/22	Wickenburg	0.50	0.39	0.51	0.75	-	28.21	-1.96	-33.33	-	Hit
08/23/22	Upper Centennial	0.75	0.75	2.01	2.50	-	0.00	-62.69	-70.00	-	Hit
08/24/22	Upper Centennial	0.75	0.71	1.26	1.50	-	5.63	-40.48	-50.00	-	Hit
09/02/22	Scottsdale North	0.75	0.08	0.76	1.00	-	837.50	-1.32	-25.00	-	Hit
09/02/22	Wickenburg	1.00	1.93	2.01	2.50	-	-48.19	-50.25	-60.00	-	Miss
09/02/22	Southeast Valley	0.50	0.12	0.26	0.50	-	316.67	92.31	0.00	-	Hit
09/02/22	Upper Centennial	1.00	1.02	1.01	1.25	-	-1.96	-0.99	-20.00	-	Hit
09/09/22	Palo Verde	1.00	0.20	1.26	1.50	-	400.00	-20.63	-33.33	-	Hit
09/09/22	Rainbow Valley	1.00	0.91	2.51	3.00	-	9.89	-60.16	-66.67	-	Hit
09/11/22	Gila River	0.50	0.59	0.76	1.00	-	-15.25	-34.21	-50.00	-	Hit
09/11/22	Southeast Valley	1.00	1.26	1.51	2.00	1.00	-20.63	-33.77	-50.00	0.00	Hit
09/11/22	Phoenix South	1.00	0.87	1.51	2.00	-	14.94	-33.77	-50.00	-	Hit
09/11/22	Scottsdale South	1.00	1.02	1.51	2.00	-	-1.96	-33.77	-50.00	-	Hit
09/11/22	East Valley	1.00	1.06	1.51	2.00	-	-5.66	-33.77	-50.00	-	Hit
09/11/22	Superstition	0.75	0.83	1.26	1.50	-	-9.64	-40.48	-50.00	-	Hit
09/11/22	Rainbow Valley	0.75	0.12	0.76	1.00	-	525.00	-1.32	-25.00	-	Hit

TABLE E-1: MSP QPF Peak Storm Total Rainfall Verification - Monsoon Season 2022											
Statement Details		Peak STP (in)					Error (%)				Verification
Date	MSP Forecast Zone	QPF	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	ALERT	GAQPE (LT)	GAQPE (UT)	LSRs	Hit/Miss
09/11/22	Phoenix North	0.75	0.79	1.01	1.25	0.85	-5.06	-25.74	-40.00	-11.76	Hit
09/11/22	Scottsdale North	1.00	0.94	0.76	1.00	-	6.38	31.58	0.00	-	Hit
09/11/22	New River/Cave Creek	0.50	0.51	0.76	1.00	-	-1.96	-34.21	-50.00	-	Hit
09/21/22	Northwest Valley	1.25	1.18	1.26	1.50	-	5.93	-0.79	-16.67	-	Hit
09/21/22	West Valley	1.50	1.69	1.51	2.00	-	-11.24	-0.66	-25.00	-	Hit
09/21/22	Gila Bend	2.00	1.93	2.01	2.50	-	3.63	-0.50	-20.00	-	Hit
09/22/22	Upper Centennial	0.75	0.63	1.51	2.00	-	19.05	-50.33	-62.50	-	Hit
09/23/22	New River/Cave Creek	1.00	1.85	2.01	2.50	-	-45.95	-50.25	-60.00	-	Miss
09/23/22	East Valley	1.00	0.24	1.01	1.25	-	316.67	-0.99	-20.00	-	Hit
09/23/22	Southeast Valley	1.00	0.87	1.01	1.25	-	14.94	-0.99	-20.00	-	Hit
09/28/22	Southeast Valley	1.00	0.83	1.51	2.00	-	20.48	-33.77	-50.00	-	Hit
09/28/22	Gila River	0.50	0.24	0.51	0.75	-	108.33	-1.96	-33.33	-	Hit
* GAQPE (Radar) estimated data given in ranges: (LT) Lower Total and (UT) Upper Total											