

**Comprehensive Agreement #1
Prescott/Prescott Valley/SRP
Monitoring/Modeling Committee
FY20 Annual Report
(July 1, 2019 – June 30, 2020)**

Introduction

The seventh annual report documents the progress of the Monitoring and Modeling Committees (Committees) established by Comprehensive Agreement #1 (CA#1). Since late 2012, the Committees have worked to implement the Data Collection and Monitoring Plan (DCMP) for the purposes of developing an improved numerical groundwater flow model of the Big Chino Sub-basin as described in the exhibits attached to CA#1. These efforts include the installation of monitoring equipment required to generate the data sets necessary for an improved groundwater flow model, to establish long-term hydrologic records, and to provide information for future adaptive management approaches in the basin. This report contains: project background, Fiscal Year 2020 (FY20) accomplishments, financial summaries, and the ongoing monitoring and modeling updates required to fully execute the CA#1 objectives. This report has been streamlined due to limitations of COVID-19.

Background

At a joint meeting on September 19, 2012, the Councils for the City of Prescott and the Town of Prescott Valley unanimously approved a comprehensive water monitoring and groundwater modeling agreement with Salt River Project and the Salt River Valley Water Users' Association (SRP) regarding the City's Big Chino Water Ranch Project. The CA#1 agreement was authorized by SRP's Board on September 10, 2012.

CA#1 evolved over two years of discussions among Prescott, Prescott Valley, and SRP ("the Parties") to implement a plan consistent with the February 11, 2010, Agreement in Principle (AIP) among the same Parties. The AIP resolved longstanding differences pertaining to water rights in the Big Chino sub-basin, set forth a framework for future agreements, and ended litigation regarding plans to pump groundwater from the Big Chino Sub-basin as authorized by Arizona state law.

CA#1 set forth a program for enhanced water monitoring and modeling of groundwater flows in the Big Chino, confirmed rights to water arising from within the Prescott Active

Management Area, and achieved a mutual agreement by all Parties not to challenge those rights. CA#1 is a long-term commitment to construct, implement, and maintain the monitoring and modeling program, with the Parties sharing in the long-term cost.

The goals of the DCMP are to:

- Improve the understanding of the hydrologic relationship between groundwater and surface water in the Upper Verde River area.
- Act as an early warning system for the Upper Verde Springs.
- Collect data that may be used to distinguish groundwater pumping from the Big Chino Water Ranch from the impacts of groundwater pumping by others, and natural system variability.
- Develop the ability to relate regional groundwater and surface water observations to future groundwater model calibration and verification.
- Determine if additional data are needed.
- Provide data for development of a numerical groundwater flow model.

Summary of Annual Accomplishments

Meetings

- Monthly meetings of the Monitoring and Modeling Committees maintained continuity during COVID-19.
- Monthly progress calls with Golder Associates (Golder)
- Stakeholder Agencies meeting (7/25/19)
- Supplemental meetings to discuss technical issues with contract holders, Specialized Technical Consultants (STC) and/or Golder

Executed Documents or Coordinated Activities

- Golder – City Contract No. 2017-246A1 (December 2019), funding increase and time extension
- USGS - City Contract No. 2017-143A4 (March 2020) a no cost extension
- ADWR – City Contract No. 2020-136 (January 2020), 7 wells equipped with monitoring equipment

Funding Contributions -All parties have completed their funding requirements to this project.

Public Information

- Kornrumpf presentation at the Arizona Hydrological Society Annual Symposium (9/27/19)

- Graser presentation at the City's WaterSmart: Drop by Drop Program (10/16/2019)
- City of Prescott website
- Town of Prescott Valley website
- SRP website <http://watershedconnection.com> that includes an overview about the CA#1 Monitoring and Modeling program.

Reports Completed

- Big Chino Sub-basin Water Monitoring Project, July 1, 2019 – June 30, 2020 Annual Report. See Appendix I
- Technical Memorandum #5 by Golder Associates, November 2019
- Technical Memorandum #6 by Golder Associates, December 2019
- Technical Memorandum #7 by Golder Associates, March 2020

Financial Summary

In accordance with CA#1, the Parties have funded the project with annual contributions to an account managed by the City of Prescott. The income for the period of this annual report (FY20) is shown in **Table 1** as Year 7. All monies have been paid into this project. It is important to note that the Communities and SRP do not have the same fiscal calendars. This project operates on a July 1st to June 30th timeframe. Further, SRP adjusted their contributions to increase their contributions in the early years of the project, but their overall project contributions total was unchanged.

A detail of expenditures for FY20 only is shown in **Table 2**. Since the CA#1 commenced, the monitoring project account balance and expenditures as of June 30, 2020 are \$1,171,684.02 and \$238,989.10, respectively. Similarly, the modeling project account balance and expenditure as of June 30, 2019 are \$565,024.04 and \$413,921.63 respectively. The overall project funds have encumbrances with ongoing contracts, but those encumbrances are not reflected in the values shown in **Table 2**.

Table 1 – Contributions by CA #1 Parties in FY19

Entity	Year 7 (FY20)		Year 6 (FY19)	
	Monitoring ¹	Modeling ¹	Monitoring	Modeling ¹
Prescott	\$0	\$0	\$114,649	\$0

Prescott Valley	\$0	\$0	\$97,271	\$0
SRP	\$0	\$0	\$105,854	\$0

¹ All Parties have completed funding requirements in accordance with City Contract No. 2013-058

Table 2 – Contract Expenditures in FY20

Monitoring		
Contractor Name, Number	Description	Amount
SRP, Contract No. 2014-001, 001A1, 001A2	New Stream Gages (Flowtography and weather equipment)	\$190,631.62
SRP, Contract No. 2014-001	Existing Stream Gages	\$5,416.70
SRP, Contract No. 2014-001	Existing Well Monitoring	\$1626.12
USGS, 2014-160, 160A1, 160A2, 160A3	Geophysics	\$25,216.67
USGS, Contract No. 2017-143, 143A1	Geochemistry	\$14,042.01
Matrix (formerly SGC, Contract No. 2016-296, 296A1	New Well Monitoring	\$2,055.98
	Monitoring Total	\$238,989.10

Modeling		
Contract Name, Number	Description	Amount
Golder Associates, Contract No. 2017- 246 and 246A1	Modeling Contract	\$413,921.63
	Modeling Total	\$413,921.63
	Combined Total	\$652,910.73

Monitoring Project - Updates

Since the commencement of this project, the CA#1 Parties and their specialized technical consultants worked with ADWR, USGS, Yavapai County Flood Control District and others to develop and monitor a network of equipment, both new and existing in the Big Chino Sub-basin. This equipment and data inventory supports the groundwater flow model that is in progress. A summary of equipment is shown in table format, by type, in Appendix II. In Appendix III, maps are available to show spatial distribution and data charts.

Groundwater Level Monitoring

- The drilling of all new monitor wells was completed in FY18.
- ADWR IGA executed for the installation of monitoring equipment in certain new wells.
- See **Appendix II** and **Appendix III, Maps 1 and 2** for ongoing water level monitoring locations and data.

Stream flow Monitoring

- The flow monitoring network remains in operation and is serviced at scheduled intervals, or as needed.
- See **Appendix I** and **Appendix III, Maps 3-5**

Weather Monitoring

- The network continued to collect a variety of weather data that will be used to help define the water budget for the Big Chino Sub-basin.

- See **Appendix III, Map 6 and 6a**

Aquifer Storage Monitoring and Geophysical Surveys

The USGS Arizona Water Science Center published two (2) Scientific Investigation Reports, see below for basic information for each.

- *Aquifer Storage Change and Storage Properties, 2010-2017, in the Big Chino Subbasin, Yavapai County, Arizona*
 - Interpreted changes in aquifer conditions through the application of microgravity techniques and groundwater-level monitoring
 - Scientific Investigations Report 2019-5060
 - <https://pubs.usgs.gov/sir/2019/5060/sir20195060.pdf>
- *Characterization of Big Chino Subbasin Hydrogeology near Paulden, Arizona, Using Controlled Source Audio-Frequency Magnetotelluric Surveys*
 - Discusses the use of geophysical and geological techniques to characterize the hydrogeology in the Big Chino subbasin for the purpose of improving the conceptual model of the aquifer
 - Scientific Investigations Report 2019-5082
 - <https://pubs.er.usgs.gov/publication/sir20195082>

Geochemical Surveys

The USGS Arizona Water Science is engaged in City Contract No. 2017-143 (and associated amendments) for geochemical data collection to improve the understandings of recharge pathways, both water and rock interactions, and residence times. This report is to be published in late September 2020. All geochemical samples were collected (FY11-18) and analyzed by USGS water quality laboratories. These data were published and publicly available on the USGS National Water Information System (NWIS). For Geochemical data, see <https://waterdata.usgs.gov/nwis>

Crop Surveys and Estimated Crop Water Use

The USGS, in contract with ADWR, conducts crop surveys in the Big Chino Sub-basin. Due to the Federal Government partial shutdown from December 22, 2018 to January 25, 2019 data compilation was delayed in previous annual reports. It was anticipated that this report would have 2018, 2019, and 2020 data; however, with COVID-19 conditions this data compilation and subsequent mapping will be absent from this report.

Modeling Project

The Big Chino Groundwater Modeling Project is an intensive 3-year effort to develop a detailed computerized groundwater model of the Big Chino Sub-basin; the contract with Golder Associates, Inc. (Golder) was executed in March 2017. In FY18, the model team focused on meeting the contract requirements related to data compilation, model domain, geologic cross-sections, and well drilling and aquifer tests. Throughout the contract period the parties' Specialized Technical Consultants (STC) worked with Golder to move data in a timely manner or convene conference calls to discuss information at key junctures. The Golder team marked several accomplishments in FY20 with the CA #1 Committee and STCs providing coordinated reviews and comments:

- Technical Memorandum #5 by Golder Associates, November 2019
TM5 documents the work conducted to create a three-dimensional geologic model of the Big Chino Sub-basin using Leapfrog™ software. This allows for visualization of the surficial geology, geologic units, borehole lithology, and other aspects of the geologic framework. The product can then be loaded directly into the numerical model for groundwater flow.
- Technical Memorandum #6 by Golder Associates, December 2019
TM6 documents the compilation and evaluation of hydrogeologic data and its use in the development of three conceptual models that will be the basis for developing the numerical model of groundwater flow in the Big Chino Sub-basin.
- Technical Memorandum #7 by Golder Associates, March 2020
TM7 defined the model domain and grid parameters, developed water use summaries, water balances, and addressed initial hydraulic property distributions for input to the numerical model.

Conclusions

The FY20 project year was primarily focused on development of the groundwater flow model. Contract Amendment #1 was necessary due to the collaborative nature of the groundwater modeling process, and the continued engagement of the STCs and Golder Associates staff as work proceeded.

Expectations for FY21 monitoring are 1) Publication of USGS Geochemistry report; 2) USGS and ADWR cooperative crop survey data collection results for June 2018 and 2019; and 3) ADWR agreement to collect water level data from monitor wells (BMW-2, BWM-3, and MW-4e). Expectations for FY21 modeling are 1) Technical Memorandum #8 (framework for model construction and calibration); and 2) Technical Memorandum #9 (Construction of numerical groundwater flow model and final report).

The project's financial condition remains strong and cost savings measures continue to be assessed and taken when possible. Communications among the Parties, with their STCs, and with the agencies will continue as the need arises.

APPENDIX I

Big Chino Sub-basin Water Monitoring Project, July 1, 2018 – June 30, 2019 Annual Report



Big Chino Sub-basin Water Monitoring Project

July 1, 2019 – June 30, 2020 Annual Report for CA1 Monitoring Committee
City of Prescott, Town of Prescott Valley, and Salt River Project

Prepared by SRP Water Measurement Staff
8-24-2020



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Cover photo credit: SRP Flowtography® at Big Chino Water Ranch on 11/29/2019 at 3:13 p.m.



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INTRODUCTION

This report has been developed for the CA1 Monitoring Committee as part of the Big Chino Sub-basin Water Monitoring Project (City Contract No. 2014-001, A1, and A2) in collaboration with the City of Prescott, Town of Prescott Valley, and Salt River Project (SRP).

A summary of flow events observed during the 2020 monitoring period (July 1, 2019 to June 30, 2020) is contained within this report.

SEASONAL FLOW SUMMARY

For this report, the 2020 annual reporting period refers to July 1, 2019 through June 30, 2020.

Surface water flow was observed at each SRP Flowtography® site during the 2020 annual reporting period. The flow event start date, an estimate of the magnitude of the flow, and the locations where surface water flow was observed are shown in Table 1 and Figure 1.

Overview of the estimated flow observed in the sub-basin during the 2020 reporting period:

- All sites experienced flow events related to winter precipitation events. Only Upper Big Chino Wash and Pine Creek experienced monsoon flow events.
- Three (3) sites including Williamson Valley Wash at XU, Lower Big Chino Wash, and Verde Headwaters at Campbell Ranch experienced flow events that exceeded the discharge rating.
- Eleven (11) separate flow events were observed at Upper Big Chino Wash, the most at any location during the monitoring period.
- Two (2) separate flow events were observed at Big Chino Wash below Partridge Creek and Lower Walnut Creek at Charney Property, all the other sites had three (3) flow events each during the monitoring period.
- The lowest estimated surface water flow volume for a single site for the 2020 annual reporting period was 30 AF observed at Pine Creek.
- The largest estimated surface water flow volume for a single site for the 2020 annual reporting period was 13,568 AF¹ at Williamson Valley Wash XU.
- The estimated total surface water flow volume for all sites in the Big-Chino sub-basin for the 2020 annual reporting period was 20,715 AF¹. Of that estimate, 20,611 AF¹ or 99% occurred after the 2019 monsoon season (from October 1, 2019 through June 30, 2020; sites not included in this estimate are Upper Walnut Creek at Forest Service, Upper Walnut Creek at Bridge, and Sullivan Dam due to not calculating discharge at those sites. Also, Partridge Creek was not included since there is no monitoring equipment located directly on the Partridge Creek channel itself).

¹ This estimated total flow volume excludes flows that exceeded the existing site discharge rating. Flows at or below this limit are included here.

TABLE 1. BIG CHINO SUB-BASIN JULY 1, 2019 – JUNE 30, 2020 FLOW EVENT SUMMARIES INCLUDING THE ESTIMATED TOTAL ACRE-FEET (AF)

Start Date ²	Upper Big Chino Wash (UBCW)	Big Chino Wash below Partridge Creek (BCWPC) ³	Partridge Creek ⁴	Pine Creek (PC)	Upper Walnut Creek at Forest Service (UWCFS) ⁵	Upper Walnut Creek at Bridge (UWCB) ⁵	Lower Walnut Creek at Charney Property (LWCCP)	Williamson Valley Wash at XU Ranch (WVWXU)	Lower Williamson Valley Wash (LWVW)	Lower Big Chino Wash (LBCW)	Sullivan Dam (SD) ⁶
7/13/2019	< 1				yes	yes					Yes
7/25/2019	5				yes	yes					yes
7/26/2019	1				yes	yes					yes
8/2/2019				12	no flow	no flow					yes
8/6/2019				19	no flow	no flow					yes
8/7/2019	< 1				no flow	no flow					yes
9/2/2019	< 1				no flow	no flow					yes
9/7/2019	1				no flow	no flow					yes
9/23/2019	19	47	28		no flow	no flow					yes
11/20/2019	8				no flow	no flow					yes
11/28/2019	54				yes	no flow					yes
11/29/2019					yes	yes		8,473 ⁷			yes
12/5/2019					yes	yes	14		84	120	yes
12/25/2019					yes	yes			1,051 ⁷	180	yes
2/2/2020					yes	yes		6			yes
3/11/2020					yes	yes		5,088 ⁷			yes
3/12/2020	1				yes	yes					yes
3/13/2020		1008	1008	4	yes	yes	52		4,098 ⁷	366	yes
3/18/2020	< 1				yes	yes					yes
Estimated Total Flow	91	1,055	1,036	35			66	13,568⁷	5,234⁷	666⁷	

² Flow events may start just prior to date indicated or continue into the following day

³ UBCW flows may be included in these numbers as the BCWPC gage is located 1.2 miles downstream

⁴ These flows were derived by subtracting the UBCW contribution from the flows at BCWPC. These are estimated flows, as there is no monitoring equipment located directly on the Partridge Creek channel itself

⁵ Surface water flow observed at this site during the reporting period. A 'yes'/'no' will indicate a visible increase in flow, 'no flow' will indicate that there was no flow at the site, and 'not visible' will indicate that it is not visible and we were unable to determine if there was flow or not at the site

⁶ Sullivan Dam spill crest is not rated for discharge measurement estimates.

⁷ This estimated total flow volume excludes flows that exceeded the existing site discharge rating. Flows at or below this limit are included here

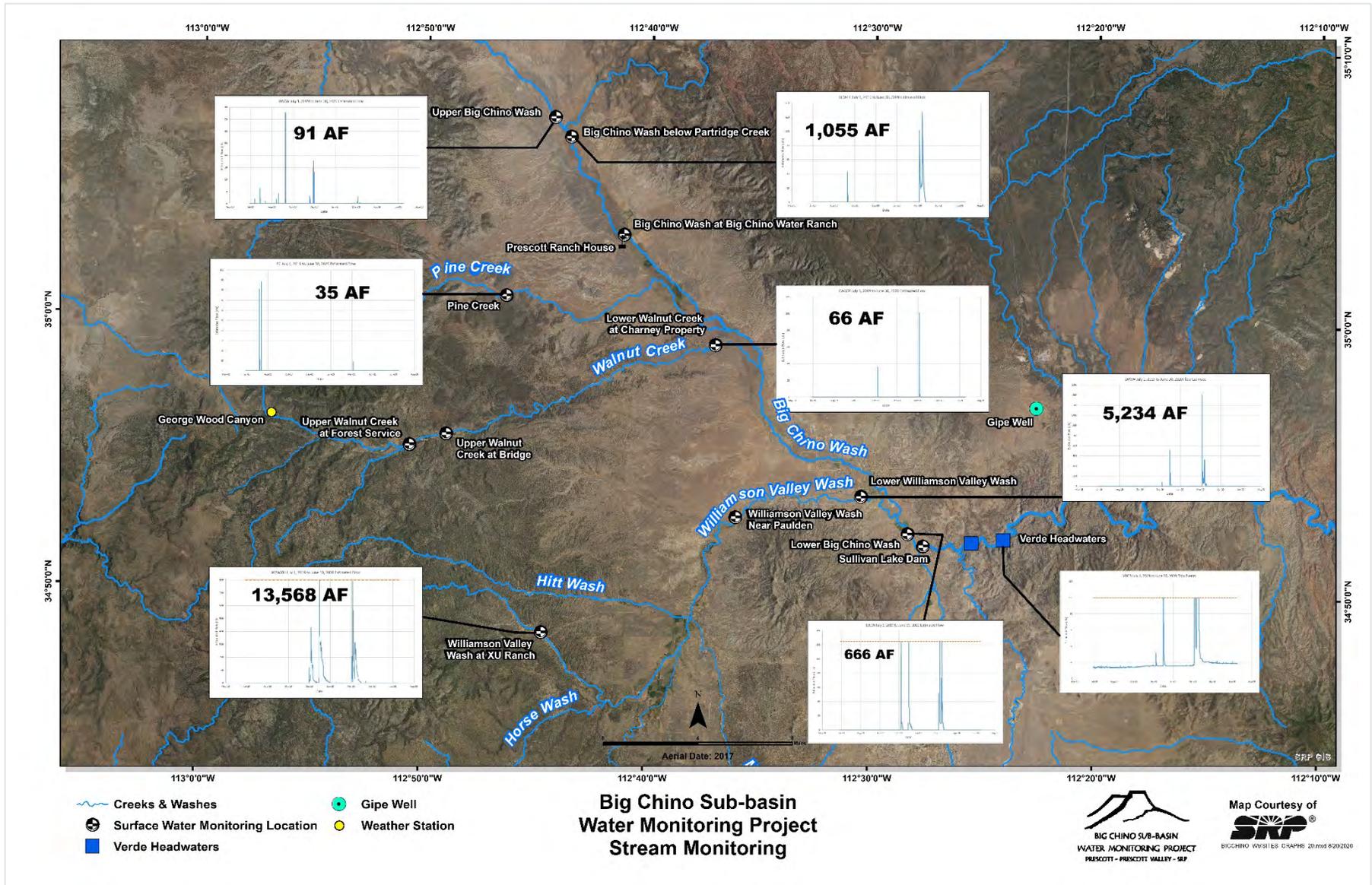


FIGURE 1. BIG CHINO SUB-BASIN MAP

LOCATION SUMMARIES

UPPER BIG CHINO WASH (UBCW)

Eleven (11) events with measurable ephemeral flow were observed at UBCW during the 2020 annual monitoring period. UBCW responded to monsoon and winter related precipitation events. Peak discharge for the year was an estimated 75 cubic feet per second (cfs) observed on 9/23/2019. The flow event on 11/28/2019 was the longest lasting, with a duration of 78.5 hours, resulting in an estimated total flow volume of 54 AF or 59% of the annual volume at the site. The total estimated volume recorded at the site for the 2020 reporting period was 91 AF. Flow events, durations, and estimated flow volumes for the annual reporting period are outlined in Table 2 and Figures 2-4.

TABLE 2. UBCW JULY 2019 – JUNE 2020 FLOW EVENTS

Start Date	Start Time ⁷	Duration ⁸ (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
7/13/2019	1:15 p.m.	4.25	0.54	4	<1
7/25/2019	11:45 a.m.	16.25	0.91	13	5
7/26/2019	10:45 a.m.	7	0.56	4	1
8/7/2019	2:45 p.m.	2.75	0.44	2	<1
9/2/2019	3:00 p.m.	2.5	0.55	4	<1
9/7/2019	4:30 p.m.	7.75	0.75	8	1
9/23/2019	9:00 p.m.	21.75	2.00	75	19
11/20/2019	6:45 a.m.	33.25	0.55	6	8
11/28/2019	7:45 p.m.	78.5	1.02	35	54
3/12/2020	10:30 p.m.	13.75	0.53	5	1
3/18/2020	2:30 p.m.	12.25	0.29	1	<1
		200 (total hours)			91 (total AF)

The UBCW was visited a total of four (4) times during the 2020 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Installed New Primary Camera Back plate
- Updated Primary Camera firmware.
- Surveyed Channel Cross Section.

⁸ Start times are approximate and actual start time are within ± 15 minutes of the noted time. Events may also continue into the next day(s).

⁹ Flow event duration is based on discharge calculated using the existing site rating.

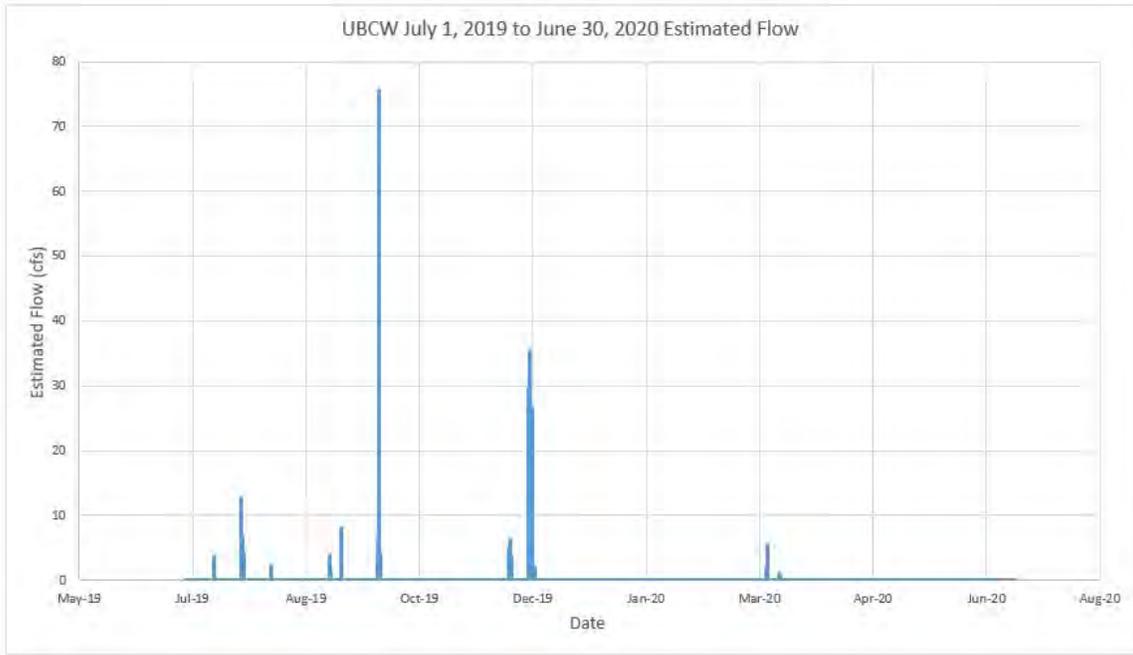


FIGURE 2. UBCW JULY 1, 2019 – JUNE 30, 2020 ANNUAL FLOW EVENTS

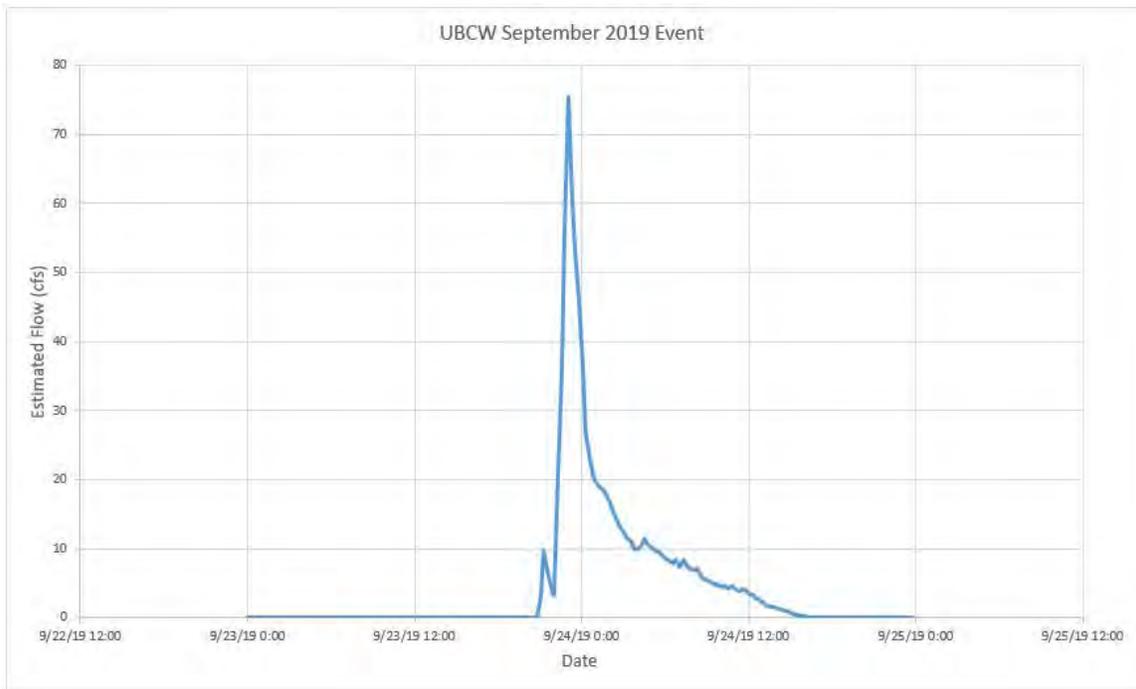


FIGURE 3. UBCW SEPTEMBER 24, 2019 FLOW EVENT

UBCW at the start of the 2020 reporting period:



Greenup after 2019 winter events:



Before Peak of 9/23/2019 flow event:



Peak of 9/23/2019 flow event:



UBCW at the end of the 2020 reporting period:



FIGURE 4. UBCW IMAGE DATA

BIG CHINO WASH BELOW PARTRIDGE CREEK (BCWPC)

Two (2) events with measurable ephemeral flow were observed at BCWPC during the 2020 annual monitoring period. BCWPC responded to monsoon and winter related precipitation events. Peak discharge for the year was an estimated 127 cfs observed on 3/13/2020. The 3/13/2020 event was the longest lasting event observed at the site for the reporting period with a duration of 361.25 hours, resulting in an estimated total flow volume of 1008 AF or 96% of the annual volume at the site. The 3/13/2020 flow event resulted in the largest estimated flow volume at 1008 AF or 96% of the annual volume at the site. The total estimated volume recorded at the site for the 2020 reporting period was 1,055 AF. BCWPC flow events, durations, and estimated volumes for the 2020 reporting period are outlined in Table 3 and Figures 5-7.

TABLE 3. BCWPC JULY 2019 – JUNE 2020 FLOW EVENTS

Start Date	Start Time ¹⁰	Duration ¹¹ (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
9/23/2019	8:45 p.m.	62.75	2.9	44	47
3/13/2020	8:45 a.m.	361.25	3.71	127	1008
		424 (total hours)			1,055 (total AF)

The BCWPC was visited a total of Three (3) times during the 2020 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Installed New Primary Camera Back plate
- Updated Primary Camera firmware.
- Surveyed Channel Cross Section.

¹⁰ Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the next day(s).

¹¹ Flow event duration is based on discharge calculated using the existing site rating.

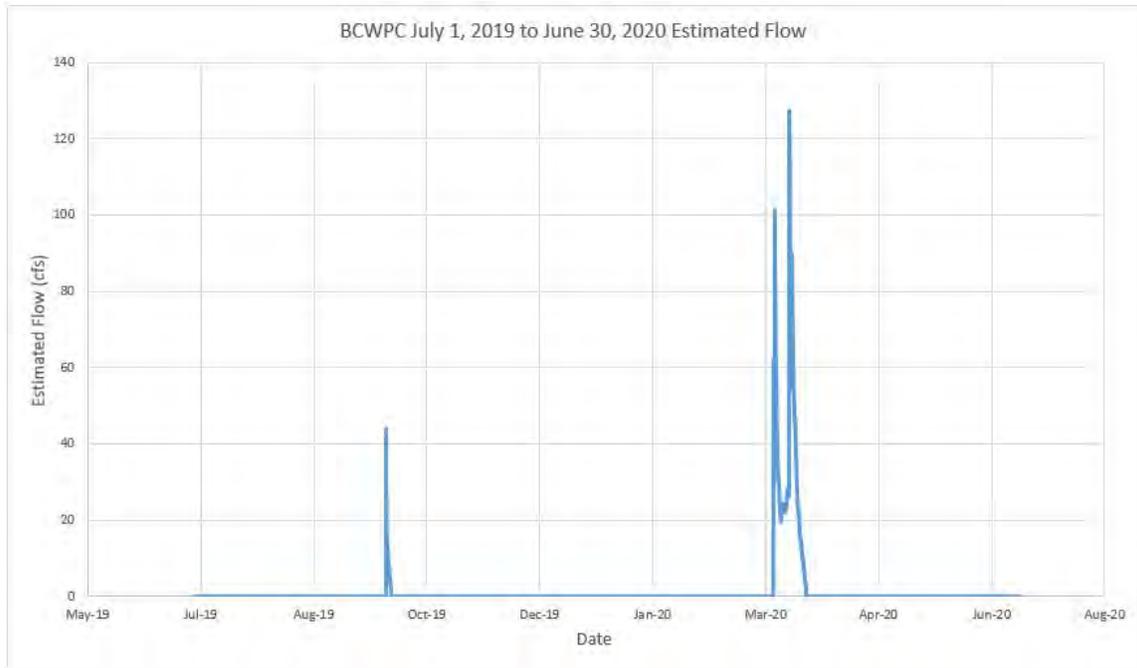


FIGURE 5. BCWPC JULY 2019 – JUNE 2020 ANNUAL FLOW EVENTS

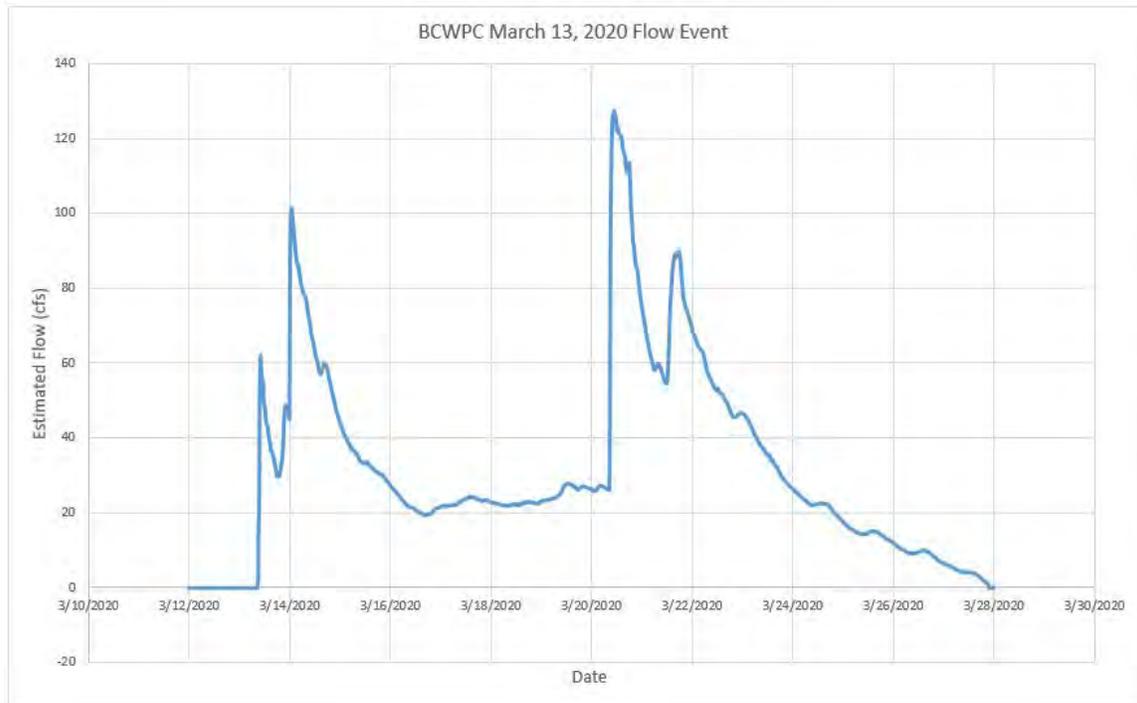


FIGURE 6. BCWPC MARCH 13, 2020 FLOW EVENT

BCWPC at the start of the 2020 reporting period:



Start of flow event on 9/24/2019:



Flow event on 3/13/2020 before peak:



Peak of flow event on 9/23/2019:



Peak of flow event on 3/20/2020:



BCWPC at the end of the 2020 reporting period:



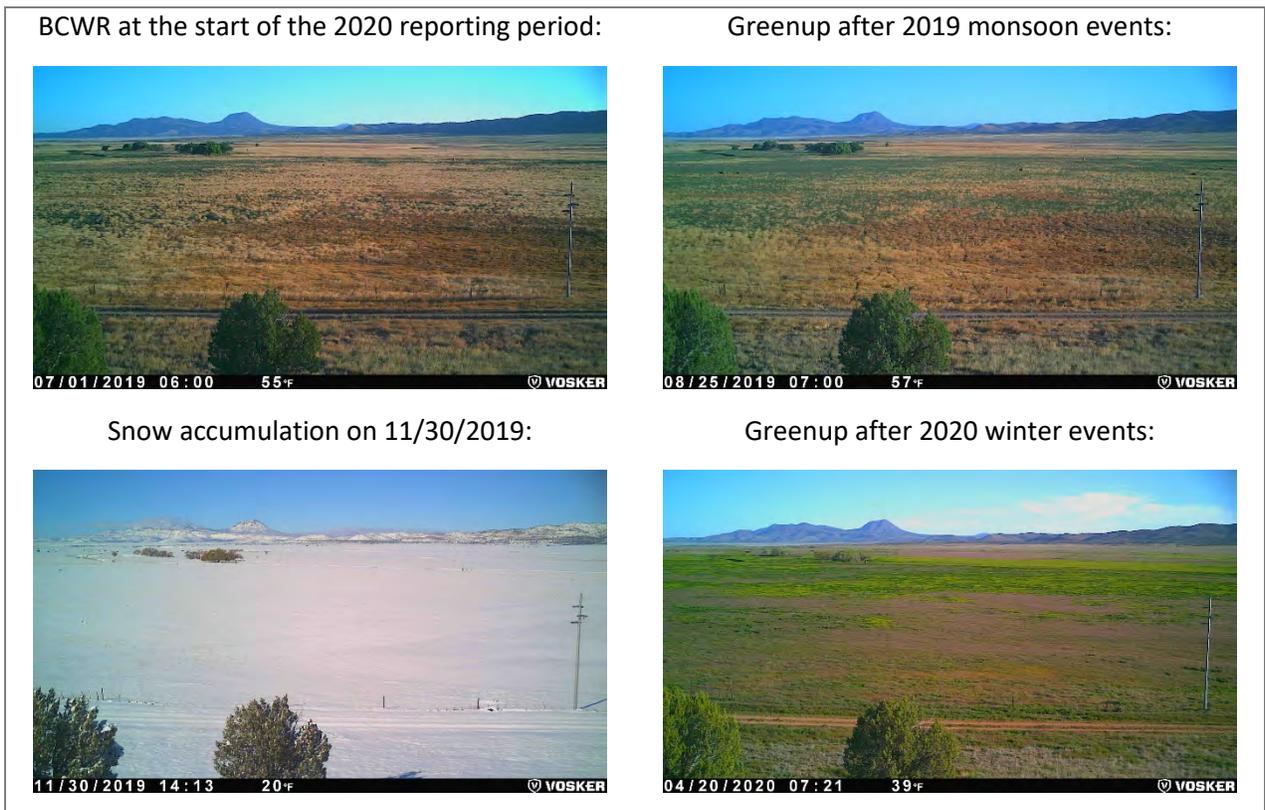
FIGURE 7. BCWPC IMAGE DATA

BIG CHINO WASH AT BIG CHINO WATER RANCH (BCWR)

Precipitation was observed at BCWR on seventy-two (72) days during the 2019 annual monitoring period. Snow accumulation was visible on Five (5) of those days. None of the observed events resulted in water pooling at the surface. BCWR site images for the annual reporting period can be seen in Figure 8 below.

The BCWR location was visited a total of four (4) times during the 2020 annual reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Installed New Primary Camera Back plate.
- Updated Primary Camera firmware.
- Performed a factory reset and configuration on the Primary camera.
- Surveyed Channel Cross Section.



BCWR at the end of the 2020 reporting period:



FIGURE 8. BCWR IMAGE DATA

PINE CREEK (PC)

Three (3) events with measurable ephemeral flow were observed at PC during the 2020 annual monitoring period. PC responded to monsoon and winter related precipitation events. The flow event on 8/06/2019 lasted for 10.75 hours and had an estimated peak stage of 1.25 feet; the peak discharge was 88 cfs. The 3/13/2020 flow event was the longest lasting event observed at the site for the reporting period with a duration of 13.5 hours, resulting in an estimated total flow volume of 4 AF or 11% of the annual volume at the site. The total estimated volume recorded at the site for the 2020 reporting period was 35 AF. PC flow events, durations, and estimated flow volumes for the annual reporting period are outlined in Table 4 and Figures 9-11.

TABLE 4. PC JULY 2019 – JUNE 2020 FLOW EVENTS

Start Date	Start Time ¹²	Duration ¹³ (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
8/2/2019	8:30 p.m.	11	1.2	81	12
8/6/2019	2:30 p.m.	10.75	1.25	88	19
3/13/2020	3:15 a.m.	13.5	0.38	9	4
		35.25 (total hours)			35 (total AF)

The PC was visited a total of three (3) times during the 2020 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Installed New Primary Camera Back plate.
- Updated Primary Camera firmware.
- Surveyed Channel Cross Section.

¹² Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the next day(s).

¹³ Flow event duration is based on discharge calculated using the existing site rating.

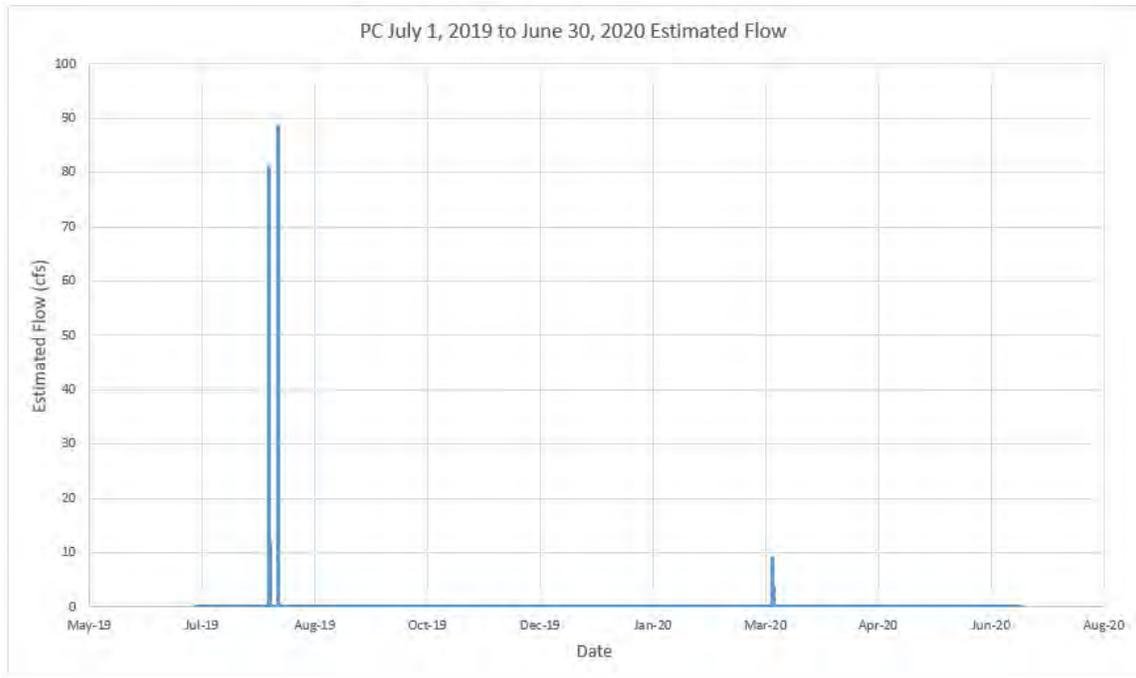


Figure 9. PC July 2019 – June 2020 Annual Flow Events

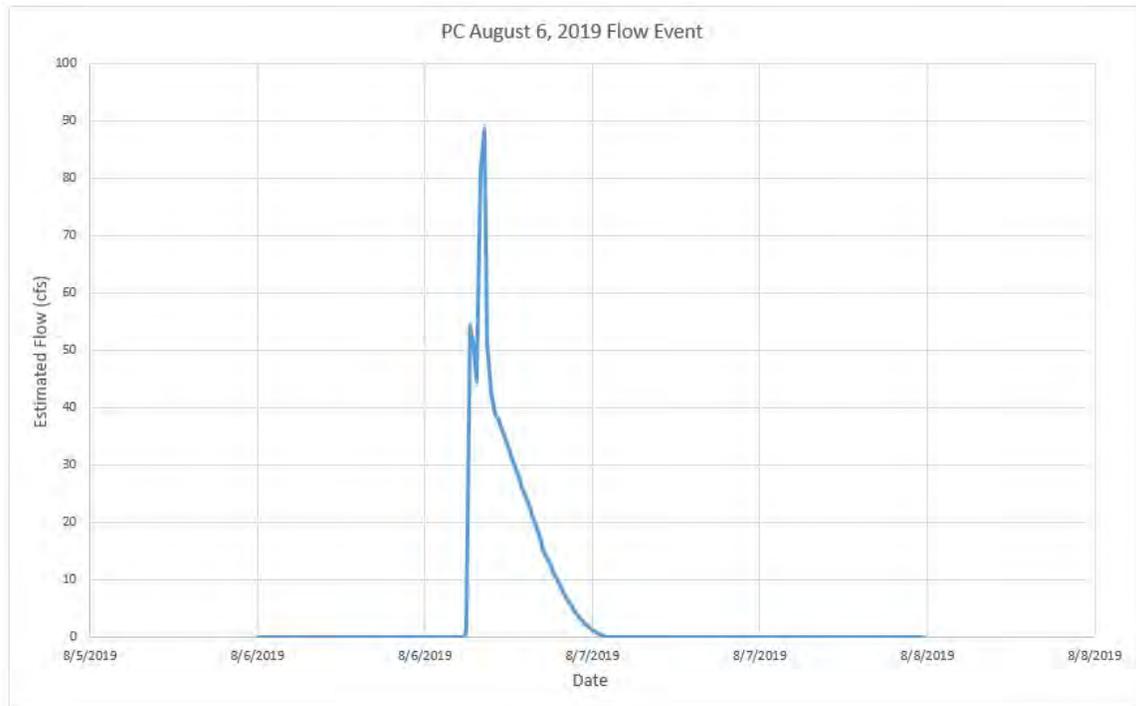


FIGURE 10. PC AUGUST 6, 2019 FLOW EVENT

PC at the start of the 2020 reporting period:



Greenup after 2019 monsoon events:



Start of flow event on 8/6/2019:



Peak of flow event on 8/6/2019:



PC at the end of the 2020 reporting period:



FIGURE 11. PC IMAGE DATA

GEORGE WOOD CANYON (GWC)

The GWC weather station collected precipitation, barometric pressure, air temperature, wind direction, peak gust, relative humidity, wind speed, and SRP Snowtopography™ images of snow depth during the 2020 annual reporting period.

Seven (7) snow events were observed during the 2020 reporting period. For five (5) of the observed events, snow depth never surpassed 0.1 feet (see Table 5). Two (2) events produced measurable snow, 11/29/2019, with a peak around 0.7' (see Figure 19) and the final event of the year on 3/18/2019, with accumulations near 0.3'. The 11/29/2019, and 12/26/2019, events each last six days. The latter event produced far less snow accumulations, but lasted multiple days to an extended period of cold temperatures.

GWC Snow accumulation and weather station data for the 2020 reporting period are outlined in Table 5 and Figures 12-19. Some observations made during the reporting period:

- 15.09" of precipitation was observed during the 2020 reporting period
- The predominant wind direction was WNW with a peak gust of 28.3 mph on 4/8/2020
- Air temperature ranged from a maximum of 93.2°F in August 2019 to a minimum of 12.2°F in February 2020

TABLE 5. GWC JULY 2019 – JUNE 2020 SNOW ACCUMULATION EVENTS

Start Date	End Date ¹⁴	Snow Visible	Peak Snow Depth
11/20/2019	11/22/2019	2 days	<0.1 feet
11/29/2019	12/4/2019	6 days	<0.7 feet
12/25/2019	12/25/2019	<1 day	<0.1 feet
12/26/2019	12/31/2019	6 days	<0.1 feet
1/9/2019	1/10/2019	<1 day	<0.1 feet
3/13/2020	3/13/2020	<1 day	<0.1 feet
3/18/2020	3/19/2020	<1 day	<0.3 feet
Totals		> 18 days	> 0.7 feet

The GWC was visited a total of four (4) times during the 2020 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Replaced camera back plate
- Updated camera firmware on primary and backup cameras

¹⁴ Snow may be visible in shaded areas after this date.

George Wood Canyon: July 2019 - June 2020

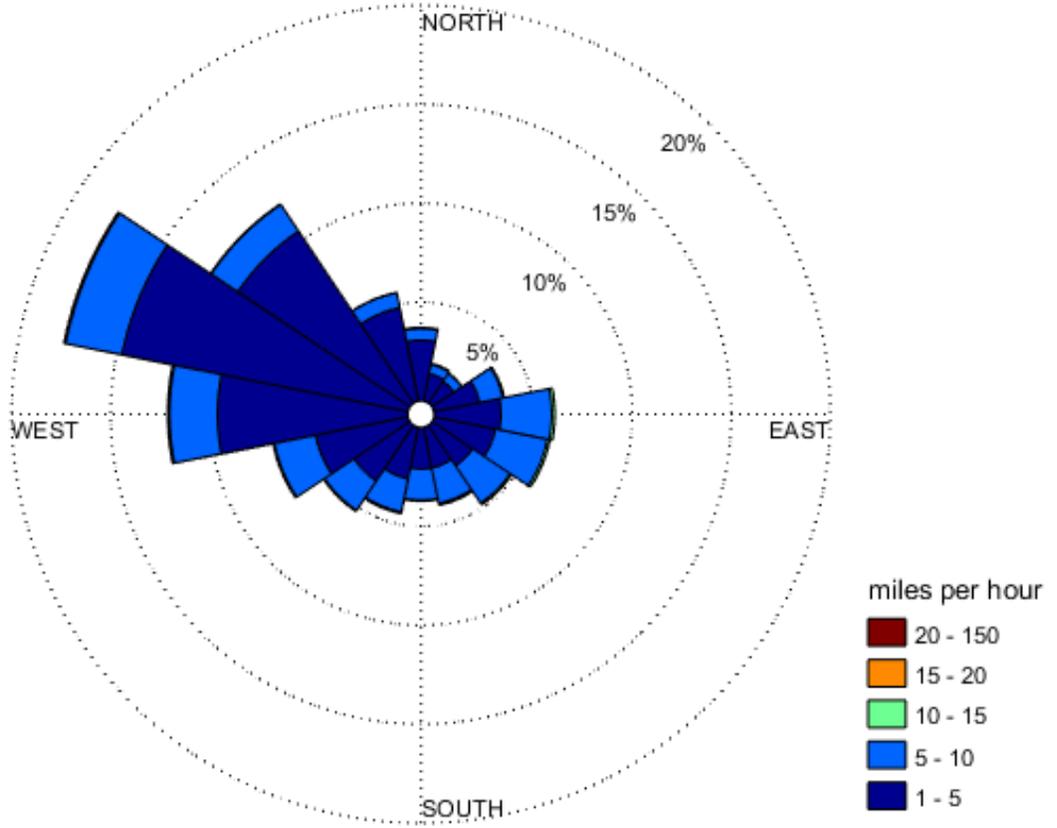


FIGURE 12. GWC JULY 2019 – JUNE 2020 WIND ROSE

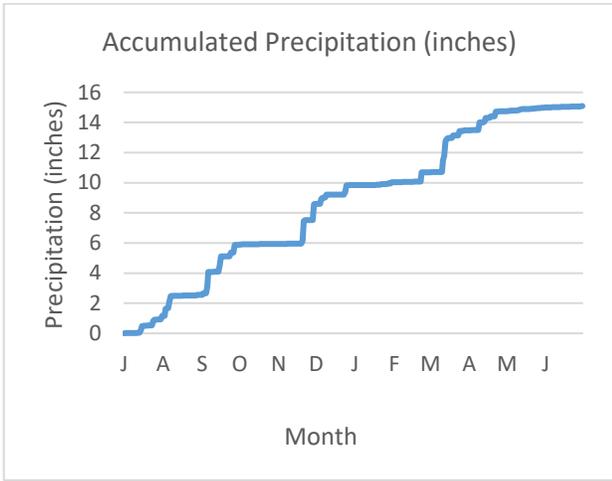


FIGURE 13. GWC JULY 1, 2019 – JUNE 30, 2020 ACCUMULATED PRECIPITATION

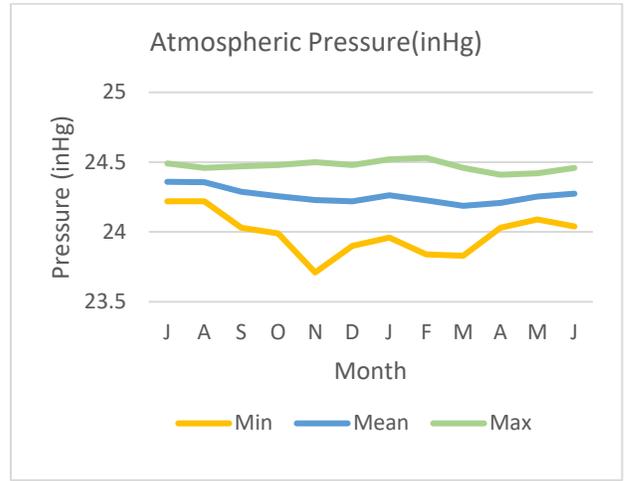


FIGURE 16. GWC JULY 1, 2019 – JUNE 30, 2020 ATMOSPHERIC PRESSURE

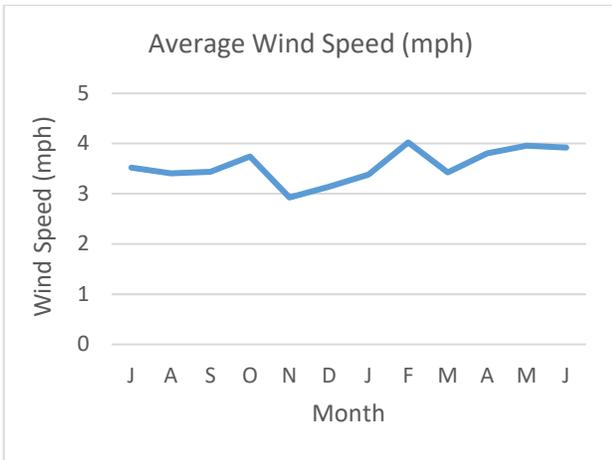


FIGURE 14. GWC JULY 1, 2019 – JUNE 30, 2020 AVERAGE WIND SPEED

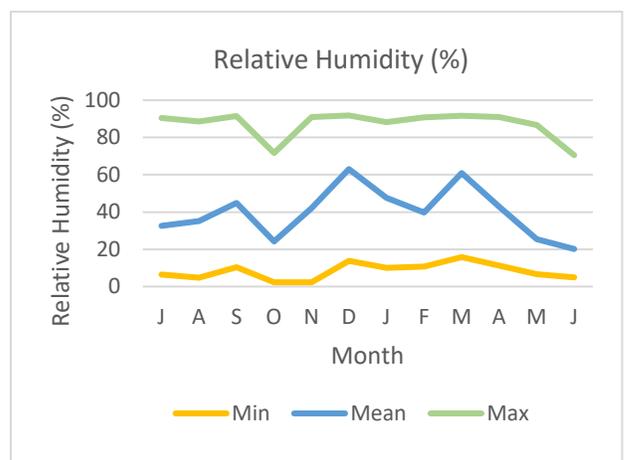


FIGURE 17. GWC JULY 1, 2019 – JUNE 30, 2020 RELATIVE HUMIDITY

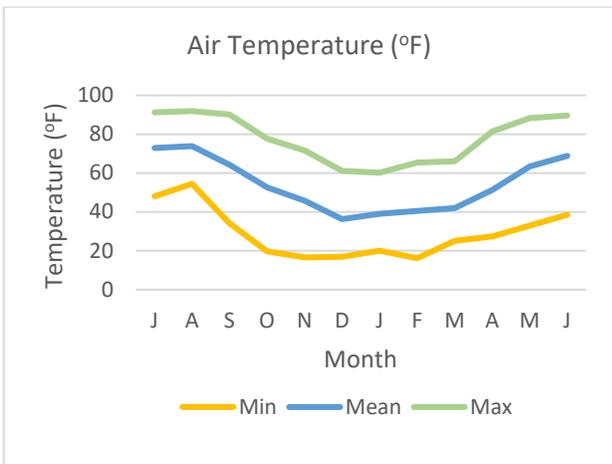


FIGURE 15. GWC JULY 1, 2019 – JUNE 2020 AIR TEMPERATURE

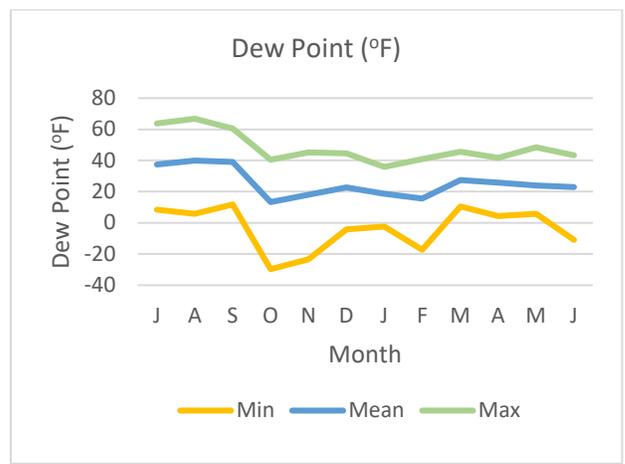


FIGURE 18. GWC JULY 1, 2019 – JUNE 30, 2020 DEW POINT

GWC at the beginning of the 2020 reporting period:



GWC at the end of the 2020 reporting period:



Snow event on 11/29/19 - 12/4/2019:



FIGURE 19. GWC IMAGE DATA

UPPER WALNUT CREEK AT FOREST SERVICE (UWCFS)

There are no estimates of flow at this site following the removal of the flume on December 22, 2016, other than visual wet/dry conditions. UWCFS site images are shown in Figure 20 below. UWCFS was dry (the site had no surface flow) from 7/28/2019 through 11/21/2019.

The UWCFS was visited a total of three (3) times during the 2020 reporting period. All site visits were for routine site service and data collection.



FIGURE 20. UWCFS IMAGE DATA

UPPER WALNUT CREEK AT BRIDGE (UWCB)

No surface water is visible at the start or the end of the 2020 annual monitoring period (see Figure 21). Maturing plant and vegetation growth block a clear view of the channel at both of these times, and for much of the reporting period.

The UWCB was visited a total of three (3) times during the 2020 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Installed New Primary Camera Back plate.
- Updated Primary Camera firmware.



FIGURE 21. UWCB IMAGE DATA

LOWER WALNUT CREEK AT CHARNEY PROPERTY (LWCCP)

Two (2) events with measurable ephemeral flow were observed at LWCCP during the 2020 annual monitoring period. LWCCP responded to monsoon and winter precipitation events. The flow event on 3/13/2020 lasted for 35.5 hours and had an estimated peak stage of 1.06 feet; the peak discharge was greater than 100 cfs. The total estimated volume recorded at the site for the 2020 reporting period was greater 66 AF. LWCCP flow events, durations, and estimated flow volumes for the annual reporting period are outlined in Table 6 and Figures 22-24.

TABLE 6. LWCCP JULY 2019 – JUNE 2020 FLOW EVENTS

Start Date	Start Time ¹⁵	Duration ¹⁶ (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
12/5/2019	4:30 a.m.	16.25	0.79	36	14
3/13/2020	7:45 a.m.	35.5	1.06	100	52
		51.75 (total hours)			66 (total AF)

The LWCCP was visited a total of four (4) times during the 2020 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Installed New Primary Camera Back plate.
- Updated Primary Camera firmware.
- Replaced Power Chord
- Surveyed Channel Cross Section.

¹⁵ Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the next day(s).

¹⁶ Flow event duration is based on discharge calculated using the existing site rating.

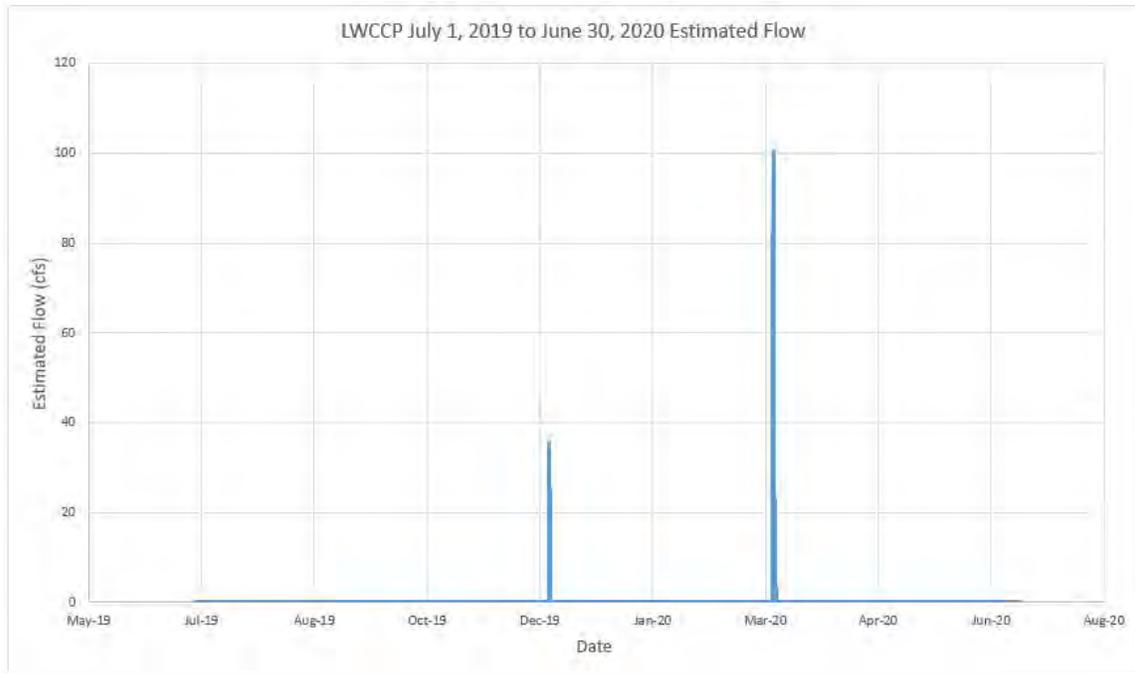


FIGURE 22. LWCCP JULY 2019 – JUNE 2020 ANNUAL FLOW EVENTS

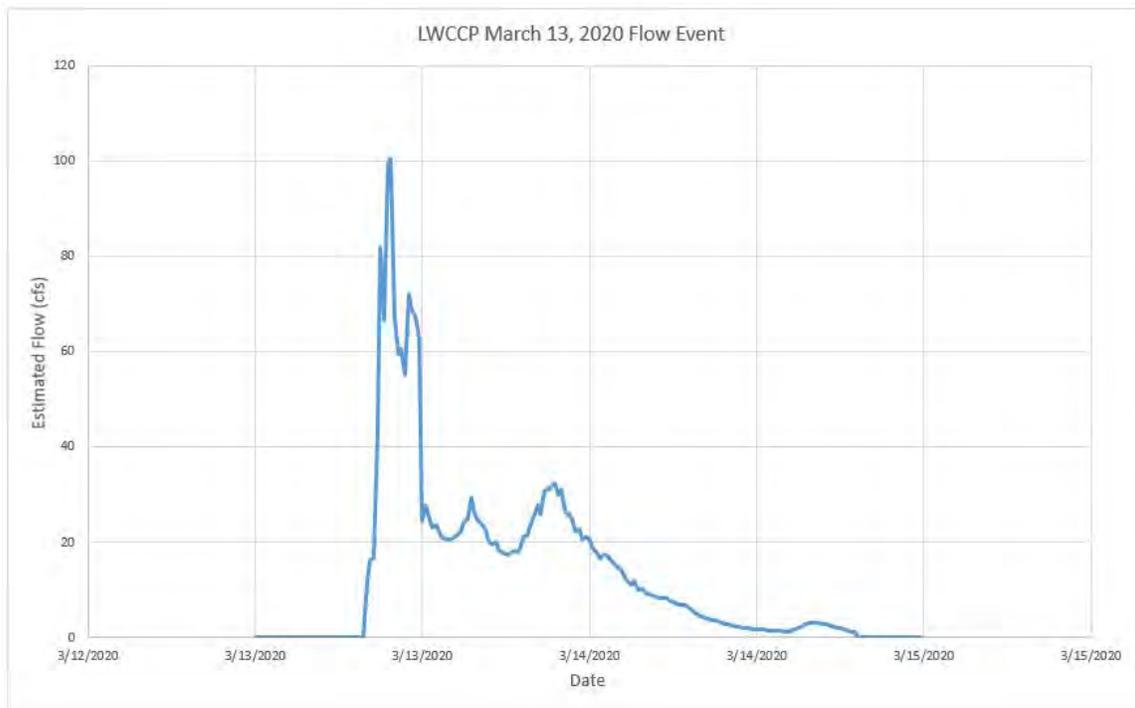


FIGURE 23. LWCCP MARCH 13, 2020 FLOW EVENT

LWCCP at the start of the 2020 reporting period:



Greenup after 2019 monsoon events:



Before the flow event on 3/13/2020:



Aftermath of peak of flow event on 3/13/2020:



LWCCP at the end of the 2020 reporting period:



FIGURE 24. LWCCP IMAGE DATA

WILLIAMSON VALLEY WASH AT XU RANCH (WVWXU)

Three (3) events with measurable ephemeral flow were observed at WVWXU during the 2020 annual monitoring period. WVWXU responded to monsoon and winter related precipitation events. Peak discharge for the year was an estimated 800¹⁹ cfs, observed on 11/29/2019. That event produced the largest estimated flow volume of 8,473²⁰ AF, or 62% of the annual volume at the site. The total estimated volume observed at the site for the 2019 reporting period was 13,568¹⁹ AF. WVWXU flow events, durations, and estimated flow volumes for the annual reporting period are outlined in Table 7 and Figures 25-27 below.

TABLE 7. WVWXU JULY 2019 – JUNE 2020 FLOW EVENTS

Start Date	Start Time ¹⁷	Duration ¹⁸ (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
11/29/2019	8:15 a.m.	1,527.5	2.95	800 ¹⁹	8,473 ²⁰
2/2/2020	1:00 p.m.	26.75	0.45	12	6
3/11/2020	6:15 a.m.	1,310.5	3.69	800 ¹⁹	5,088 ²⁰
		2,864.75 (total hours)			13,568²⁰ (total AF)

The WVWXU was visited a total of six (6) times during the 2019 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Installed New Primary Camera Back plate.
- Updated Primary Camera firmware.
- Updated secondary Camera firmware
- Replace event Gage damaged during a high flow event.
- Surveyed Channel Cross Section

¹⁷ Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the next day(s).

¹⁸ Flow event duration is based on discharge calculated using the existing site rating.

¹⁹ The peak discharge noted is the maximum calculated discharge for the site according to the existing discharge rating. Actual peak discharge may be greater than this.

²⁰ Estimated flow volumes for flow events where the flow exceeded the site discharge ratings may be lower than the actual flow.

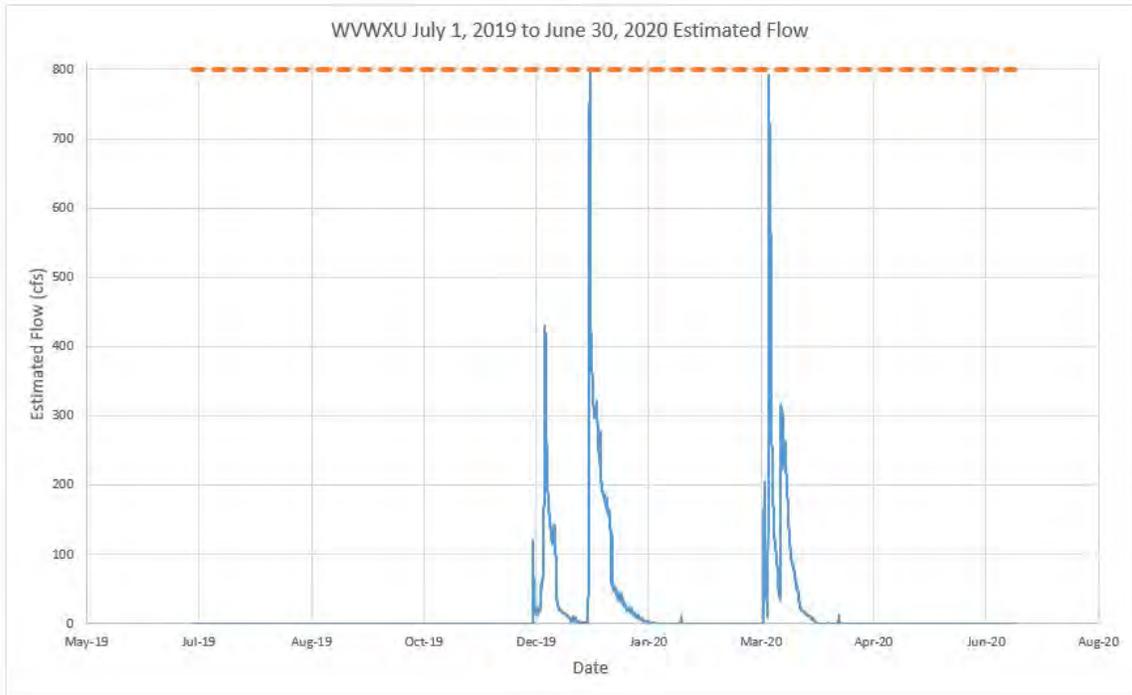


FIGURE 25. WVWXU JULY 2019 – JUNE 2020 ANNUAL FLOW EVENTS¹⁹

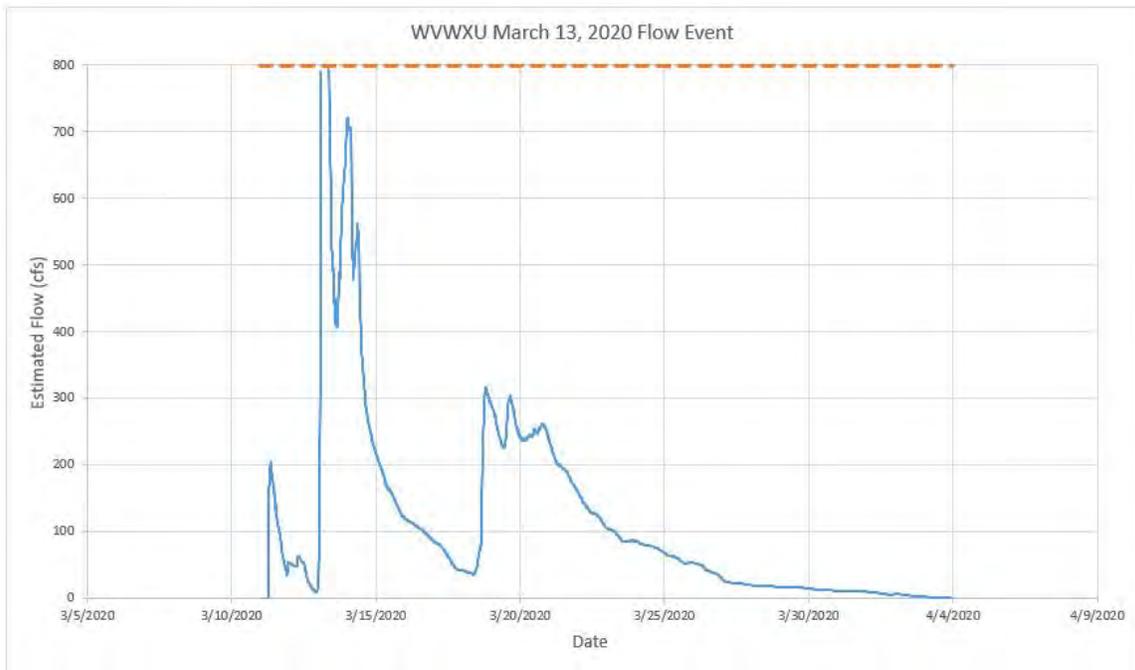


FIGURE 26. WVWXU MARCH 13, 2020 FLOW EVENT¹⁹



FIGURE 27. WVWXU IMAGE DATA

LOWER WILLIAMSON VALLEY WASH (LWVW)

Three (3) events with measurable ephemeral flow were observed at LWVW during the 2020 annual monitoring period. LWVW responded to monsoon and winter related precipitation events. The event on 3/13/2020 was the longest lasting with a duration of 264 hours and an estimated peak stage of 4.09 feet; the peak discharge was 1,804 cfs. This event was also the highest estimated stage. The total estimated volume recorded at the site for the 2020 reporting period was greater than 5,234 AF. LWVW flow events, durations, and estimated flow volumes for the annual reporting period are outlined in Table 8 and Figures 28-30 below.

TABLE 8. LWVW JULY 2019 – JUNE 2020 FLOW EVENTS

Start Date	Start Time ²¹	Duration ²² (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
12/5/2019	12:15 a.m.	66.75	1.38	76.5	84
12/25/2019	0:15 a.m.	108.5	2.86	720	1,051
3/13/2020	7:45 a.m.	264	4.09	1,804	4,098
		439.25 (total hours)			5,234 (total AF)

The LWVW was visited a total of six (6) times during the 2020 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Installed New Primary Camera Back plate.
- Updated Primary Camera firmware.
- Updated Secondary Camera firmware
- Replace event Gage damaged during a high flow event.
- Surveyed Channel Cross Section.
- Replaced Downstream Pressure Transducer

²¹ Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the next day(s).

²² Flow event duration is based on discharge calculated using the existing site rating.

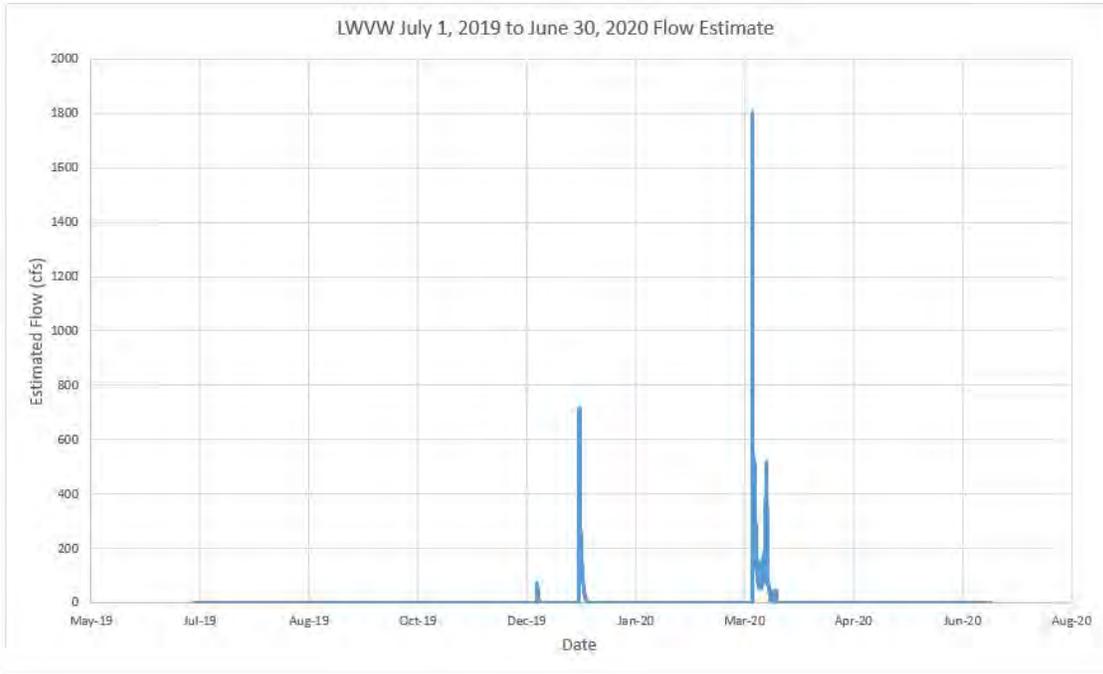


FIGURE 28. LWVW JULY 2018 – JUNE 2019 ANNUAL FLOW EVENTS

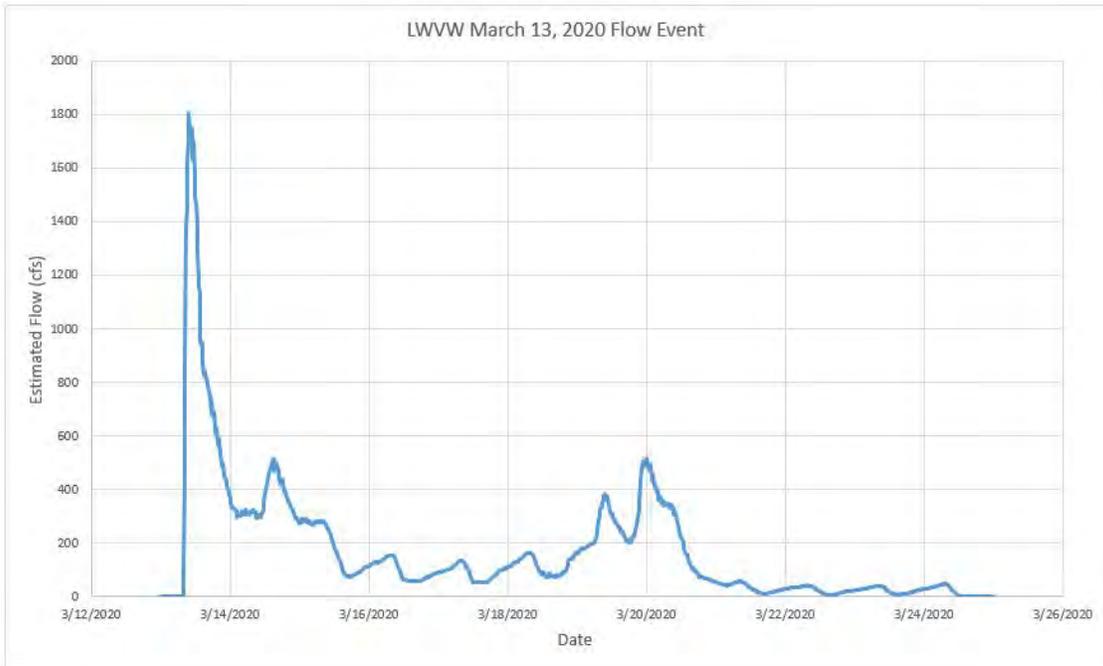


FIGURE 29. LWVW FEBRUARY 14, 2019 FLOW EVENT

LWVW at the start of the 2020 reporting period:



Greenup after 2019 monsoon events:



Start of flow event on 3/13/2020:



LWVW on 3/13/2020 with flow above bank full conditions:



LWVW at the end of the 2020 reporting period:



FIGURE 30. LWVW IMAGE DATA

LOWER BIG CHINO WASH (LBCW)

Three (3) flow events that exceeded the site rating were observed at LBCW during the 2020 annual monitoring period. LBCW responded to monsoon and winter related precipitation events. The event on 2/25/2020 was the longest lasting with a duration of 413.5 hours and an estimated peak stage of 6.97 feet; the peak discharge was greater than 124²⁵ cfs. The total estimated volume recorded at the site for the 2020 reporting period was greater than 666 AF²⁶. LBCW flow events, durations, and estimated flow volumes for the annual reporting period are outlined in Table 9 and Figures 31-37 below.

TABLE 9. LBCW JULY 2019 – JUNE 2020 FLOW EVENTS

Start Date	Start Time ²³	Duration ⁹²⁴ (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
12/5/2019	5:15 p.m.	251	4.36	124 ²⁵	120 ²⁶
2/25/2019	2:15 a.m.	413.5	6.97	124 ²⁵	180 ²⁶
3/13/2020	9:15 a.m.	412.5	8.23	124 ²⁵	366 ²⁶
		1,077 (total hours)			666 (total AF)²⁶

The LBCW was visited a total of three (3) times during the 2020 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Installed New Primary Camera Back plate.
- Updated Primary Camera firmware.
- Surveyed Channel Cross Section.

²³ Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the next day(s).

²⁴ Flow event duration is based on discharge calculated using the existing site rating.

²⁵ This estimated total flow volume excludes flows that exceeded the existing site discharge rating. Flows at or below this limit are included here.

²⁶ Estimated flow volumes for flow events where the flow exceeded the site discharge ratings may be lower than the actual flow.

The LBCW is located ~ 2.5 miles southeast and ~ 3.8 river miles downstream of LWVW. Between the two sites are a series of meandering bends. The flow relationship between the two sites has behaved as it has in the past several years, where larger accumulated flows were observed at LWVW than at LBCW. The LBCW has a much smaller flow area than at the LWVW, so many times the site experiences flows that exceeds its rating. See Figure 31 below for an aerial image of the sites.



FIGURE 31. AERIAL IMAGE OF WILLIAMSON VALLEY WASH CONFLUENCE WITH BIG CHINO WASH BETWEEN LWVW AND LBCW

As of this report, the wetted area and its infiltration rate between the the two locations is not defined, see Figure 31. The accumulated flow differences between the two sites are detailed in Figure 32 which provide aerial imagery coupled with flow details of the largest magnitude event. In addition to the CA1 Monitoring locations, the accumulated flows as defined at the USGS gage sites at Lower Williamson Valley Wash (upstream) and the USGS Big Chino Wash at Paulden, AZ gage (downstream of the LBCW) are shown.

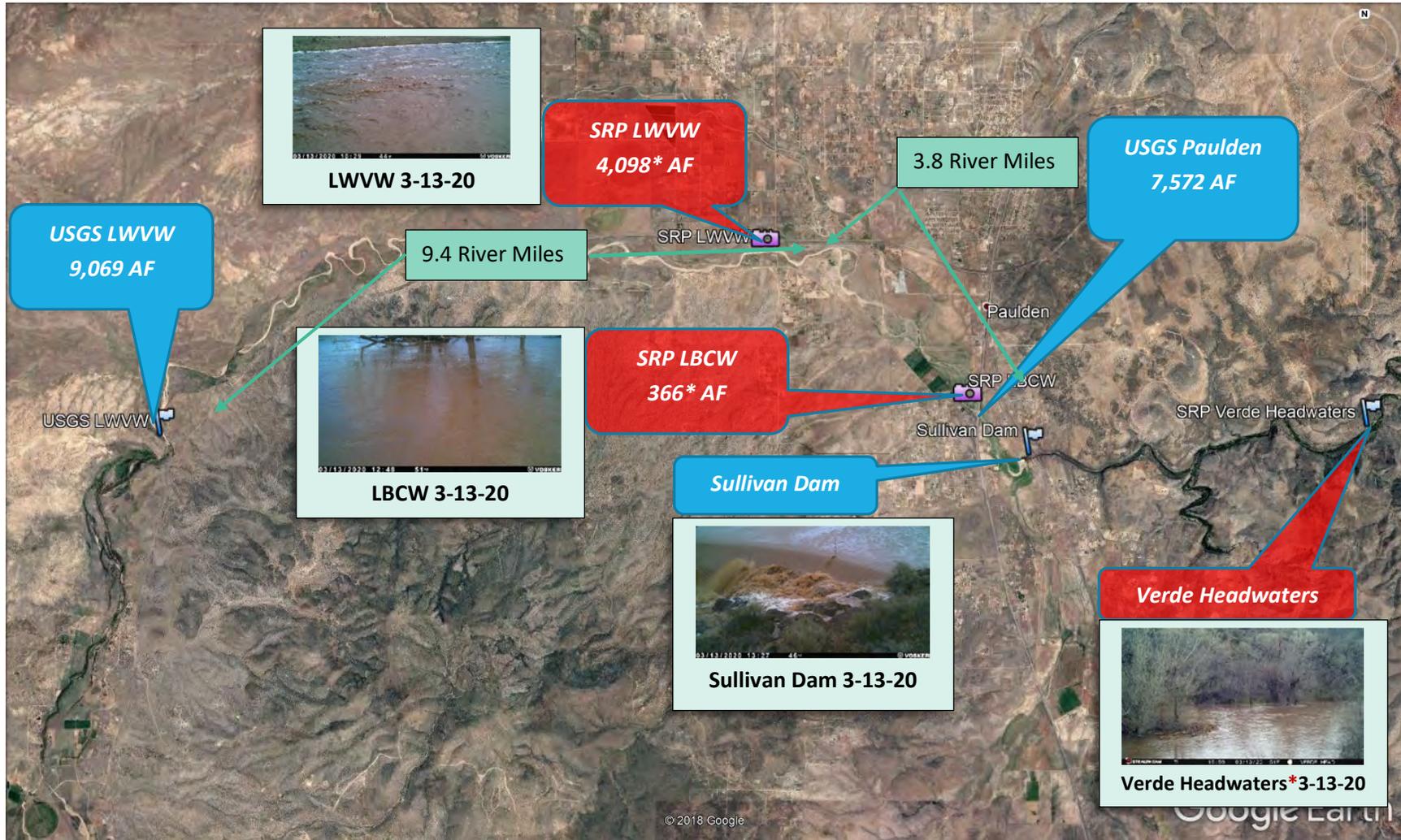


FIGURE 32. AERIAL IMAGE OF WILLIAMSON VALLEY WASH CONFLUENCE WITH BIG CHINO WASH - TOTAL ACRE FEET FOR 3/13/2020 EVENT (13 DAYS)

USGS LWVW AF was obtained from the USGS website.
 USGS Paulden AF was obtained from the USGS website.
 Sullivan Dam is not measured.

SRP LWVW* Estimated flow volumes for flow events where the flow exceeded the site discharge ratings may be lower than the actual flow.
SRP LBCW* Estimated flow volumes for flow events where the flow exceeded the site discharge ratings may be lower than the actual flow.
Verde Headwaters* Estimated flow volumes for flow events where the flow exceeded the site discharge ratings may be lower than the actual flow.

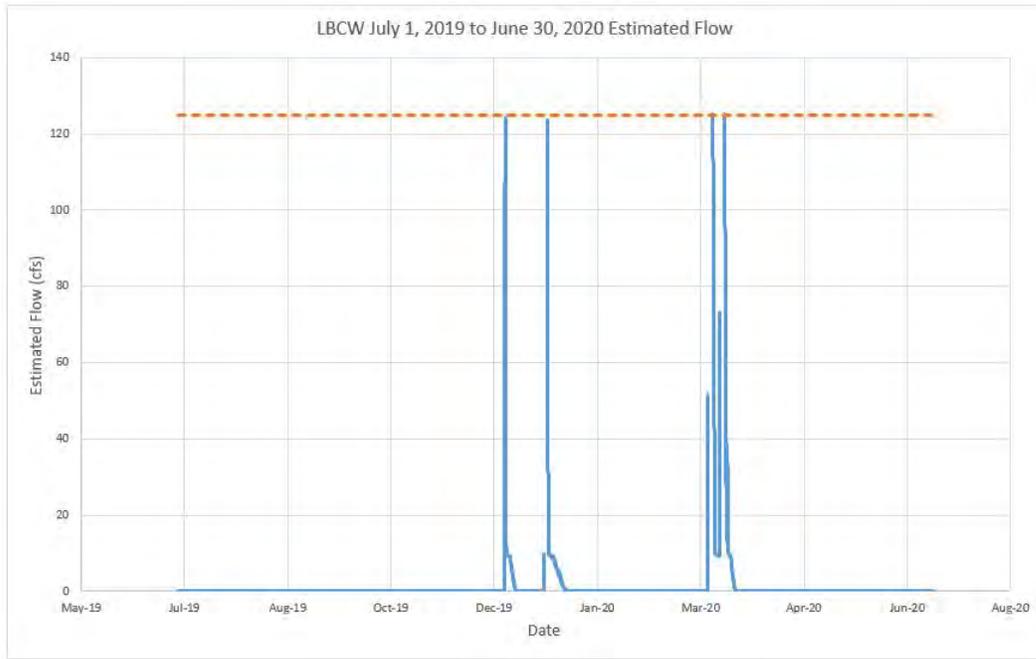


FIGURE 33. LBCW JULY 2019 – JUNE 2020 ANNUAL FLOW EVENTS²⁷

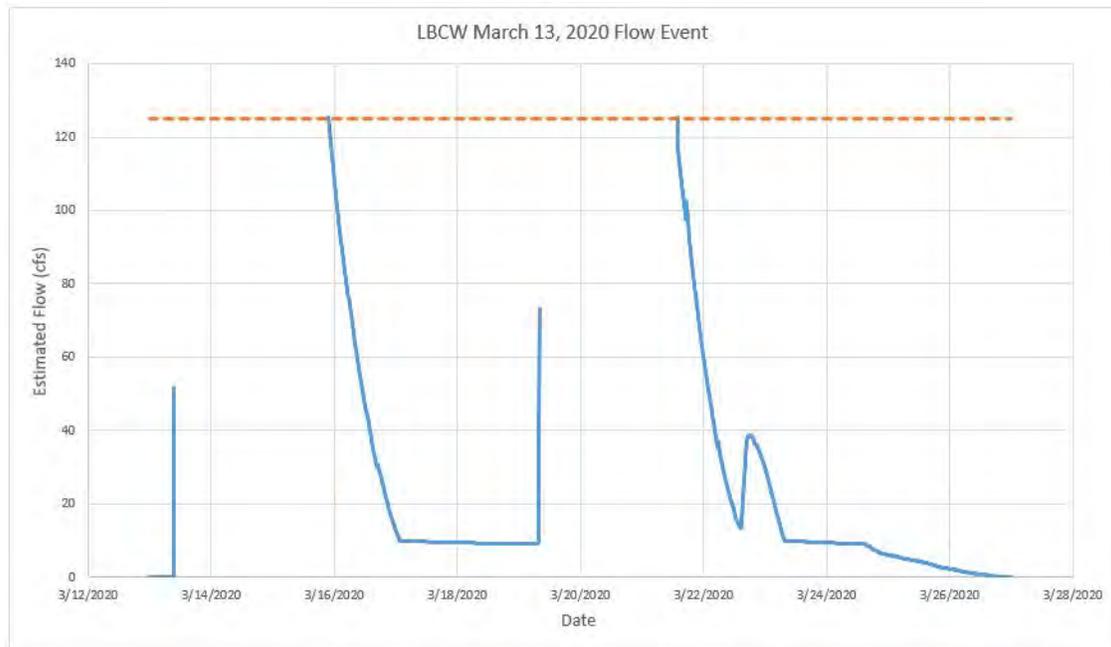


FIGURE 34. LBCW MARCH 13, 2020 FLOW EVENT²⁷

²⁷ Discharge is not calculated when flow exceeds the existing site rating. Flow was above the discharge rating for 114 hours.

LBCW at the start of the 2019 reporting period:



LBCW green up after early winter events:



Morning before the peak flow event 3/13/2020:



Peak of flow event on 3/13/2020:



LBCW at the end of the 2020 reporting period:



FIGURE 35. LBCW IMAGE DATA

SULLIVAN DAM (SD)

Six (6) events were observed at SD during the 2020 annual monitoring period. SD responded to winter related precipitation events. Standing surface water was visible behind the dam starting from 7/1/2019 to 8/8/2019. Standing surface water was again visible behind the dam starting 8-28-2019 to the end of the 2020 reporting period. Stage represents the water depth of water spilling over the SD structure crest. There is no stage to discharge relation for the site, therefore no flow data is assumed. SD events, durations, and peak stages for the annual reporting period are outlined in Table 10 and Figures 38-40.

TABLE 10. SD JULY 2019 – JUNE 2020 FLOW EVENTS

Start Date	Start Time ²⁸	Duration ²⁹ (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
12/6/2019	2:00 a.m.	75.75	0.25		
12/25/2019	5:00 a.m.	75	0.74		
12/29/2019	2:00 p.m.	8	0.22		
12/30/2019	1:15 a.m.	8	0.22		
12/31/2019	1:30 a.m.	8	0.32		
3/13/2020	9:30 a.m.	329	1.63		
		503.75 (total hours)			

The SD was visited a total of five (5) times during the 2020 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Installed New Primary Camera Back plate.
- Updated Primary Camera firmware.
- Replace event Gage damaged during a high flow event.
- Replaced Pressure Transducer.
- Surveyed Channel Cross Section.
- Replaced Solar Regulator

²⁸ Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the next day(s).

²⁹ Stage event duration is based on stage data, no discharge data available.

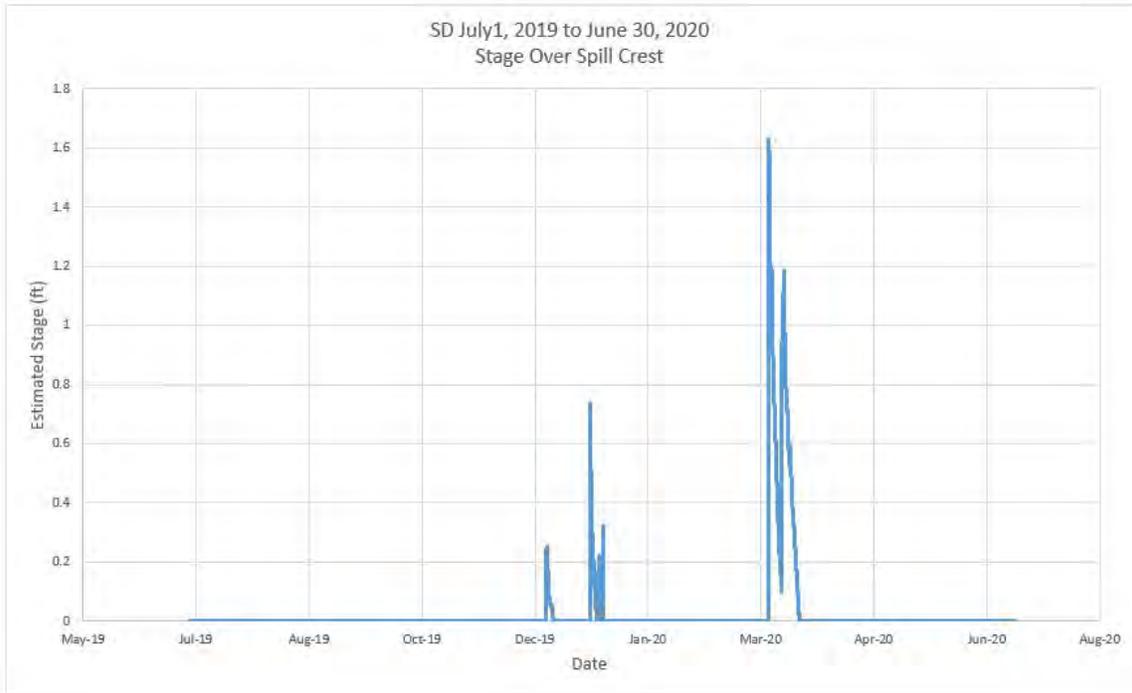


FIGURE 36. SD JULY 2019 - JUNE 2020 STAGE DATA

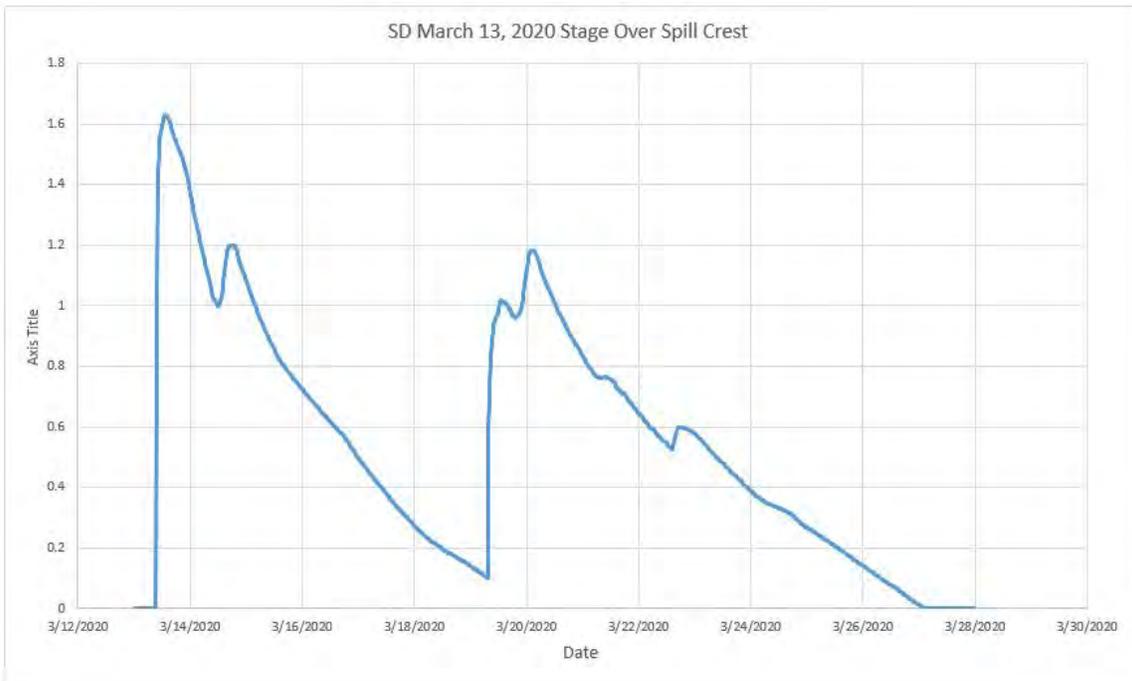


FIGURE 37. SD MARCH 13, 2020 STAGE EVENT

SD at the start of the 2020 reporting period:



Greenup at SD after monsoon events:



Start of flow event on 3/13/2020:



Continued flow event on 3/13/2020:



SD at the end of the 2020 reporting period:



FIGURE 38. SD IMAGE DATA

VERDE HEADWATERS AT CAMPBELL RANCH (VHCR)

Three (3) events were observed at VHCR during the 2020 annual monitoring period (for this site and report, a flow event was defined as exceeding a flow rate of over 20 cfs). Two (2) flow events exceeded the flume flow design limit of 100 cfs. VHCR flow events for the annual reporting period are outlined in Table 11 and Figures 41-43.

The USGS Verde River near Paulden, AZ stream gage is approximately 6 river miles downstream of VHCR. Flow events observed at VHCR were also observed at the USGS gage (see Table 11 and Figure 44 below).

TABLE 11. VHCR AND VERDE RIVER NEAR PAULDEN, AZ USGS JULY 2019 – JUNE 2020 PEAK FLOW EVENT DATA

Date	VHCR	USGS Verde River near Paulden, AZ
12/6/2019	31 cfs	29.4 cfs
12/25/2019	100+ cfs (exceeded flume)	841.0 cfs
3/13/2020	100+ cfs (exceeded flume)	2630.0 cfs

The VHCR was visited a total of two (2) times during the 2020 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Replaced site battery
- Pumped stilling well two (2) times
- Replaced solar voltage regulator
- Performed six (6) current meter measurements

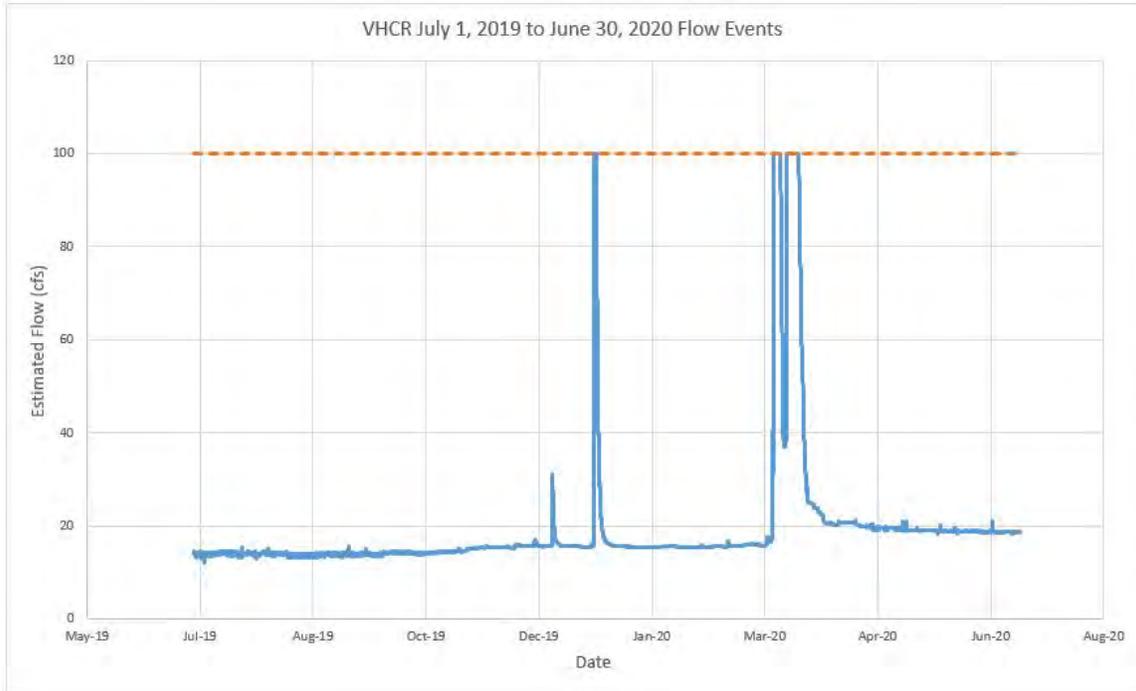


FIGURE 39. VHCR JULY 2019 – JUNE 2020 ANNUAL FLOW EVENTS³⁰

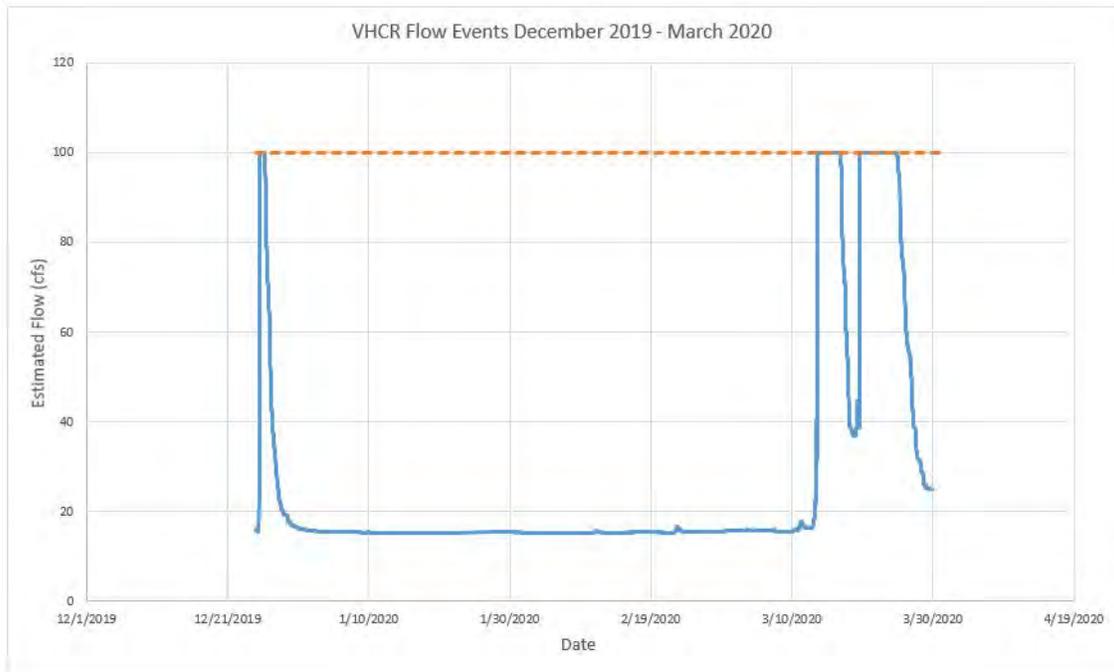


FIGURE 40. VHCR DECEMBER 2019 THROUGH MARCH 2020 FLOW EVENTS³⁰

³⁰ Discharge is not calculated when flow exceeds the existing site rating. Flow was above the discharge rating for 223 hours from December 2019 through March 2020.

VHCR before flow event on 3/13/2020:



VHCR during flow event on 3/13/2020:



FIGURE 41. VHCR SITE IMAGES

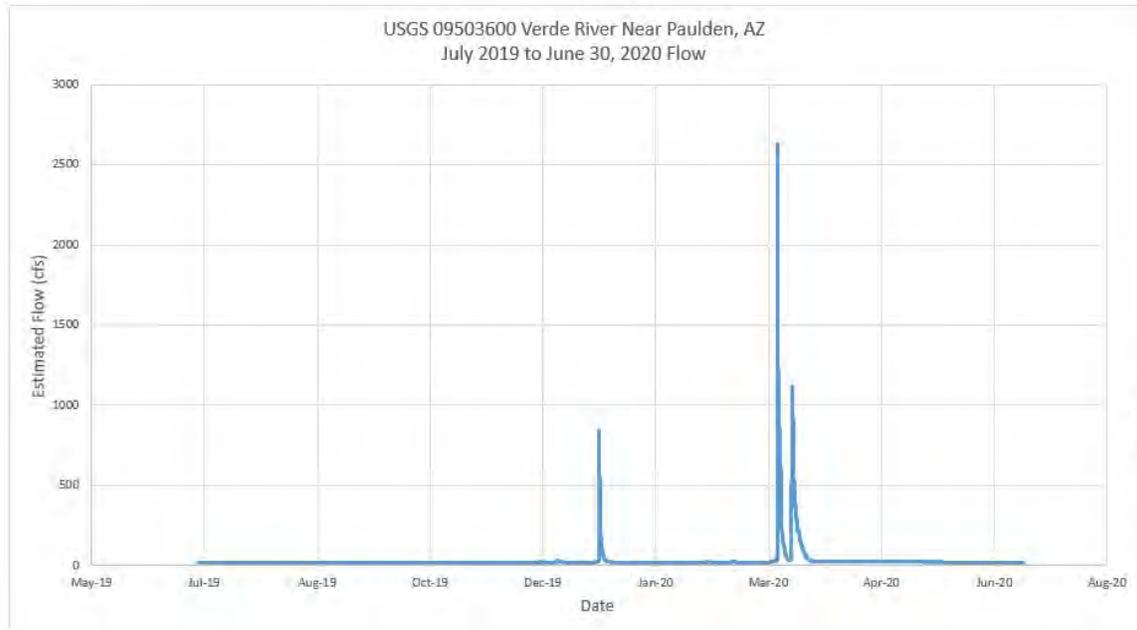


FIGURE 42. USGS VERDE RIVER NEAR PAULDEN, AZ JULY 2019 – JUNE 2020 FLOW EVENTS

GIPE WELL (GW)

The GW location records the distance from land to water (stage in feet below land surface). Between July 2019 and June 2020, the overall water level decreased 0.38 feet (see Figures 45-47 below).



FIGURE 43. GW SITE IMAGE FOR REFERENCE

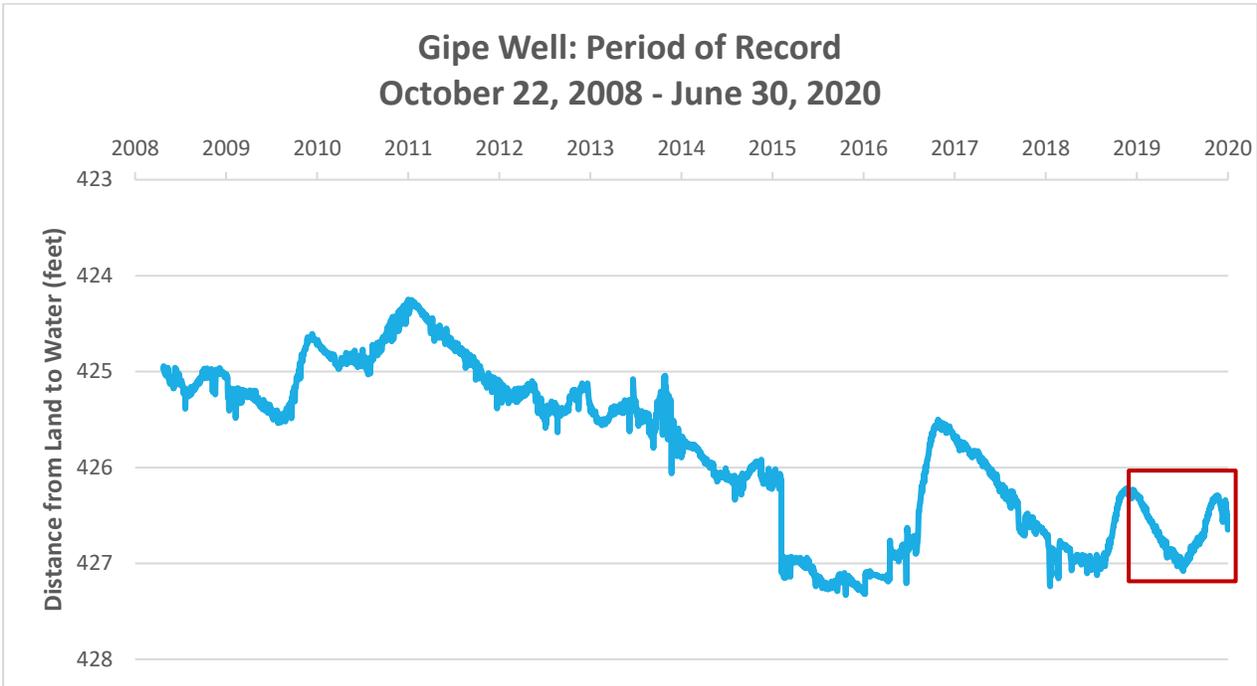


FIGURE 44. GIPE WELL PERIOD OF RECORD 10/22/2008 - 6/30/2020 DISTANCE FROM LAND TO WATER

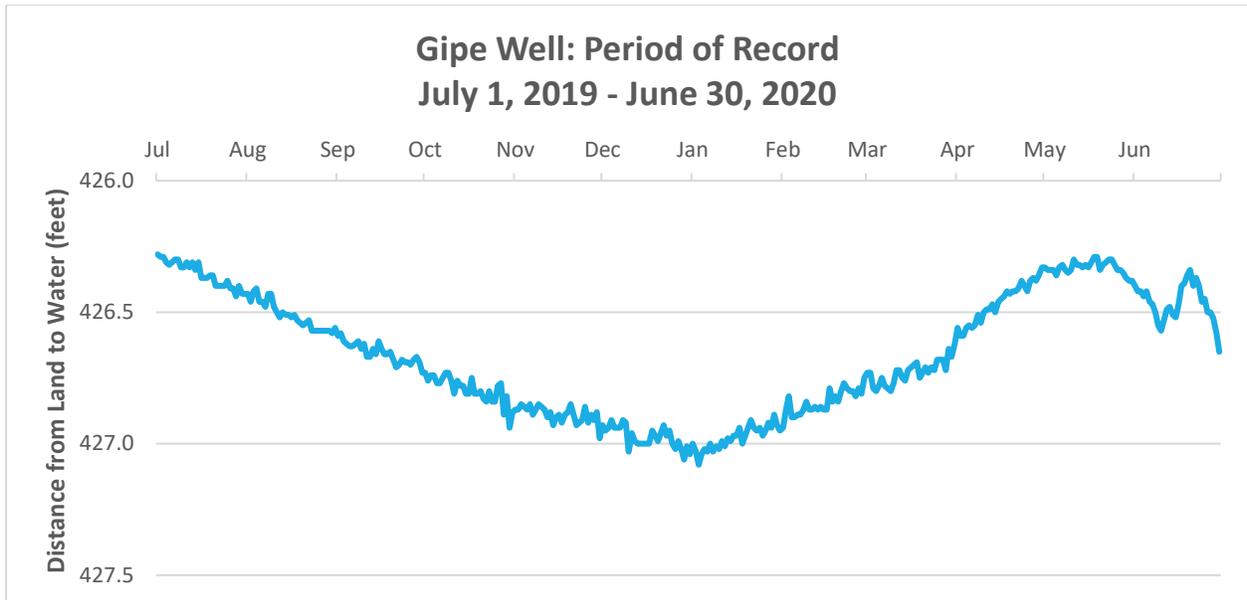


FIGURE 45. GW JULY 2019 – JUNE 2020 DISTANCE FROM LAND TO WATER

SUMMARY

All sites within the Big Chino sub-basin experienced flow at various times during the annual 2020 reporting period, during both the monsoon and winter seasons. The majority of the flow events occurred in the winter season.

Over half of the total estimated AF produced in the sub-basin during the 2020 annual reporting period was from the Williamson Valley Wash XU for an estimated 13,568 acre-feet (AF) or 66% of observed AF.

The sites with the fewest observable flow events were Big Chino Wash below Partridge Creek (BCWPC) and Lower Walnut Creek at Charney Property (LWCCP) with two (2) observed events for at each site. The estimated total for BCWPC was 1,055 AF and the estimated total for LWCCP was 66 AF.

The site that experienced the lowest estimated total flow volume was Pine Creek, with 35 AF.

The largest flow event for an estimated total of greater than 8,473 AF occurred at Williamson Valley Wash at XU Ranch starting on November 29, 2019.

There were several events that produced less than an estimated 1 AF at Upper Big Chino Wash.

Almost 23 inches of precipitation was recorded at the George Wood Canyon site during the reporting period, with approximately 40% of the precipitation occurring during the 2018 monsoon season. The remaining 60% of recorded precipitation coincided with observable flow at most sites within the sub-basin during the fall and winter seasons. All winter precipitation events resulted in approximately 1 foot of observable snow accumulation.

There was no water in storage behind Sullivan Dam at the from August 8, 2019 through August 28, 2019. Water started to pool on 8/29/2019, and the first spill event occurred on 12/6/2019. After the 2019 monsoon precipitation events, the water behind Sullivan Dam was present through the end of the calendar year. Winter precipitation events resulted in six (6) observed spill events over Sullivan Dam. Water remained pooled behind Sullivan Dam for the remainder of the reporting period.

At Gipe Well, the water level decreased 0.38 feet during the 2020 annual monitoring period. It is not known if livestock watering operations were in service during this period.

Prolonged flows at several sites were observed during the 2020 winter season. SRP Water Measurement staff were unable to collect in-stream current measurements due to site conditions that were not safe for an in-stream measurement and COVID-19 travel restrictions activated by SRP to protect staff and the public from virus.

All Flowtography® sites were surveyed and the surveys were used to enhance the site discharge ratings equations at those locations.

SRP Water Measurement continues to maintain the sites and process pressure transducer and SRP Flowtography® and SRP Snowtography™ images collected at the monitoring locations.

The data presented within this report are provisional in nature, and is reflective of the best available data at the time this report was prepared.

APPENDIX II

Summary of Data Collection Equipment

Established Monitoring Efforts

Groundwater Level Monitoring

<u>Well Name</u>	<u>ADWR 55 #</u>	<u>Land Owner</u>	<u>Cadastral</u>	<u>Depth (ft bgs)</u>	<u>Perf Interval (ft bgs)</u>	<u>Water Level (ft bgs)</u>	<u>Data Repository</u>
MW-4b1	228266	USDA Forest Service	B(18- 01)28BCD	460	340- 460	320	GWSI
MW-4b2	228265	USDA Forest Service	B(18-01)19 ADC	520	420- 520	400	GWSI
MW-4b3	228262	Arizona State Land Department	B(18-01)31 CCD	480	380- 480	360	GWSI
MW-4d	228264 (c) 228472	Arizona State Land Department	B(17- 02)11ABD	450	280- 340 (LCS); 330- 450 (PVC)	310	GWSI
MW-4e	228263	Arizona State Land Department	B(17- 02)12CBD	340	240- 340	225	GWSI
MW-4g	921236	Southwest Land & Cattle LLC (dba K Larson)	B(18- 03)26BDD	1400	1000- 1400	142	GWSI
BMW-2	921256	Kieckhefer, J.I.	B(18- 04)01ACA	2000	1600- 2000	180	GWSI
Glidden	631886	USDA Forest Service	B(18-01) 27ABD	230	150- 219	192.4	GWSI
HR-2	527679	Civitan Foundation	B(17-02) W02DCC1	500	Not cased	328.3	GWSI
MW-4f.1 (Patton) ¹	803378	Southwest Land and Cattle Co.	B(18-01) 26BDD	92	25 to 60 and 80 to 90	15.5 to 18.3	GWSI
MW-4f.2 (Johnson) ¹	609259	Southwest Land and Cattle Co.	B(18-01) 26BDB1	320	37 to 320	119.4 to 141.8	GWSI
WMW-1 (Pump 7) ²	624116	City of Prescott	B-20-04 19CBA	600	unk	66.2 to 103	GWSI

WMW-2 (200' N of Pump 3) ²	210660	City of Prescott	B-20-04 33CBD2	100- 160 and 310- 400	0-420	30	NWIS and GWSI
WMW-3 (1000' SE of Pump 12) ²	210659	City of Prescott	B-19-04 10CCB2	670	614- 654	14-29	NWIS and GWSI
BMW-3	905773	Kieckhefer	B-18-04 01ACA2	1000' casing	499- 999	155 (2008)	GWSI
BMW-1 (previously named BH- 1) ²	200027	Kieckhefer	B-18-04 11ACC	490	290- 490	315.6 (2007)	
BCMw-1	211839		B-18-04 25AAA2	737	300- 620	261.2 (2008)	GWSI
Gipe Well	511557	Gipe	B-18-01 17AAA	620	540- 620	419- 425	GWSI and SRP DB
Paulden South (PZ3)	524078	City of Prescott	B-17-02S 04DBC3	170	130- 170	108 (2019)	GWSI

¹Southwest Groundwater Consultants, January 4, 2017

²Southwest Groundwater Consultant, December 23, 2004

Stream flow Monitoring

Stream flow Monitoring Sites Funded By/Established Under CA#1

Name	Completion Date	Comments
Verde Headwaters at Campbell Ranch	4/2005	
Williamson Valley Wash Near Paulden, AZ	1965-1985 2002-Current	USGS Gage 09502800
Big Chino Wash below Partridge Creek	6/26/2014	
Lower Big Chino Wash	5/21/2014	
Lower Walnut Creek at Charney Property	6/10/2014	
Lower Williamson Valley Wash	5/22/2014	
Pine Creek	5/19/2014	
Upper Big Chino Wash	1/16/2014	
Upper Walnut Creek at Forest Service	10/1/2014	Displaced and removed
Williamson Valley Wash at XU Ranch	6/12/2014	
Upper Walnut Creek at Bridge	6/26/2014	Camera only
Upper Walnut Creek at Bridge	6/05/2015	Yavapai County Flood Control District radar stage gage
Big Chino Wash at Prescott Ranch	8/26/2015	Camera only, basin conditions stage gage/transducer installed
Sullivan Dam	5/25/2016	10/12/2017

Climate Monitoring

Publicly Accessible Repositories for Climate Data

Agency Name	Data Portal
YCFCD	http://weather.ycflood.com/
USGS	http://waterdata.usgs.gov/az/nwis/rt
NWS-HADS (Camp Wood – CPWA3, Ashfork – ASFA3)	http://www.nws.noaa.gov/oh/hads/
Historic Climatic Data	http://www.wrcc.dri.edu/summary/climsmaz.html

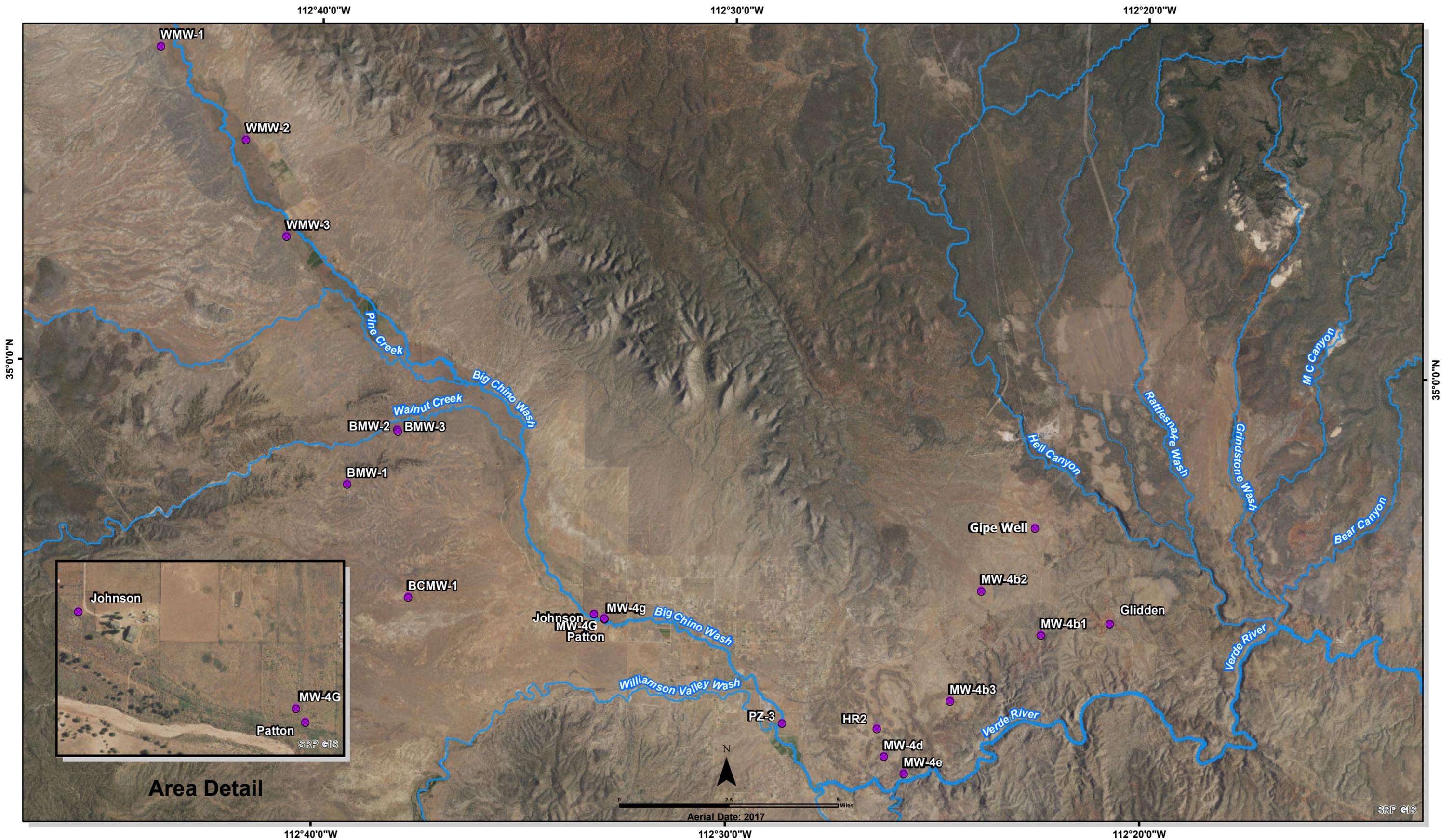
Existing Weather Stations in the Big Chino Sub-basin¹

Station Name	Responsible Agency	Data Collected
Granite Basin	YCFCD	Precipitation
Walnut Creek	YCFCD	Precipitation/Stage
Big Chino Wash @ SR 89	YCFCD	Precipitation/Stage
CYFD @ Outer Loop Rd	YCFCD	Precipitation
Hyde Mountain	YCFCD	Precipitation
Williamson Valley FD	YCFCD	Precipitation
Seligman Airport	YCFCD	Precipitation/Weather
Ash Fork Draw @ I-40	YCFCD	Precipitation/Stage
Partridge Creek @ I-40	YCFCD	Precipitation/Stage
Crookton	YCFCD	Precipitation
Big Chino Water Ranch ¹	YCFCD	Precipitation/Weather
Williamson Valley Wash near Paulden, AZ	USGS	Precipitation/Stage/Flow
Verde River @ Perkinsville	USGS	Precipitation/Stage/Flow
Camp Wood nr Bagdad CPWA3	National Weather Service	Precipitation
Ashfork 12 NW ASFA3	National Weather Service	Precipitation

¹ Not all Weather Stations are included on Maps 7 and 7a.

APPENDIX III

Maps

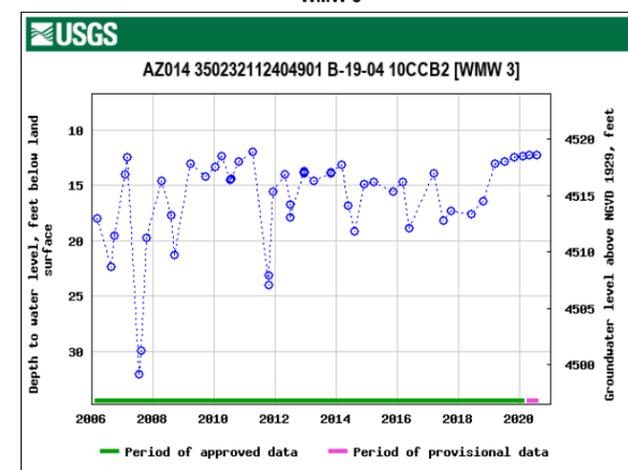
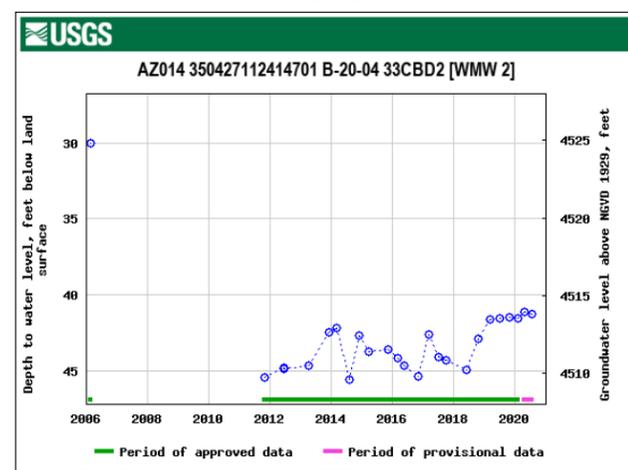
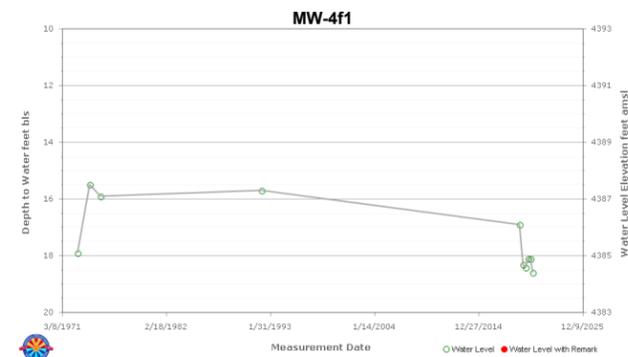
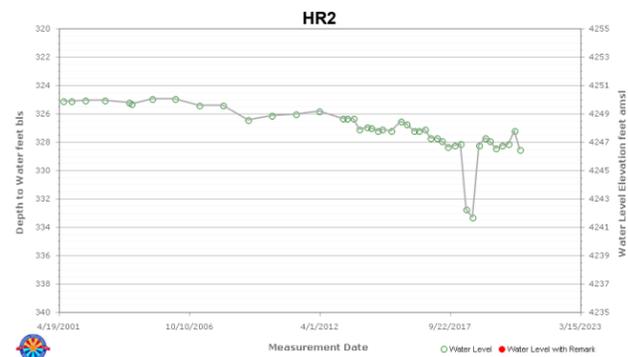
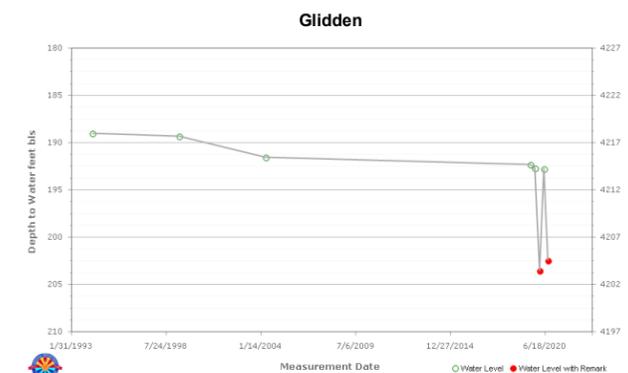
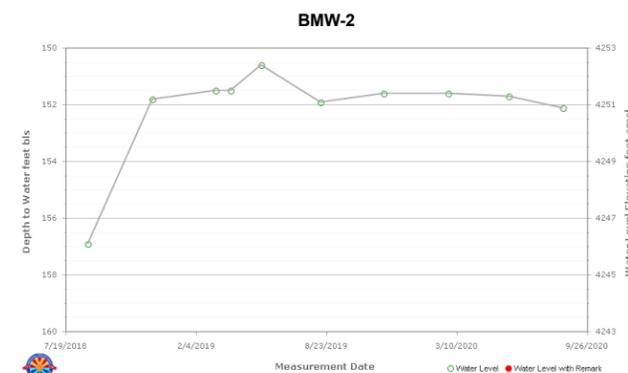
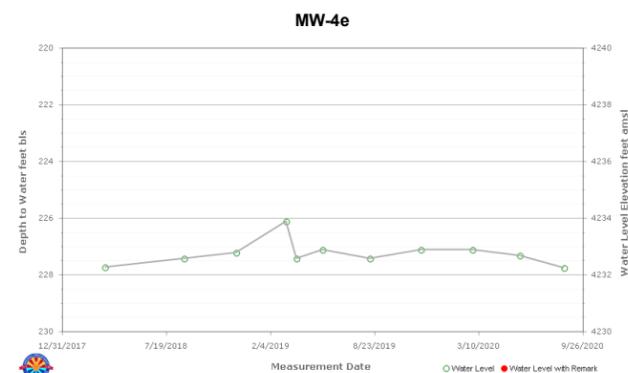
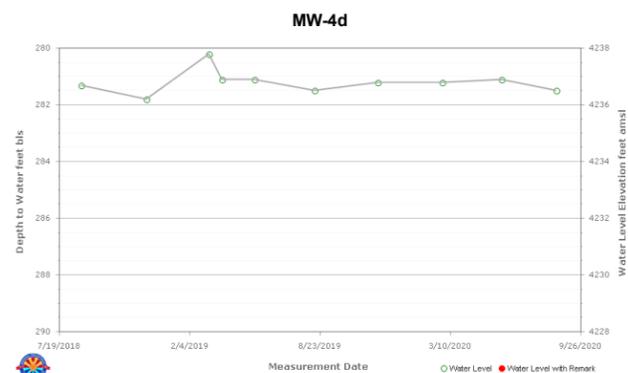
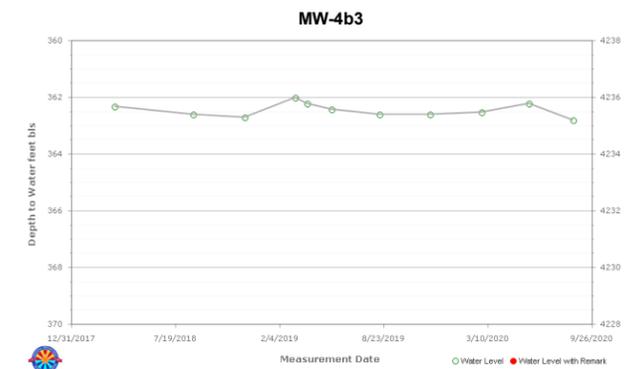
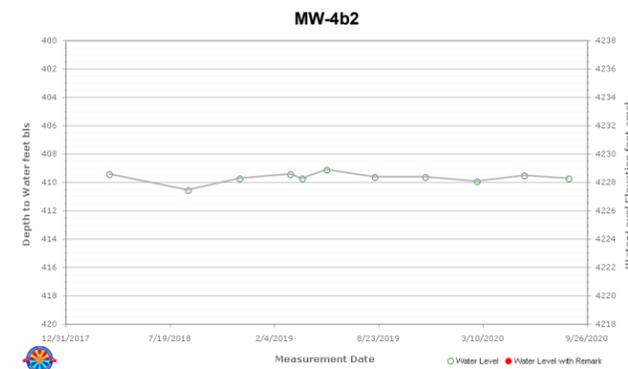
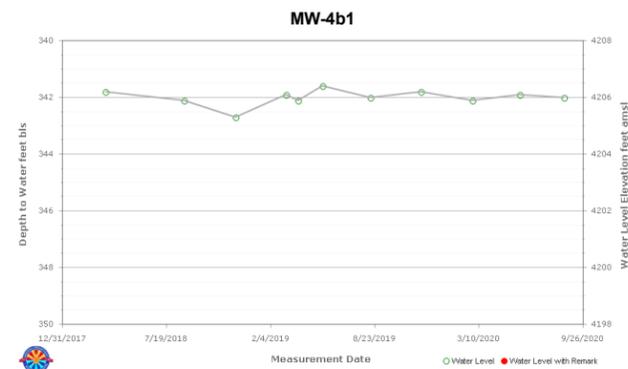
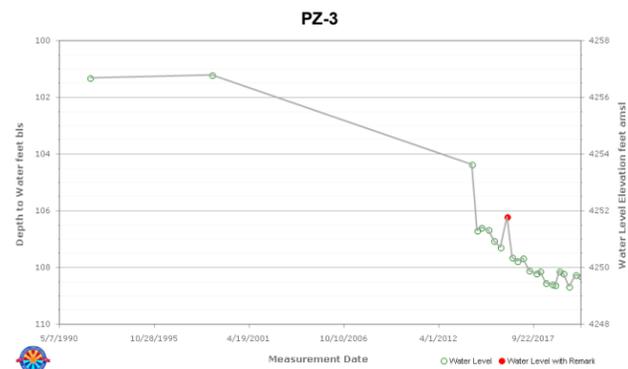
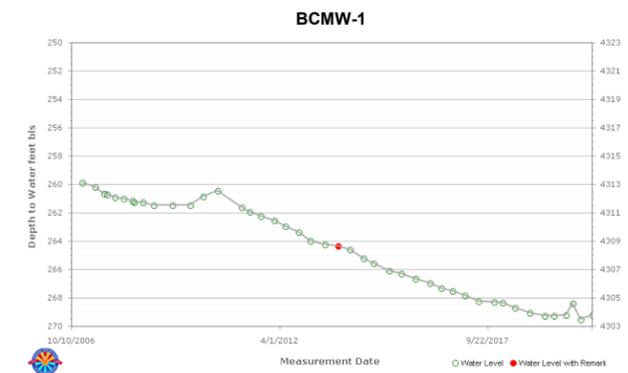
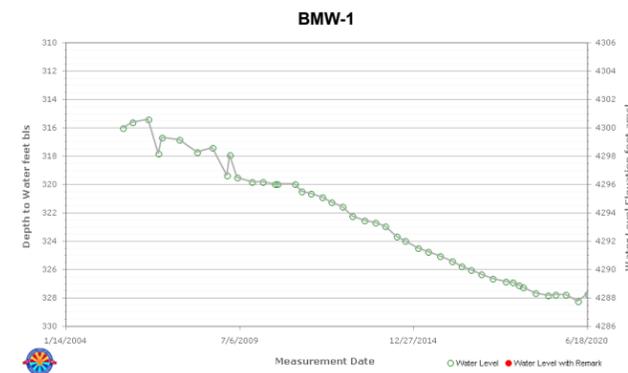
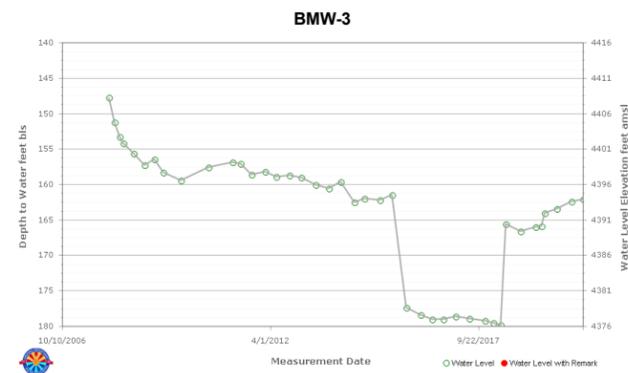


Existing Monitor Well

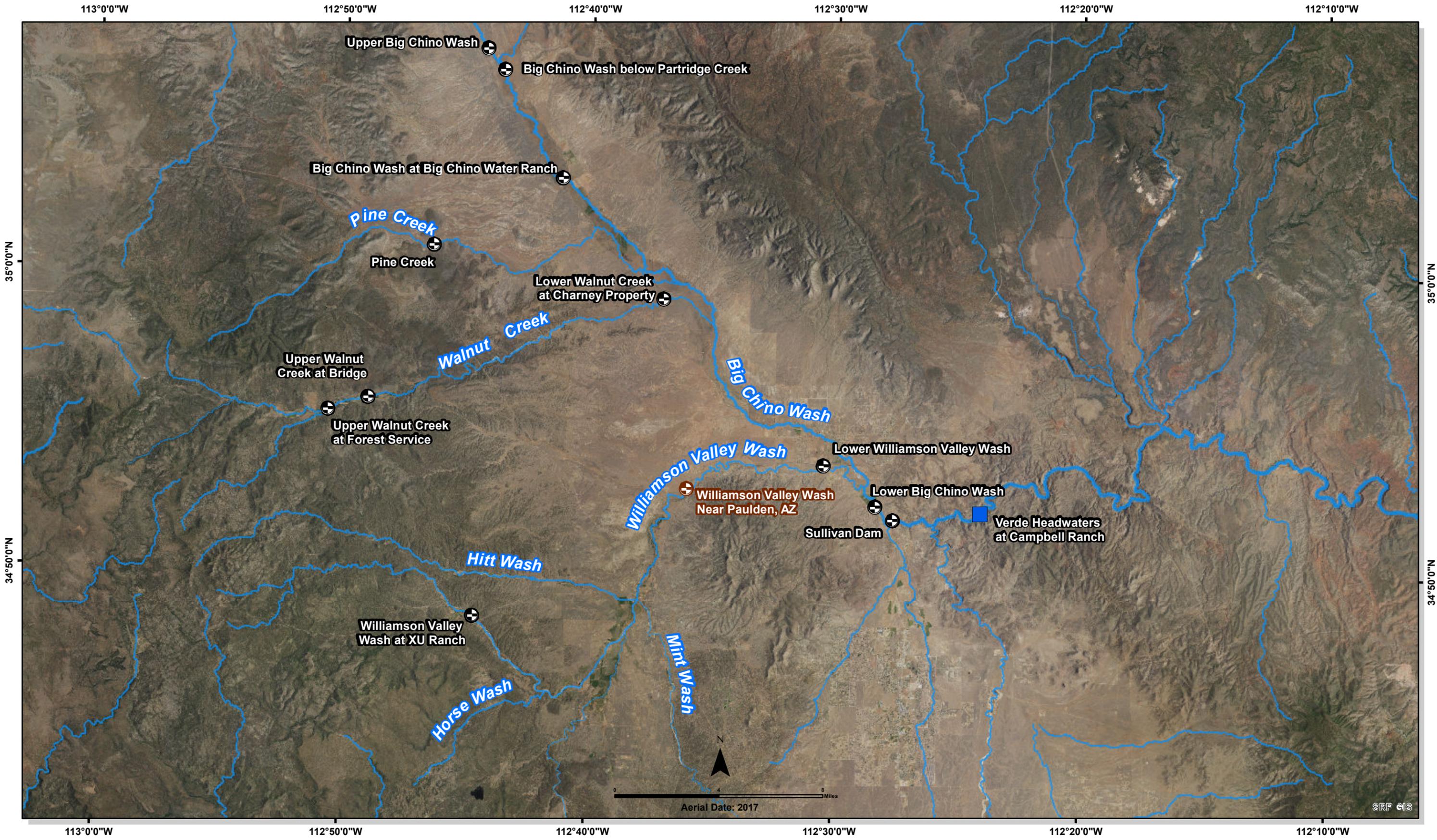
Map 1 Big Chino Sub-basin Water Monitoring Project



Map Courtesy of
SRP
BIGCHINO_MAP1_20.mxd
8/28/2020

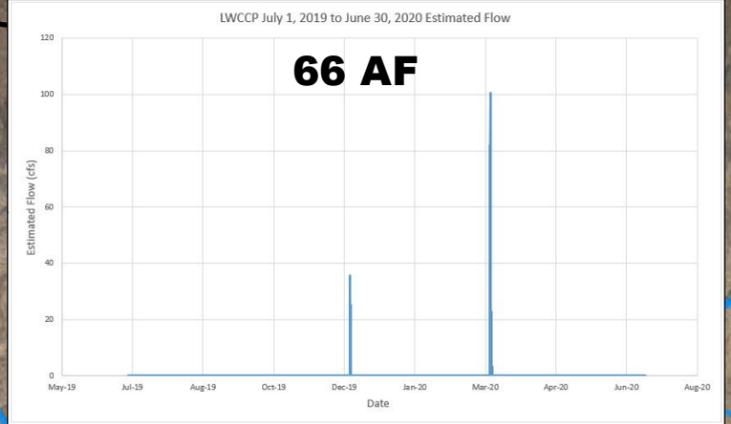
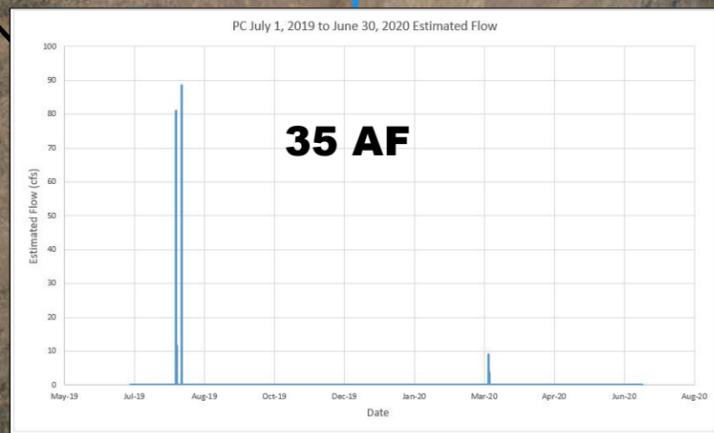
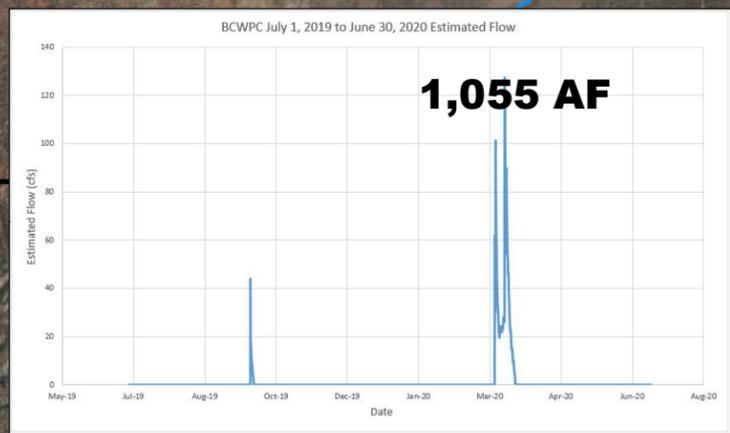
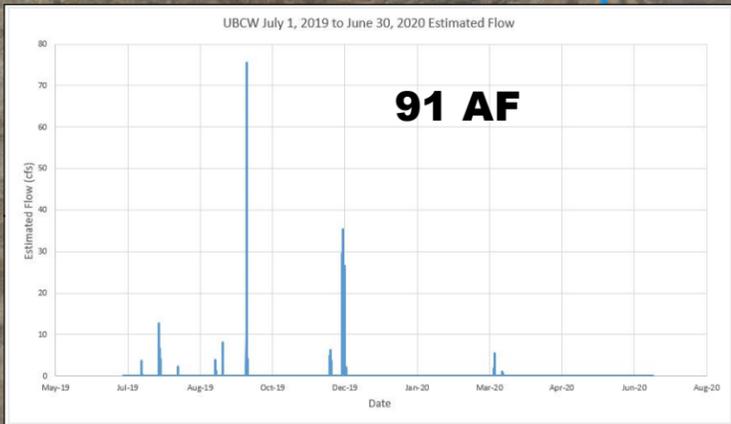
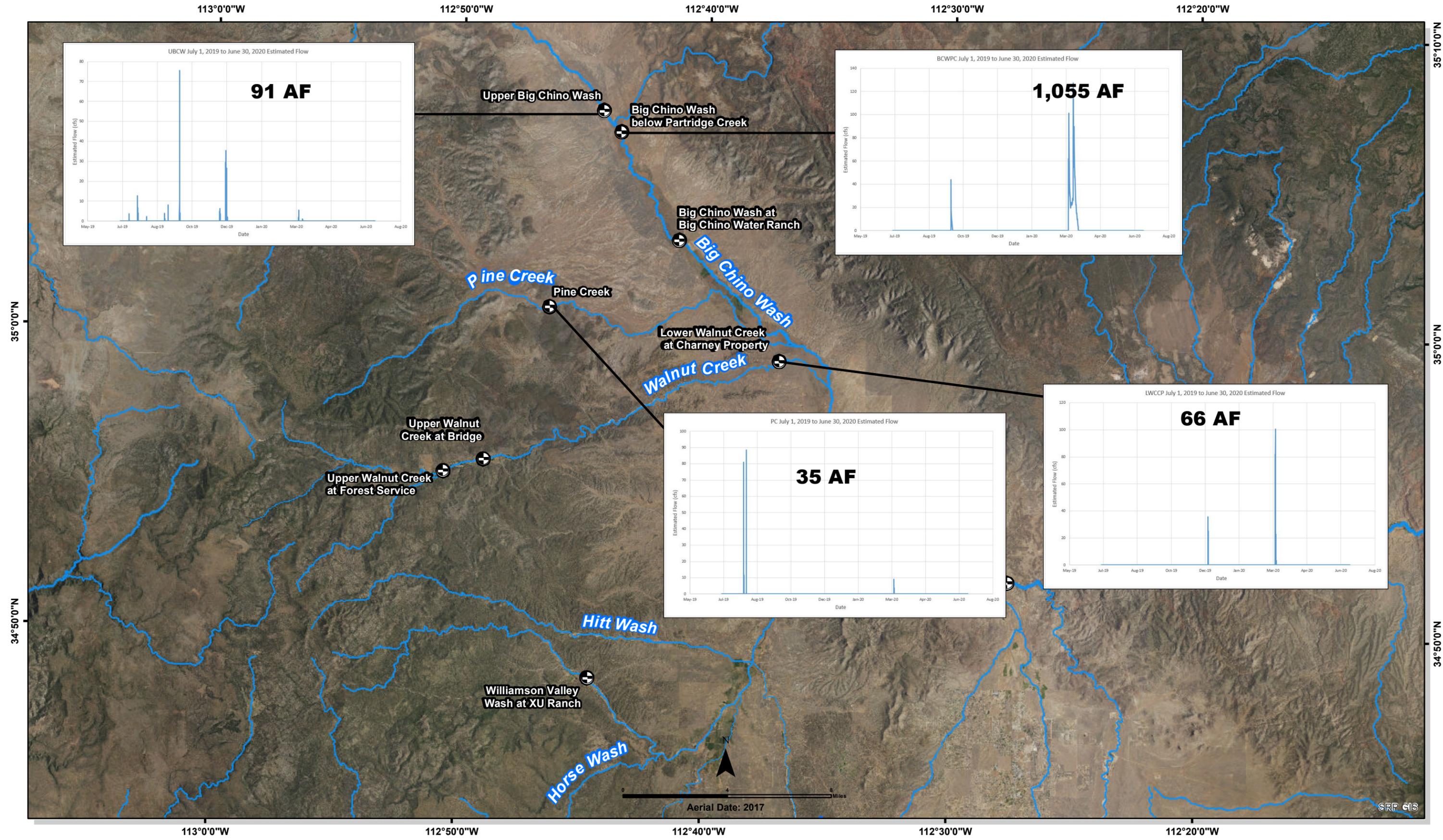


Map 2 Big Chino Sub-Basin Water Monitoring Project



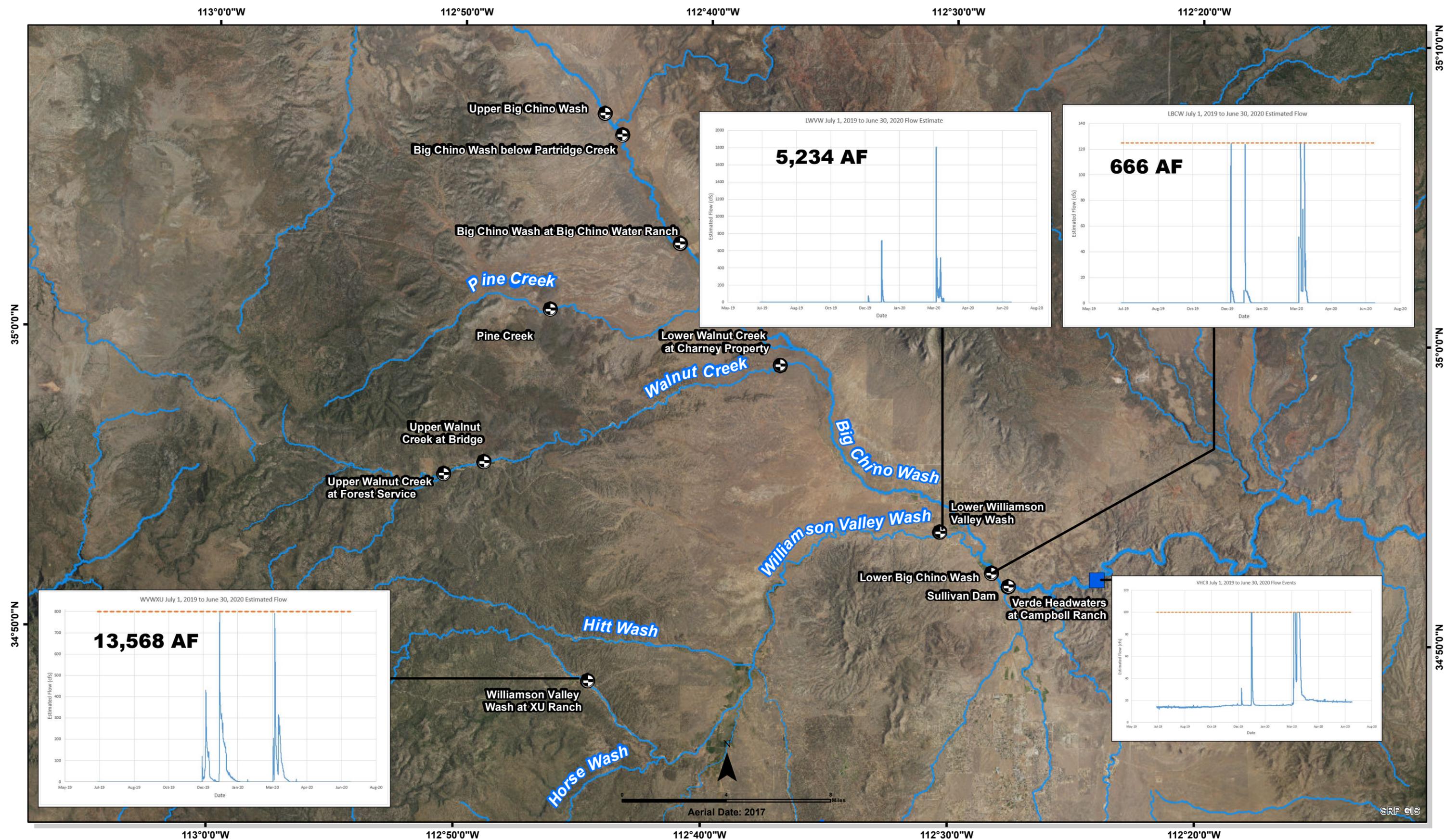
-  Surface Monitoring Location
-  USGS Gauge
-  Verde Headwaters
-  Creeks & Washes

Map 3
Big Chino Sub-basin - Surface Water Monitoring
 (existing flowtopography, camera only sites and Verde Headwaters)



- Creeks & Washes
- Surface Water Monitoring Location
- Verde Headwaters

Map 4
Big Chino Sub-basin - Surface Water Monitoring
Northern Hydrographs

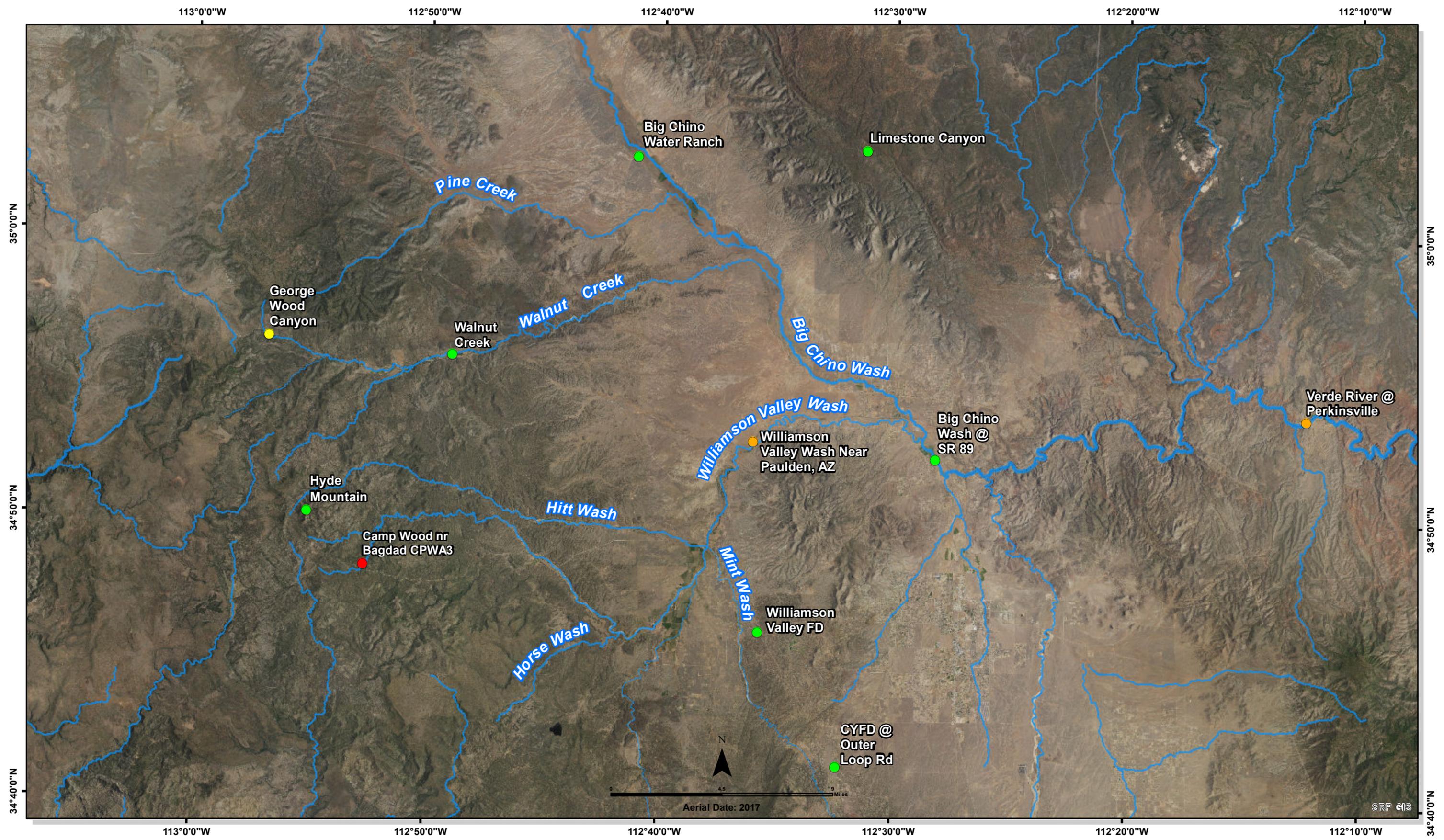


-  Creeks & Washes
-  Surface Water Monitoring Location
-  Verde Headwaters

Map 5

Big Chino Sub-basin - Surface Water Monitoring

Southern Hydrographs



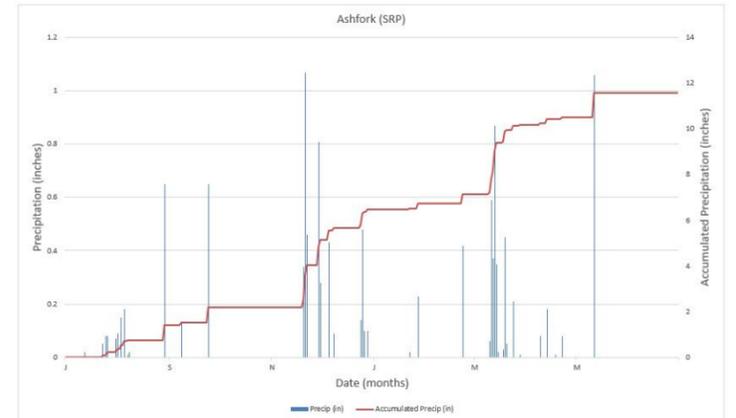
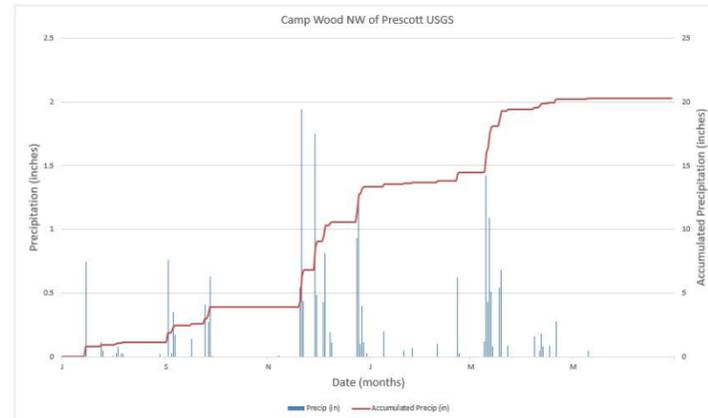
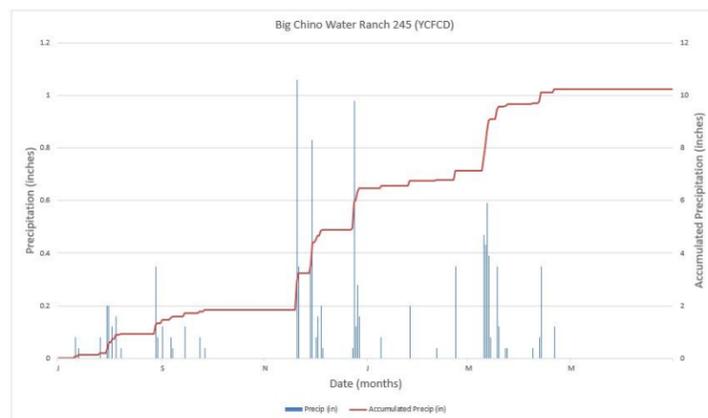
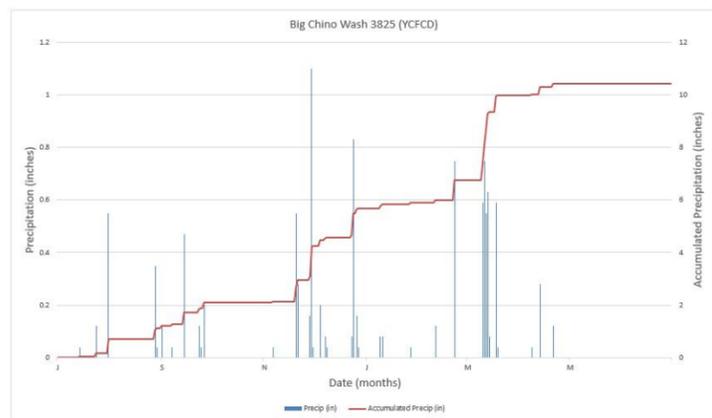
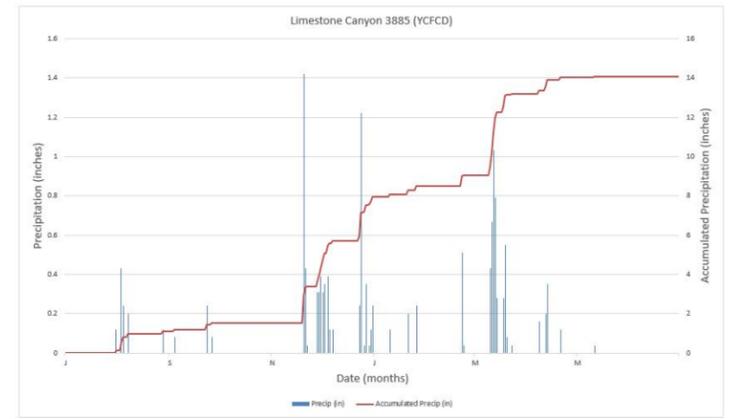
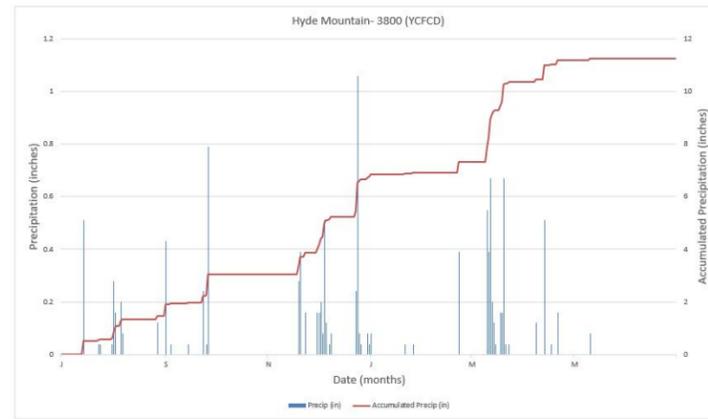
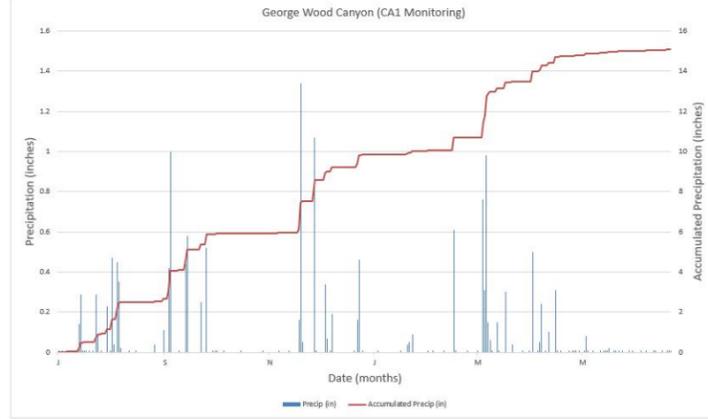
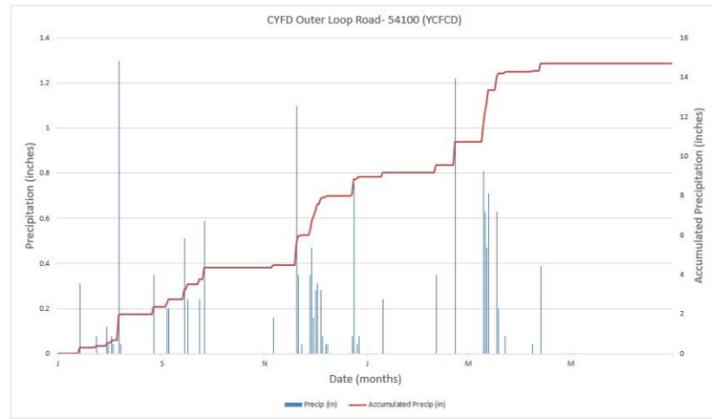
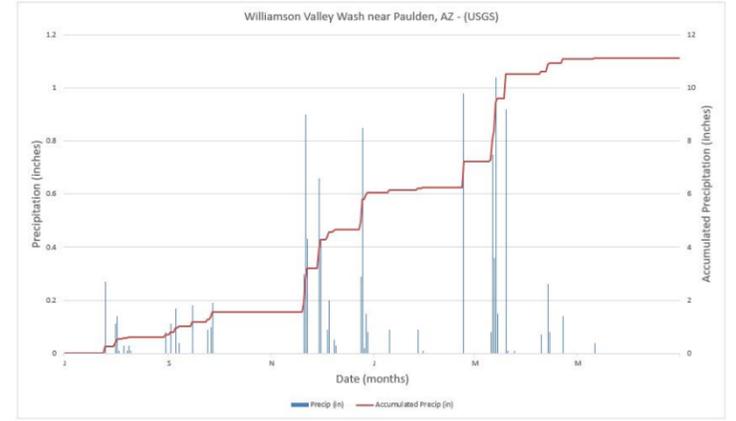
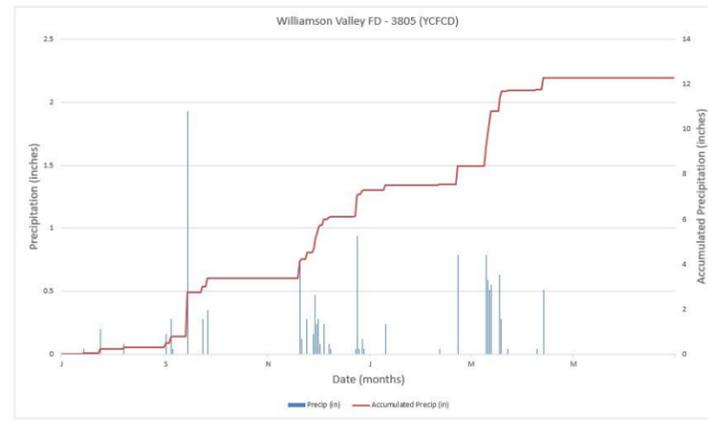
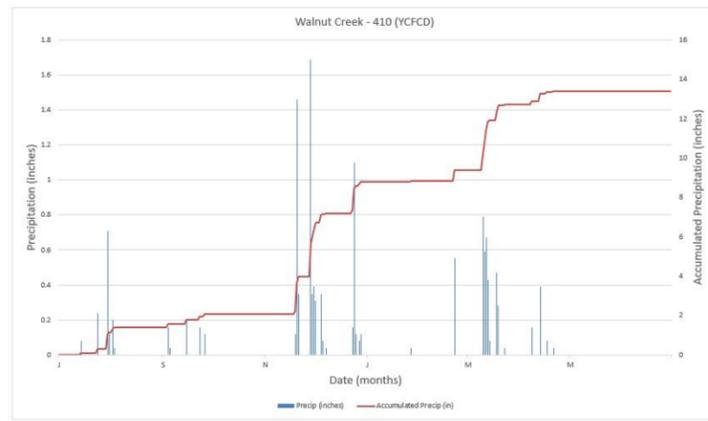
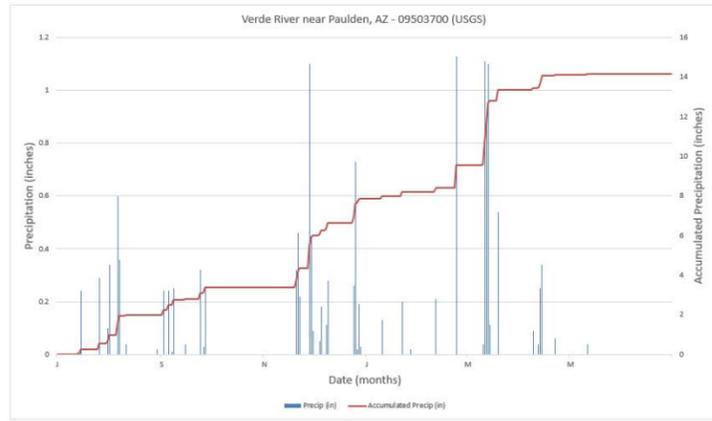
- Yavapai County Flood Control District Weather Station
- National Weather Service Hydrometeorological Automated Data System Station
- USGS Weather Station
- SRP Weather Station

Map 6
Big Chino Area
Weather Stations



Map Courtesy of

 BIGCHINO_MAP6_20.mxd
 8/28/2020



Map 6a Big Chino Area Weather Station Data

