

# Comprehensive Agreement No. 1

## Eighth Annual Report

FY21  
(July 1, 2020 – June 30, 2021)



BIG CHINO SUB-BASIN  
WATER MONITORING PROJECT  
PRESCOTT - PRESCOTT VALLEY - SRP

Prepared by:



September 2021

**Comprehensive Agreement #1  
Prescott/Prescott Valley/SRP  
Monitoring and Modeling Committee  
FY21 Annual Report  
(July 1, 2020 through June 30, 2021)**

**Introduction**

The eighth 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. In February 2017, the groundwater modeling work commenced with the execution of City Contract No. 2017-246. This portion of the project has been as intensive as the monitoring contract efforts. The annual report will document how the modeling contract has evolved. This report contains: project background, Fiscal Year 2021 (FY21) accomplishments, financial summaries, and the ongoing monitoring and modeling updates required to fully execute the CA#1 objectives. Similar to the FY20 Annual Report, this report has been streamlined due to ongoing limitations related to 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 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 the 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 DCMF 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 ongoing CoVID-19 conditions.
- Monthly progress calls with Golder Associates and many additional meetings that included Golder and the Specialized Technical Consultants (STCs) to evaluate the conceptual models and the data that did or did not support them.
- Supplemental meetings to discuss technical issues with contract holders, STCs, and/or Golder Associates Inc.
- Communication with ADWR to understand the release of an updated Prescott AMA model.
- Communication with USGS regarding geo-chemistry, micro-gravity and groundwater level monitoring contracts.

#### Executed Documents or Coordinated Activities

- Golder- City Contract No. 2017-246A2 (December 2020), time extension to September 22, 2021
- Golder – City Contract No. 2017-246A3 (June 2021), funding increase in the amount of \$241,959.00, and time extension to July 15, 2022

Funding Contributions – All the Parties completed their funding requirements to this project as of FY19.

#### Public Information

- City of Prescott website
- Town of Prescott Valley website
- SRP website <https://www.watershedconnection.com/projects/big-chino.aspx> that includes an overview of the CA#1 Monitoring and Modeling program and Flowtography, <https://www.watershedconnection.com/projects/flowtography.aspx>

Reports Completed – Big Chino Sub-basin Water Monitoring Project, July 1, 2020 – June 30, 2021  
**(Appendix I)**

#### Financial Summary

In accordance with CA#1, the Parties fund the project with annual contributions to an account managed by the City of Prescott. All monies were paid into this project as of FY19. It is important to note that the Communities and SRP do not have the same fiscal calendars. This project operates on a July 1<sup>st</sup> to June 30<sup>th</sup> timeframe. Further, SRP adjusted their contributions to increase their portion of the funding in the earlier years of the project, but their overall project contributions total was unchanged.

A detail of expenditures for FY21 only is shown in Table 1. Since CA#1 commenced the overall monitoring project account balance and expenditures as of June 30, 2021 are \$1,281,996.87 and \$3,397,009.80, respectively. Similarly, the overall modeling project account balance and expenditures as of June 30, 2021 are \$10,836.04 and \$1,272,994.43, respectively. The overall project funds have encumbrances with ongoing contracts, but those encumbrances are not reflected above nor in the values shown in **Table 1**.

The initial time frame for contributions has expired. As a result of overall project savings remaining funds are available for ongoing expenses in the near term. Future contributions may

be necessary if additional work is required. The CA#1 Committee has discussed development of a scope of work to address the potential impact of several growth scenarios in the Big Chino Sub-basin using the groundwater model currently under development.

**Table 1 – Contract Expenditures in FY21**

Contractor Name, Number	Description	Amount
SRP, Contract No. 2014-001, 001A1, and 001A2	New Stream Gages (Flowtography and weather equipment)	\$110,826.22
SRP, Contract No. 2014-001	Existing Stream Gage (Headwaters)	\$3,090.14
SRP, Contract No. 2014-001	Existing Monitor Well (Gipe)	\$452.70
USGS, 2014-160A4	Water Levels, Gravity, and SW Gauging (WV)	\$26,749.66
ADWR IGA Contract No. 2020-136	Installation of monitoring equipment and data collection	\$11,642.49
	<b>Monitoring Total</b>	<b>\$152,758.21*</b>
Golder Associates, Contract No. 2017-246, 246A1, 246A2, and 246A3	Modeling Contract	\$277,106.00
	<b>Monitoring Total</b>	<b>\$277,106.00</b>
	<b>Combined Total</b>	<b>\$429,864.21</b>

Note: these expenditures are broken down by the original financial accounts structure that identified costs by the descriptions shown.

\*An additional cost of \$30.00 was paid to ADWR for paperwork related to a filing fee for what was formerly “the Larson well” on the 1-acre property acquired with the drilling of one of the new monitor wells.

### **Monitoring Project – Equipment**

Since the commencement of the project, the Parties and their STCs 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. In FY21, no new equipment was installed. Existing data collection types are listed below and their basic details are shown in maps and tables in the appendices.

- Groundwater Level Monitoring – See **Appendix II** for tabular information and Appendix III for mapped locations
- Streamflow Monitoring – See **Appendix I** for SRP’s Big Chino Sub-basin Water Monitoring Project Annual Report, and **Appendix III** for mapped locations
- Weather Monitoring – See **Appendix II** for tabular information and **Appendix III** for mapped locations
- Crop Survey and Estimated Crop Water Use – See **Appendix III**, this fiscal year both Calendar Year 2019 and 2020 crop information will be included. Due to CoVID-19 limitations, the 2019 information was not available for inclusion in the 7<sup>th</sup> Annual report.

### **Monitoring Project – Analytical Results and Data Collected**

The results of the data collection and data interpretation efforts are provided in separate reports and databases produced and managed by the responsible agency. One of the duties of the CA#1 Monitoring Committee is to coordinate and monitor these data collection and reporting efforts so that the results are useful for the groundwater modeling and monitoring purposes outlined in CA#1. A brief explanation of active contracts or efforts are documented below.

Groundwater Monitoring – Groundwater level monitoring efforts continued to be completed both under contract with the CA#1 program (e.g. USGS Contract No. 2014-160A4 and ADWR IGA Contract No. 2020-136), and through traditional water level monitoring efforts by the Arizona Department of Water Resources.

- Efforts by USGS: From July 1, 2020, through June 30 2021, the U.S. Geological Survey operated one stream gaging station on Williamson Valley Wash and four continuous groundwater-level monitoring stations. Three of the monitoring wells are located on the Big Chino Water Ranch (USGS stations 350232112404901, 350427112414701, 350403112421801). Groundwater levels at these wells rose slightly in fiscal year 2021 (0.5-1 ft.) likely as the result of decreased irrigation near the Big Chino Water Ranch. Groundwater level at the fourth well (350403112421801) lowered gradually about 0.5 ft. from July 2020 before rising about 1.5 ft. in summer 2021 owing to monsoon streamflow in nearby Big Chino Wash. Also in fiscal year 2021, USGS carried out aquifer-storage change monitoring (repeat microgravity) at locations on the Big Chino Water Ranch and K4 Ranch to the west in July and October 2020. These measurements show little to no storage change during the monitoring period going back several years. Finally, to monitor surface water and groundwater resources in the Big Chino area USGS maintains additional stream gaging stations on Big Chino

Wash, the Verde River, Del Rio Springs, and Granite Creek, and carries out groundwater-level monitoring at an additional well in the Paulden area (345557112294501).

- Efforts by ADWR

The State routinely collects water levels in the project area as part of their Basic Data program on an annual basis at select well (Index lines) and basin-wide sweeps that are generally scheduled every five (5) years. The last “sweep” of the Big Chino Sub-basin occurred in Spring 2017. Additionally, the Parties entered into ADWR IGA Contract No. 2020-136 for assistance to begin regular data collection at the new monitor wells drilled to improve understandings of the geologic and hydrologic conditions in the project area. During FY21, ADWR installed automated water level monitoring equipment at seven (7) wells in the Big Chino Sub-basin.

Streamflow Monitoring - efforts in the Big Chino Sub-basin are conducted by SRP Field Services Division and by USGS under contract with the CA#1 project. The USGS also maintains other stream gauging in the area, but outside of the CA#1 contract. Additionally, flow stage data is collected by Yavapai County Flood Control District (YCFCD) for their flood warning purposes, but there have been several locations that both YCFCD and CA#1 found mutually beneficial. YCFCD has assumed the cost of these gauges.

- Efforts by SRP

SRP Measurement Services (now Aquifer Management and Data Analytics) collects streamflow data and other information at thirteen (13) locations in the Big Chino Sub-basin under contract with the Parties. The July 2020-June 2021 timeframe was extremely dry with only three flow events observed at four site locations. The full report for FY21 documenting the results of the flow monitoring program is attached as **Appendix I**. The annual hydrographs are located in **Appendix III, Maps 4 and 5**. Note that during this fiscal year there were discussions to update the contract for Flowtopography and other data collection services provided SRP, outcomes will be noted in the FY22 annual report.

- Efforts by USGS

The USGS operates several stream gauges in the Big Sub-basin. The Williamson Valley Wash near Paulden gauge is funded through the CA#1 program, and the Verde River near Paulden gauge is funded through a separate program with SRP, the USFS, and the USGS. In 2017, USGS installed the Big Chino Wash at Paulden gauge which is entirely funded by the USGS. Streamflow records for these sites are

maintained by the USGS in their online database,  
<https://waterdata.usgs.gov/az/nwis/current/?type=flow>

- Efforts by YCFCD  
 YCFCD collects flow stage data at four (4) locations in the Big Chino Sub-basin: Ashfork Draw at I-40, Partridge Creek at I-40, Big Chino Wash at Highway 89, and Walnut Creek at Walnut Creek Bridge. The CA#1 Committee and SRP Field Services evaluated these sites for their usefulness in converting flood stage data into streamflow records. Of the listed sites only the Walnut Creek Bridge stage data will be used for calculating streamflow. Data, is available on the YCFCD ALERT System webpage, <https://yavapaiaz.gov/ycflood/weather>

Crop Surveys and Estimated Crop Water Use – the FY21 Annual Report includes data for both Calendar Years 2019 and 2020. As noted in this year’s and last year’s report, crop survey data for Calendar 2019 was not available at the time of the FY20 Annual Report production. It was understood by many that some data sets and their processing had increased timelines which could be due to modified work practices during COVID-19. Both Calendar Years, 2019 and 2020 findings are presented below using the same format. For clarity, this year the Parties included text of “consumptive use” when summarizing the irrigation volumes so users of this report understand the volumes are not based on a meter at an irrigation well.

#### Calendar Year 2019

The USGS, in contract with ADWR, conducts crop surveys in the Big Chino Subbasin during June 2019, the results are shown in **Table 2** and illustrated in **Appendix III, Maps 7-1 through 7-5**. Each year the CA1 Parties seek the compiled data for inclusion in their annual report. The basic conclusions that can be drawn from 2019 data include:

- Approximately 26% of the irrigable lands that were surveyed were being irrigated in 2019 (1,013 acres cropped).
- Approximately 1,813 acre-feet was calculated based on consumptive use to irrigate this year’s cropping pattern.
- Approximately 1.8 acre-feet was used per crop acre.

**Table 2 – 2019 Crop Survey – Acres Irrigated**

Crops	Upper Big Chino	Paulden	Walnut Creek	Williamson	Turkey Canyon	Total
ALFALFA			7	8		15
GRASS		531	28		63	622
VINYARD		2				2
PASTURE	38	52	111	118		319

SOD		34				34
VEGETABLE		21				21
<b>Total Crop Acres</b>	<b>38</b>	<b>640</b>	<b>146</b>	<b>126</b>	<b>63</b>	<b>1013</b>
<b>No Crop Evident</b>	<b>1838</b>	<b>357</b>	<b>107</b>	<b>616</b>	<b>38</b>	<b>2956</b>
<b>Calculated Consumptive Use (acre-feet)</b>	<b>9</b>	<b>199</b>	<b>261</b>	<b>1215</b>	<b>129</b>	<b>1813</b>

Calendar Year 2020 Data

The USGS, in contract with ADWR, conducts crop surveys in the Big Chino Subbasin during July 2020, the results are shown in **Table 3** and illustrated in **Appendix III, Maps 8-1 through 8-5**. Each year the CA1 Parties seek the compiled data for inclusion in their annual report. The basic conclusions that can be drawn from 2020 data include:

- Approximately 26% of the irrigable lands that were surveyed were being irrigated in 2020 (1,059 acres cropped).
- Approximately 2,456 acre-feet was calculated based on consumptive use to irrigate this year’s cropping pattern.
- Approximately 2.3 acre-feet was used per crop acre.

**TABLE 3 – 2020 Crop Survey – Acres Irrigated**

<b>Crops</b>	<b>Upper Big Chino</b>	<b>Paulden</b>	<b>Walnut Creek</b>	<b>Williamson</b>	<b>Turkey Canyon</b>	<b>Total</b>
ALFALFA		55	2	12		69
GRASS		27	23	478	63	591
VINYARD		2				2
PASTURE			47	276		323
SOD		52				52
VEGETABLE		22				22
<b>Total Crop Acres</b>	<b>0</b>	<b>158</b>	<b>72</b>	<b>766</b>	<b>63</b>	<b>1059</b>
<b>No Crop Evident</b>	<b>1878</b>	<b>339</b>	<b>179</b>	<b>608</b>	<b>38</b>	<b>3042</b>
<b>Calculated Consumptive Use (acre-feet)</b>	<b>0</b>	<b>391</b>	<b>134</b>	<b>1779</b>	<b>152</b>	<b>2456</b>

## Modeling Project

Groundwater flow modeling was identified in Exhibit 5 of the CA#1 contract to be an intensive 3-year, \$1.2 M effort to develop a defensible computerized groundwater flow model of the Big Chino Sub-basin. In early 2017, the City entered into Contract No. 2017-246 with Golder Associates, Inc. Since that time contract amendments were executed with the third contract amendment in FY 21. The contract and its amendments, shown in **Table 4** are attributed to several conditions including price of service increases that have occurred since the original cost estimates. Original cost estimates were generated based on 2007 costs which remained in place when the CA#1 was executed in 2012. Other conditions for the amendments include greater than expected volume of data sets, extended completion dates for monitoring contracts, elevated review and coordination between Golder and STCs, and challenges related to attempting to develop and test three (3) conceptual models.

**Table 4- Final cost \$1,668,719.00 and completion date July 15, 2022**

Contract No.	Date Executed	Amount; completion date
2017-246	2/28/2017	\$1,149,300.00; 3/31/2020
2017-246A1	12/5/2019	\$277,460.00; 12/31/2020
2017-246A2	1/5/2021	\$0; 9/22/2021
2017-246A3	7/1/2021	\$241,959.00; 7/15/2022

The remaining focus areas of the contract and their associated timetables for completion are shown in **Table 5**.

**Table 5 – Model completion task and dates**

Item	Completion Date	Notes
<b>Numerical Model Development</b>	12/20/21	
Parameter Estimation		To improve model calibration
Sensitivity Analysis		Focus on new criteria for Conceptual Models 2 and 3
<b>Additional Calibration</b>	11/8/21	
Irrigation Pumping and Return Flow		Irrigation return flow is tied, as a percentage, to irrigation pumping, and as such will also be reconsidered
Fluxes Across the Southern Boundary		Decision about the most appropriate or realistic fluxes to apply across the southern model boundary
Recharge and Hydraulic Conductivity		Additional adjustments after the irrigation and boundary items above have been determined
Model Targets		Focus calibration on higher quality and value data.

<b>Model Calibration Criteria</b>	12/20/21	
Primary Calibration Criteria		Baseflow at Paulden Gage, Water Levels, Calibration statistic for predicted vs observed, Hydraulic conductivity and storage values, Hydrograph trends reasonably match key wells. Observed water level drawdown and recovery generally match past 10-20 years.
Secondary Calibration Criteria		Simulated total pumping no more than 90% of the expected total pumping volume, Baseflow comparisons
<b>Groundwater Model Report</b>	5/11/22	

## Conclusions

The FY21 project year continued to focus on development of the groundwater flow model. With the final contract amendment for the modeling coming to completion toward this end of the FY22 fiscal year. It is anticipated the Golder contract will close out on-time, no later than July 15, 2022. During the fiscal year several monitoring contracts remained active, and those may be modified to align them to the project needs (e.g. a new USGS Joint Funding Agreement for the Williamson Valley streamflow gauge, and a new contract with SRP for equipment that will be continued).

It is expected that the final annual report of the CA#1 project will be produced at the end of FY22 (July 1, 2021 through June 30 2022).

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, 2020 – June 30, 2021  
Annual Report*



# Big Chino Sub-basin Water Monitoring Project

July 1, 2020 – June 30, 2021 Annual Report for CA1 Monitoring Committee  
City of Prescott, Town of Prescott Valley, and Salt River Project

Prepared by SRP Aquifer Management and Data Analytics  
9-1-2021



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Cover photo credit: SRP Flowtography® at Big Chino Water Ranch on 8/30/2020 at 2:43 p.m. Normally during this time of year we see a visible green up following monsoon storms.



# 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 2021 monitoring period (July 1, 2020 through June 30, 2021) are contained within this report.

## SEASONAL FLOW SUMMARY

For this report, the 2021 annual reporting period refers to July 1, 2020 through June 30, 2021.

Surface water flow was not observed at each SRP Flowtography® site during the 2021 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 2021 reporting period:

- The year was extremely dry, with the only flow observed was during the 2020 monsoon.
- Only three (3) events were observed during the 2021 reporting period between only four (4) locations: UBCW, BCWPC, WVWXU, and PC.
- Four sites experienced no flow for the duration of the reporting period including: LWCCP, LWVW, LBCW, and SD.
- All flow events were within the individual location's established rating.
- The lowest recorded surface water flow event was observed at Pine Creek with a total estimated flow volume of 13 AF.
- The largest estimated surface water flow event was observed at Big Chino Wash below Partridge Creek with a total estimated flow volume of 26 AF.
- No single location experienced more than one flow event.
- As a result, the estimated event flow volume totals are the same as the estimate annual flow totals for these locations.
- The flow at UBCW is likely contained in the BCWPC data for the 7/3/2020, event. The real total flow value might be closer to 58 AF (see footnote #2 and #3 on Page #5, Table 1).



TABLE 1. BIG CHINO SUB-BASIN JULY 1, 2020 – JUNE 30, 2021 FLOW EVENT SUMMARIES INCLUDING THE ESTIMATED TOTAL ACRE-FEET (AF)

Start Date <sup>1</sup>	Upper Big Chino Wash (UBCW)	Big Chino Wash below Partridge Creek (BCWPC) <sup>2</sup>	Partridge Creek <sup>3</sup>	Pine Creek (PC)	Upper Walnut Creek at Forest Service (UWCFS) <sup>4</sup>	Upper Walnut Creek at Bridge (UWCB) <sup>5</sup>	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) <sup>5</sup>
7/3/2020	16	26	10		yes	yes					no flow
7/24/2020				13	yes	yes					no flow
8/29/2020					yes	yes		19			no flow
<b>TOTAL AF</b>	<b>16</b>	<b>26</b>	<b>10</b>	<b>13</b>				<b>19</b>			

<sup>1</sup> Flow events may start just prior to date indicated or continue into the following day

<sup>2</sup> UBCW flows may be included in these numbers as the BCWPC gage is located 1.2 miles downstream

<sup>3</sup> 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

<sup>4</sup> 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

<sup>5</sup> Sullivan Dam spill crest is not rated for discharge measurement estimates.

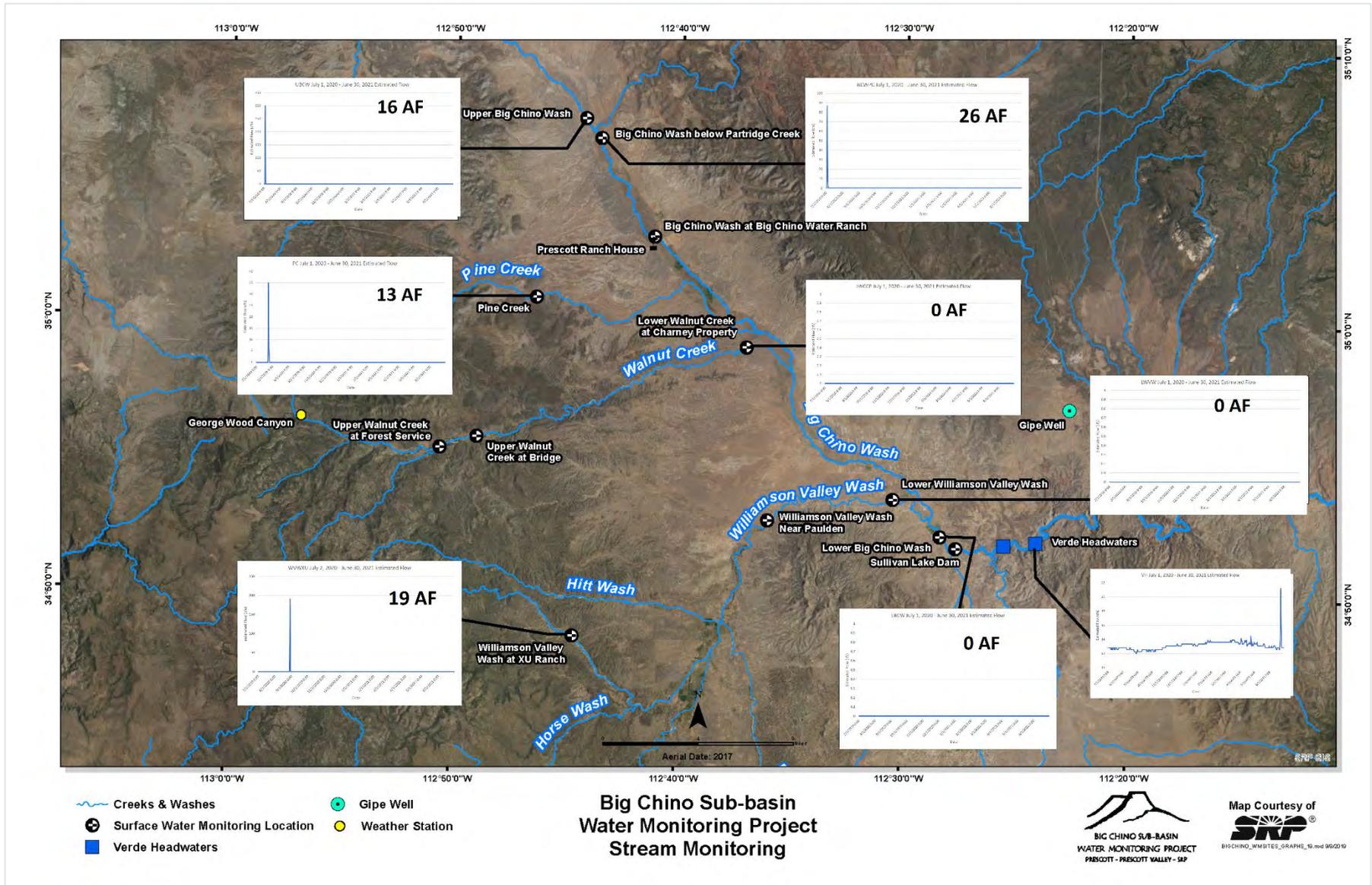


FIGURE 1. BIG CHINO SUB-BASIN MAP

# LOCATION SUMMARIES

## UPPER BIG CHINO WASH (UBCW)

One (1) event with measurable flow was observed at UBCW during the 2021 annual monitoring period. UBCW responded to one (1) monsoon related precipitation event. Peak discharge for the event was an estimated 228 cubic feet per second (cfs) observed on 7/3/2020. The event had a duration of 11.25 hours, resulting in an estimated total flow volume of 16 AF. Because this was the only event observed during the year, the 16 AF is also the estimated volume recorded at the site for the 2021 reporting period. Flow event data including duration and estimated flow volume for the annual reporting period are outlined in Table 2 and Figures 2-4.

TABLE 2. UBCW JULY 2020 – JUNE 2021 FLOW EVENTS

Start Date	Start Time <sup>6</sup>	Duration <sup>7</sup> (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
7/3/2020	1:15 p.m.	11.25	2.0	228.26	16
		<b>11.25 (total hours)</b>			<b>16 (total AF)</b>

The UBCW was visited a total of four (4) times during the 2021 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Straightened event gage

<sup>6</sup> 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).

<sup>7</sup> Flow event duration is based on discharge calculated using the existing site rating.

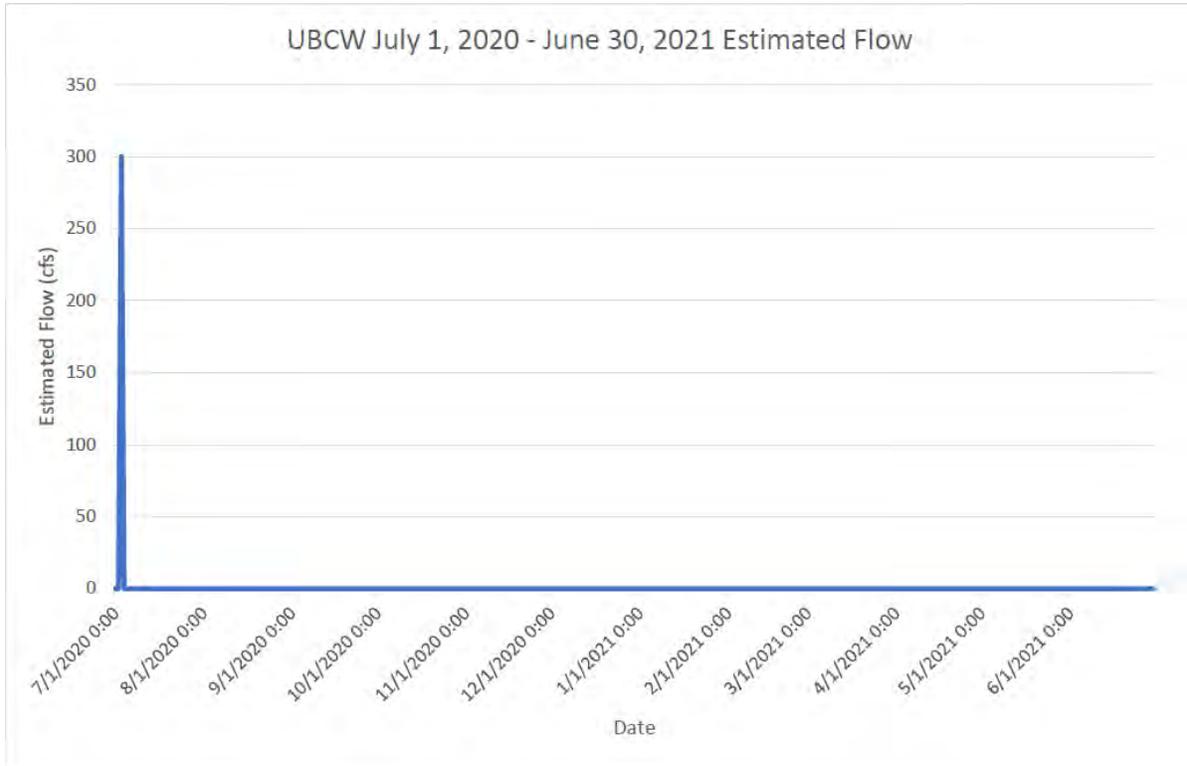


FIGURE 2. UBCW JULY 1, 2020 – JUNE 30, 2021 ANNUAL FLOW EVENTS

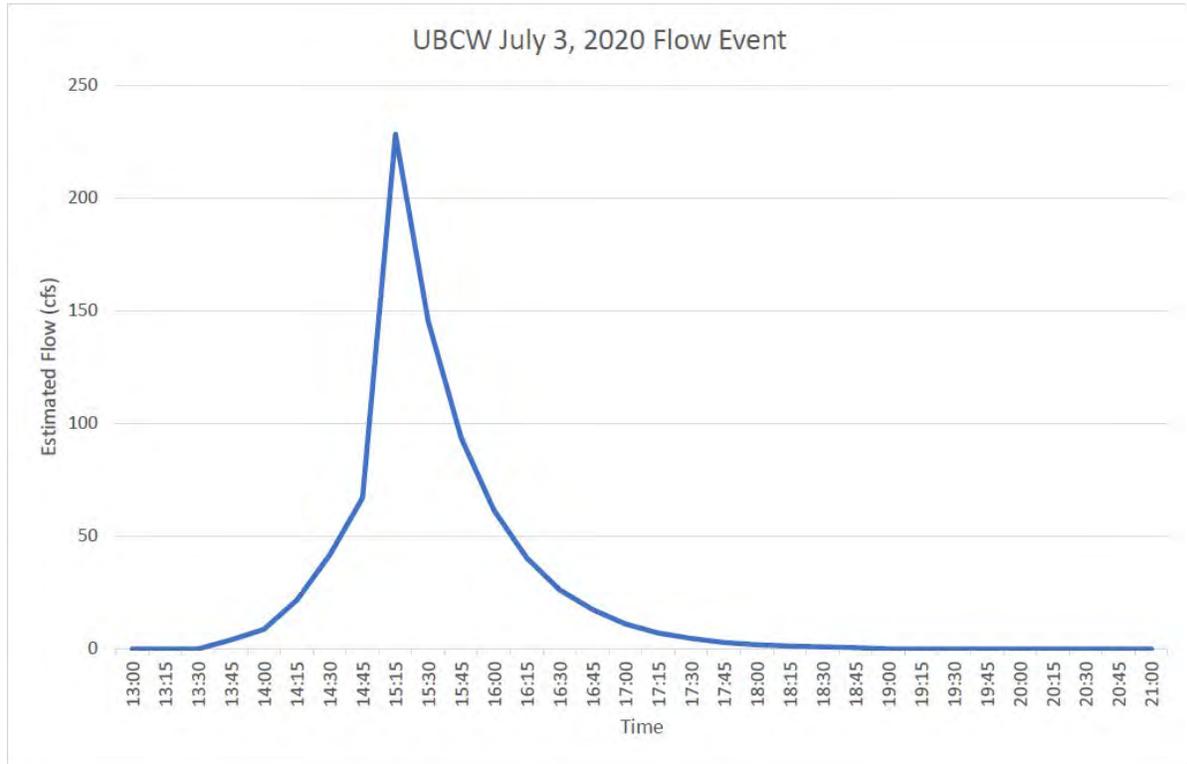


FIGURE 3. UBCW JULY 3, 2020 FLOW EVENT

UBCW at the start of the 2021 reporting period:



Peak of 7/3/2020 flow event:



End of 7/3/2020 flow event:



UBCW at the end of the 2021 reporting period:



FIGURE 4. UBCW IMAGE DATA

## BIG CHINO WASH BELOW PARTRIDGE CREEK (BCWPC)

One (1) event with measurable ephemeral flow was observed at BCWPC during the 2021 annual monitoring period. BCWPC responded to one (1) monsoon related precipitation event. Peak discharge for the event was an estimated 86.4 cfs observed on 7/3/2020. The event had a duration of 12.75 hours, resulting in an estimated total flow volume of 26 AF. Because this was the only event observed during the year, the 26 AF is also the estimated volume recorded at the site for the 2021 reporting period. The BCWPC flow event duration and estimated volume for the 2021 reporting period are outlined in Table 3 and Figures 5-7.

TABLE 3. BCWPC JULY 2020 – JUNE 2021 FLOW EVENTS

Start Date	Start Time <sup>8</sup>	Duration <sup>9</sup> (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
7/3/2020	15:30 p.m.	12.75	3.1	86.4	26
		<b>12.75 (total hours)</b>			<b>26 (total AF)</b>

The BCWPC was visited a total of four (4) times during the 2021 reporting period. All site visits to the site were for routine maintenance and data collection.

<sup>8</sup> 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).

<sup>9</sup> Flow event duration is based on discharge calculated using the existing site rating.

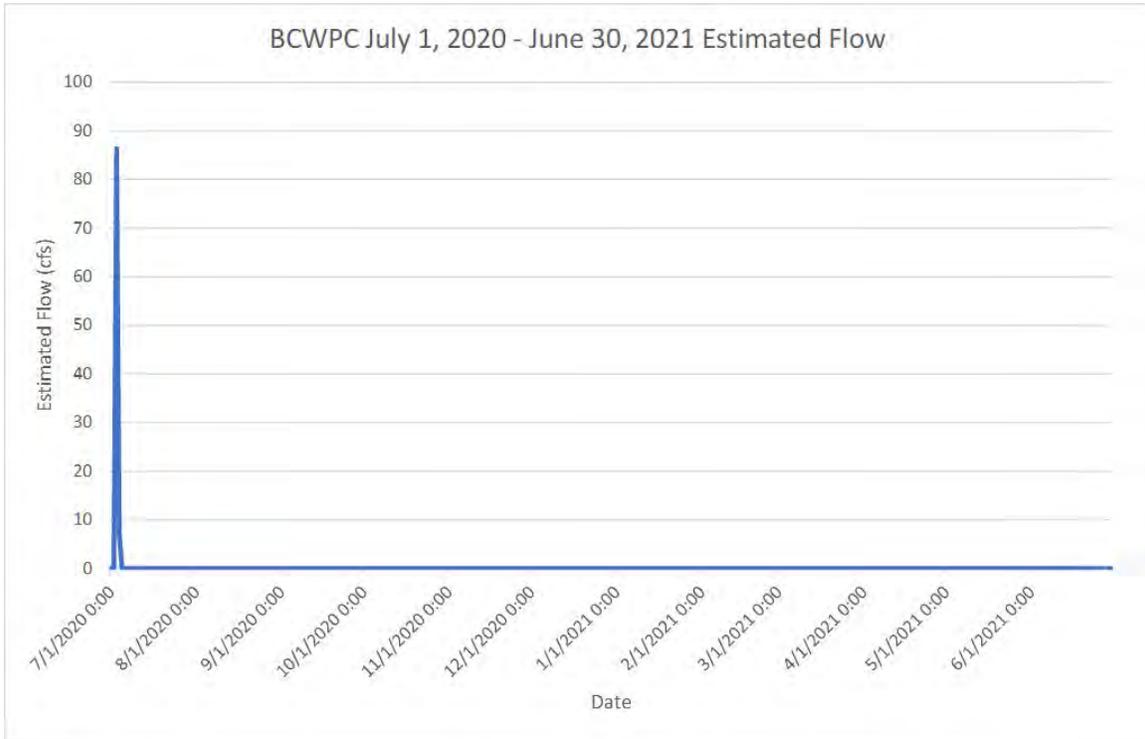


FIGURE 5. BCWPC JULY 1, 2020 – JUNE 30, 2021 ANNUAL FLOW EVENTS

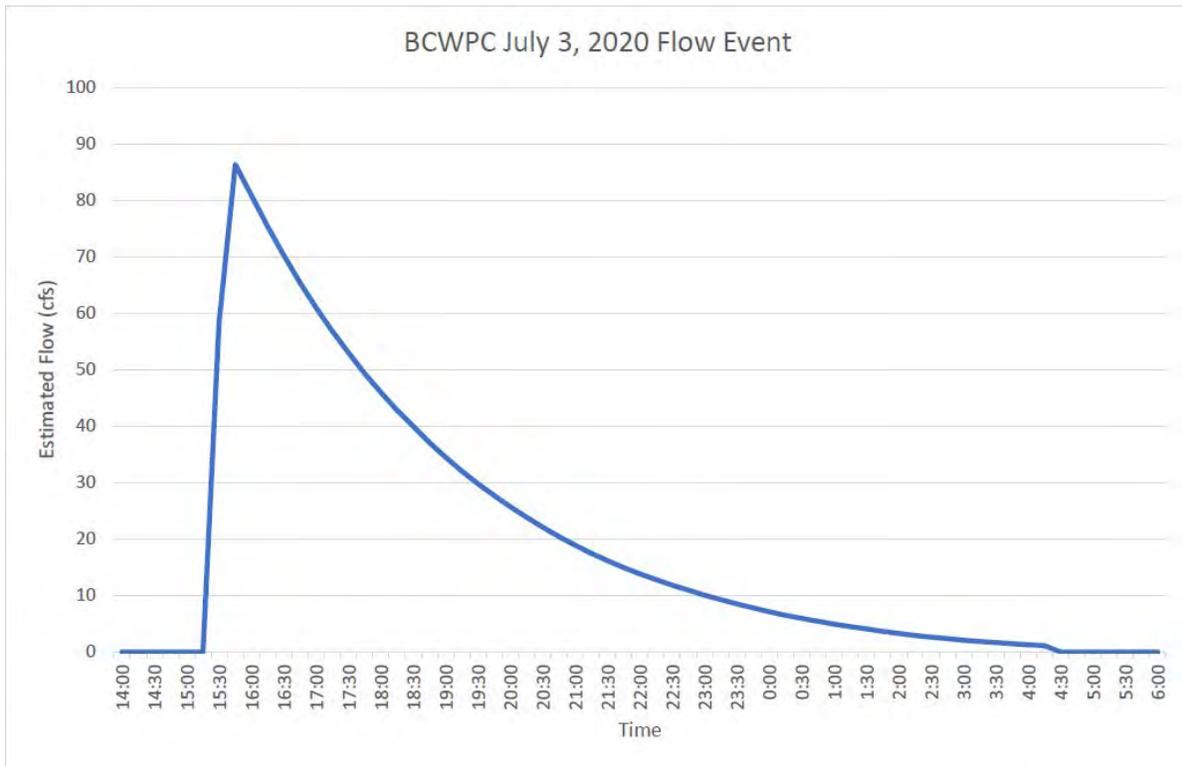


FIGURE 6. BCWPC JULY 3, 2020 FLOW EVENT

BCWPC at the start of the 2021 reporting period:



Peak of flow event on 7/3/2020:



Following day after event on 7/4/2020:



Dry channel after flow event on 7/7/2020:



BCWPC at the end of the 2021 reporting period:



FIGURE 7. BCWPC IMAGE DATA

## BIG CHINO WASH AT BIG CHINO WATER RANCH (BCWR)

Precipitation was observed in the images at BCWR on six (6) days during the 2021 annual monitoring period. Due to a camera malfunction, images between the middle of October and beginning of March were corrupted. Snow accumulation was visible on two (2) 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 2021 annual reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Upgraded camera firmware

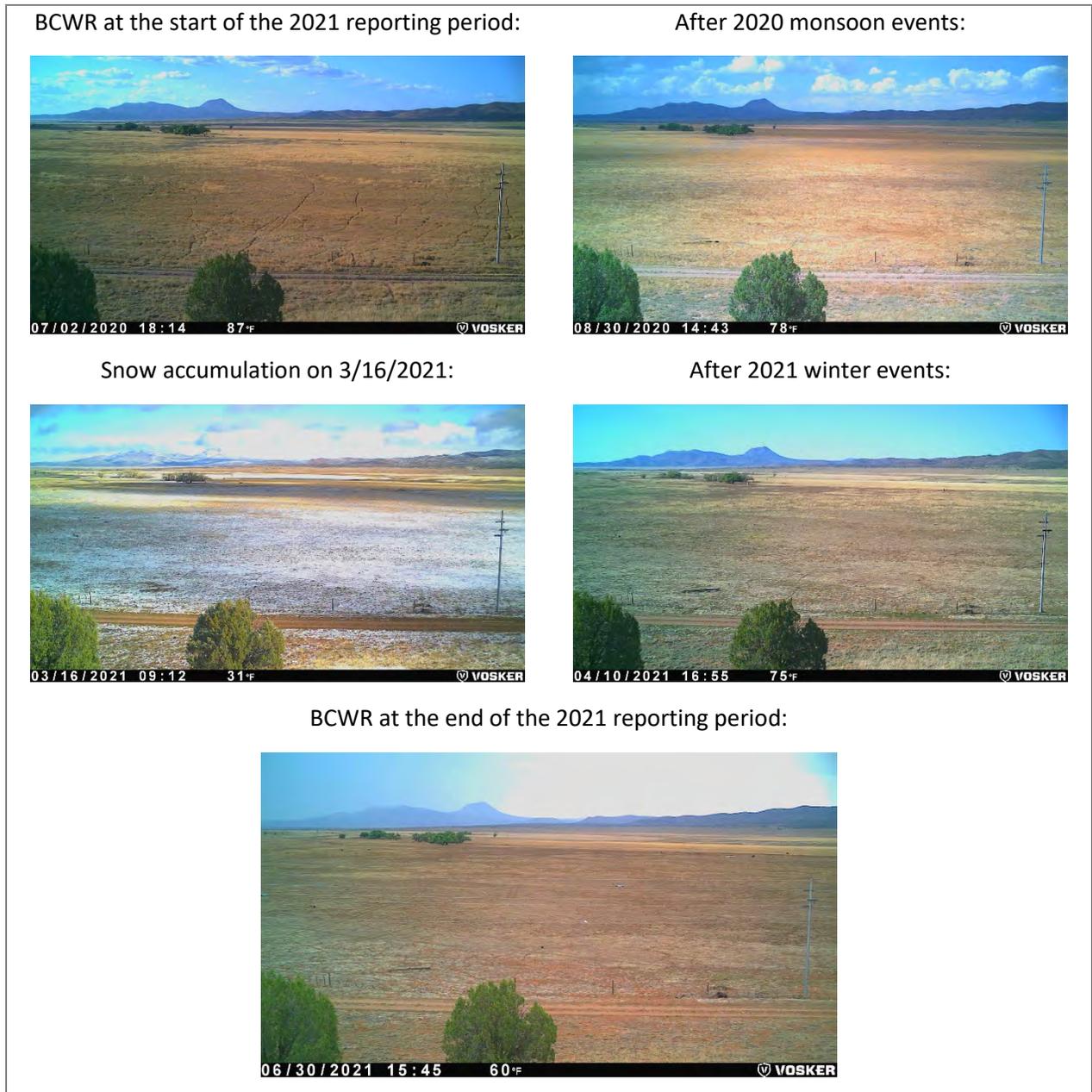


FIGURE 8. BCWR IMAGE DATA

## PINE CREEK (PC)

One (1) event with measurable flow was observed at PC during the 2021 annual monitoring period. PC responded to one (1) monsoon related precipitation event. Peak discharge for the event was an estimated 35 cfs observed on 7/24/2020. The event had a duration of 15.75 hours, resulting in an estimated total flow volume of 13 AF. Because this was the only event observed during the year, the 13 AF is also the estimated volume recorded at the site for the 2021 reporting period. PC flow event duration and estimated flow volume for the annual reporting period are outlined in Table 4 and Figures 9-11.

TABLE 4. PC JULY 2020 – JUNE 2021 FLOW EVENTS

Start Date	Start Time <sup>10</sup>	Duration <sup>11</sup> (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
7/24/2020	3:30 p.m.	15.75	0.8	35	13
		<b>15.75 (total hours)</b>			<b>13 (total AF)</b>

The PC was visited a total of four (4) times during the 2021 reporting period. All site visits to the site were for routine maintenance and data collection.

<sup>10</sup> 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).

<sup>11</sup> Flow event duration is based on discharge calculated using the existing site rating.

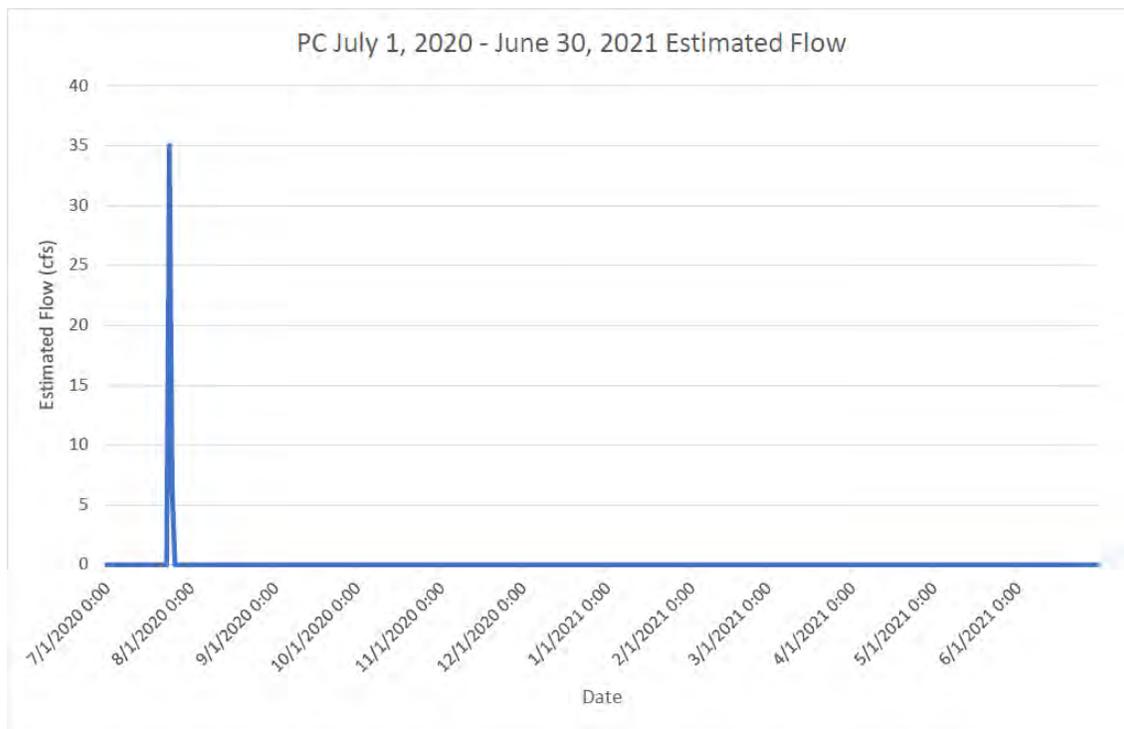


Figure 9. PC July 2020 – June 2021 Annual Flow Events<sup>12</sup>

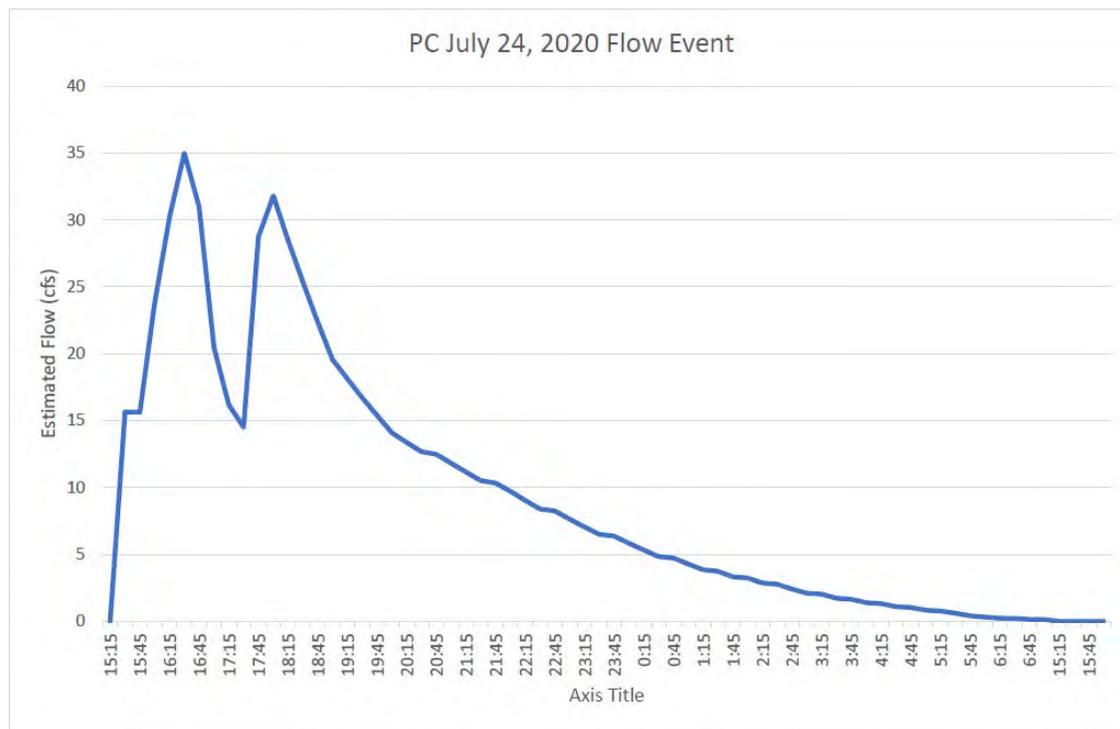


FIGURE 10. PC JULY 24, 2020 FLOW EVENT<sup>24</sup>

<sup>12</sup> Discharge is not calculated when flow exceeds the existing site rating. Flow was above the discharge rating for 3 hours.

PC at the start of the 2021 reporting period:



During flow event on 7/24/2020:



End of flow event on 7/25/2020:



PC at the end of the 2021 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 2021 annual reporting period.

Ten (10) snow accumulation events were observed during the 2021 reporting period. Only two (2) events exceeded 0.1' of snow accumulation (see Table 5). The longest lasting event started on 1/24/2021 with snow visible for 10 days and a peak depth just under 1.5'.

GWC Snow accumulation and weather station data for the 2021 reporting period are outlined in Table 5 and Figures 12-19. Some observations made during the reporting period:

- 8.51" of precipitation was observed during the 2021 reporting period

TABLE 5. GWC JULY 2020 – JUNE 2021 SNOW ACCUMULATION EVENTS

Start Date	End Date <sup>13</sup>	Snow Visible	Peak Snow Depth
1/20/2021	1/20/2021	<1 day	<0.1 feet
1/24/2021	2/2/2021	10 days	<1.5 feet
3/4/2021	3/4/2021	<1 day	<0.1 feet
3/11/2021	3/11/2021	<1 day	<0.1 feet
3/12/2021	3/12/2021	<1 day	<0.1 feet
3/13/2021	3/14/2021	2 days	<0.2 feet
3/16/2021	3/16/2021	<1 day	<0.1 feet
3/23/2021	3/24/2021	2 day	<0.1 feet
3/26/2021	3/26/2021	<1 day	<0.1 feet
3/27/2021	3/27/2021	<1 day	<0.1 feet
<b>Totals</b>		<b>&gt; 14 days</b>	<b>&gt; 2.0 feet</b>

The GWC was visited a total of four (4) times during the 2021 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Replaced the weather station solar panel and battery

<sup>13</sup> Snow may be visible in shaded areas after this date.

# George Wood Canyon: July 2020 - June 2021

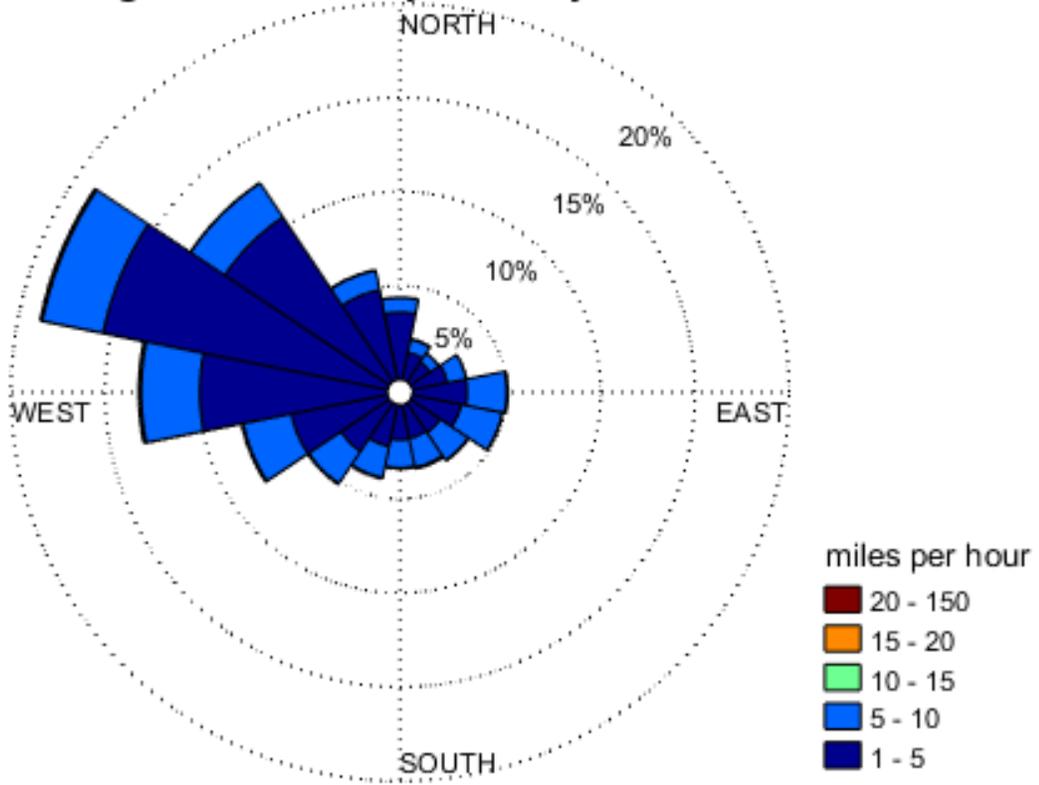


FIGURE 12. GWC JULY 2020 – JUNE 2021 WIND ROSE

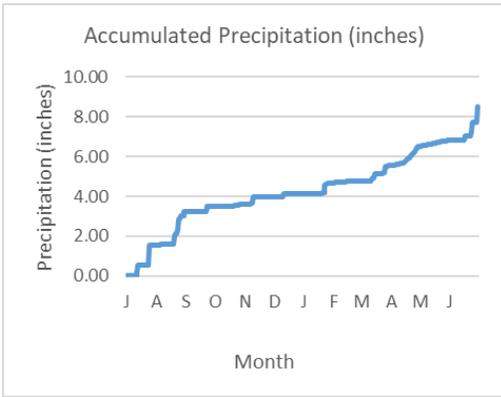


FIGURE 13. GWC JULY 1, 2020 – JUNE 30, 2021 ACCUMULATED PRECIPITATION

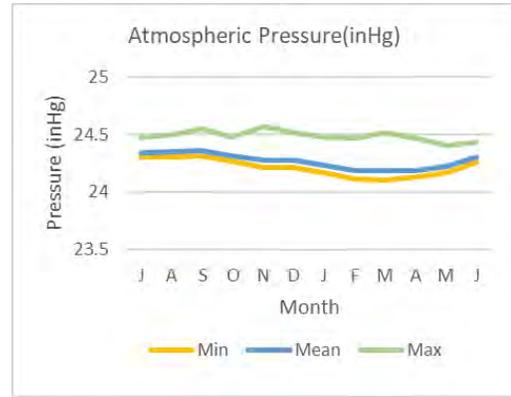


FIGURE 16. GWC JULY 1, 2020 – JUNE 30, 2021 ATMOSPHERIC PRESSURE

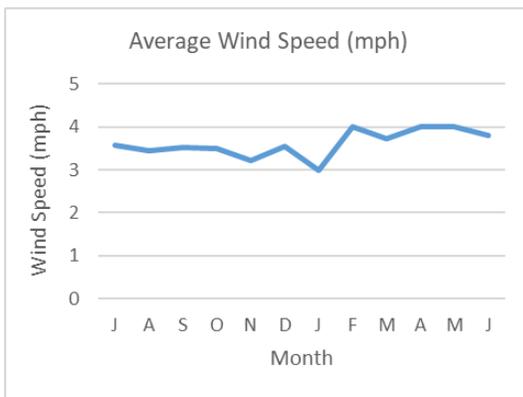


FIGURE 14. GWC JULY 1, 2020 – JUNE 30, 2021 AVERAGE WIND SPEED

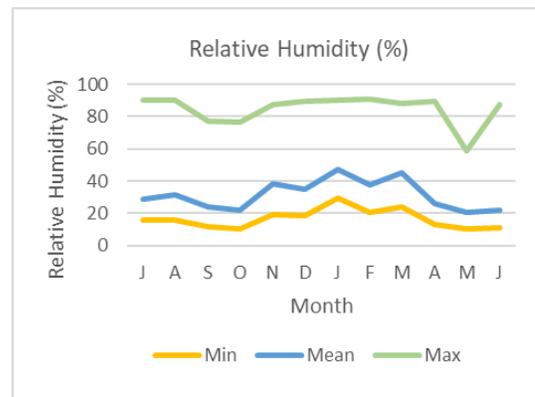


FIGURE 17. GWC JULY 1, 2020 – JUNE 30, 2021 RELATIVE HUMIDITY

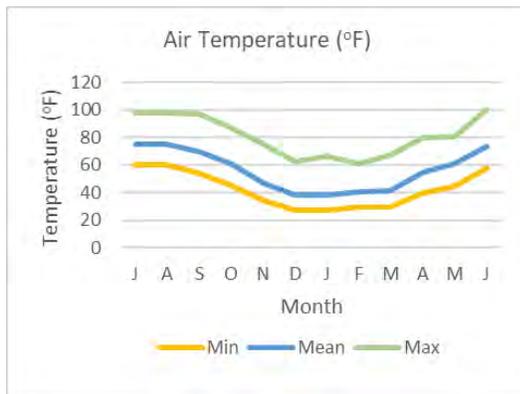


FIGURE 15. GWC JULY 1, 2020 – JUNE 30, 2021 AIR TEMPERATURE

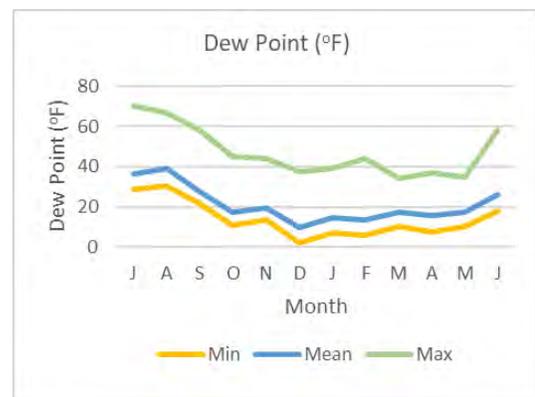


FIGURE 18. GWC JULY 1, 2020 – JUNE 30, 2021 DEW POINT

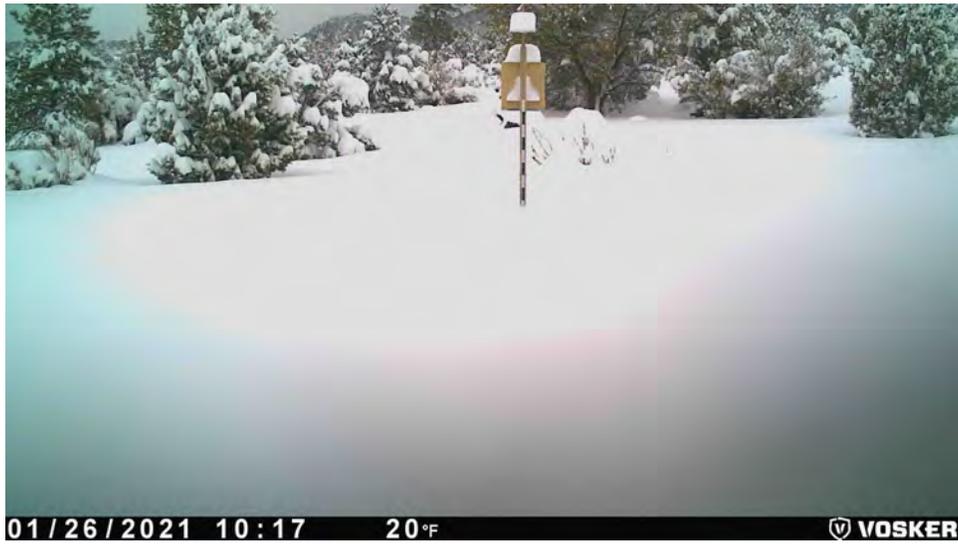
GWC at the beginning of the 2021 reporting period:



GWC at the end of the 2021 reporting period:



Peak of snow accumulation event that began on 1/24/2021:



Snow accumulation event on 3/14/2021:



FIGURE 19. GWC IMAGE DATA

## UPPER WALNUT CREEK AT FOREST SERVICE (UWCFS)

There are no estimates of actual flow at this site following the removal of the flume on December 22, 2016. The images are us to visually assess wet and dry conditions. UWCFS site images are shown in Figure 20 below. UWCFS had surface water present from the start of the reporting period through June 6, 2021.

The UWCFS was visited a total of four (4) times during the 2021 reporting period. All site visits were for routine site service and data collection.

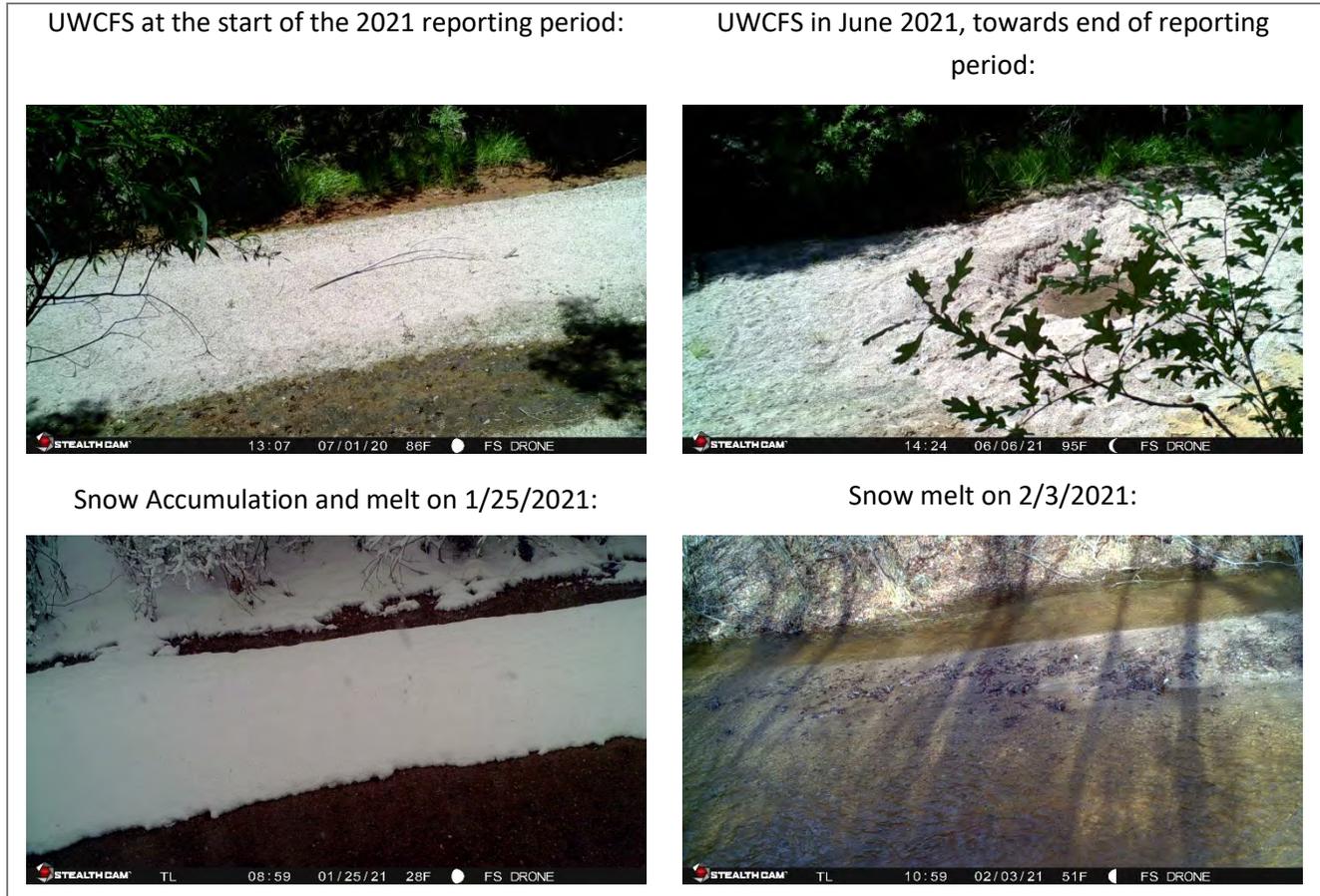


FIGURE 20. UWCFS IMAGE DATA

## UPPER WALNUT CREEK AT BRIDGE (UWCB)

Surface water is visible occasionally during the 2021 annual monitoring period (see Figure 21).

The UWCB was visited a total of four (4) times during the 2021 reporting period. All site visits were for routine site service and data collection.

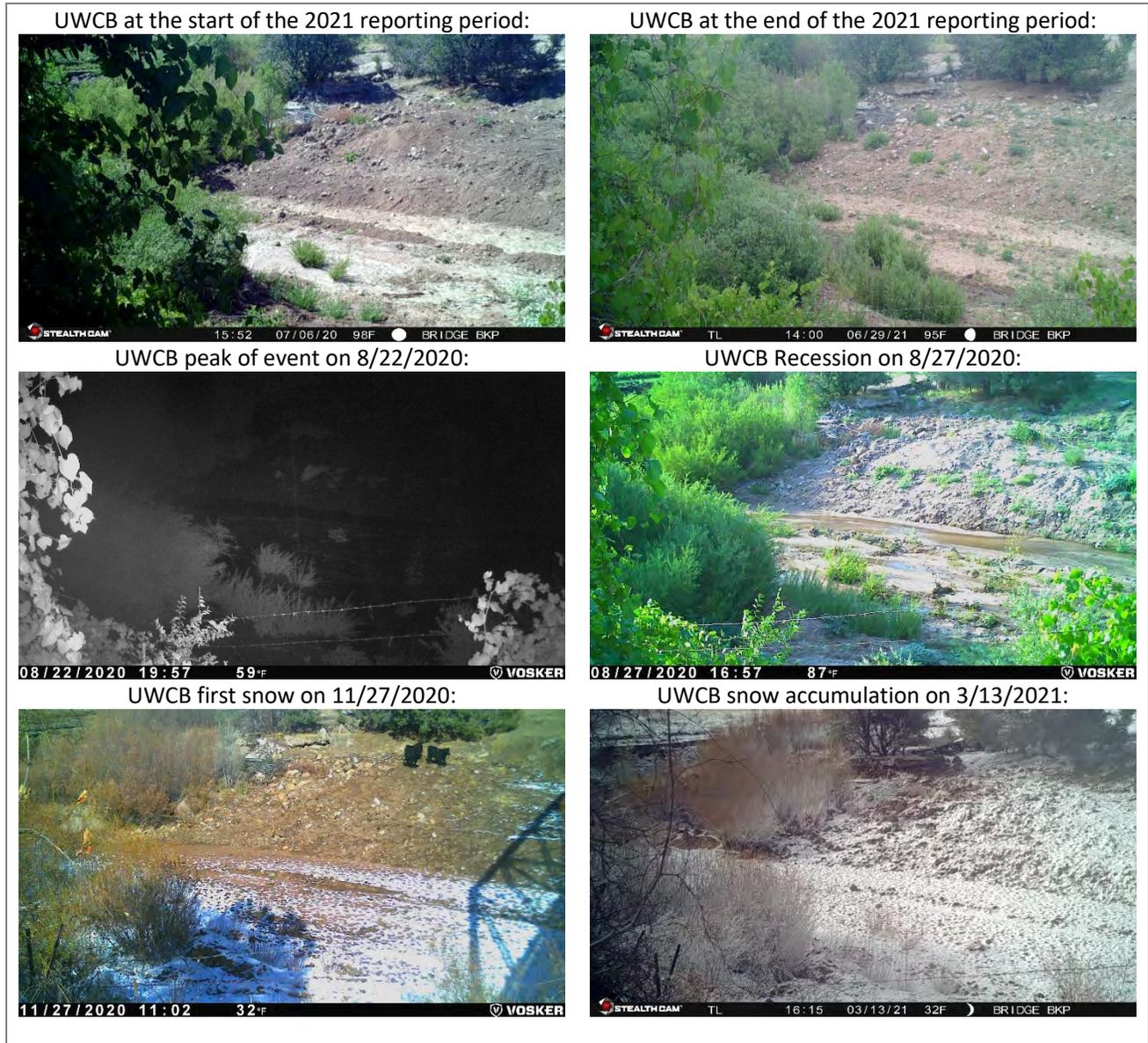


FIGURE 21. UWCB IMAGE DATA

## LOWER WALNUT CREEK AT CHARNEY PROPERTY (LWCCP)

Zero (0) events with measurable flow were observed at LWCCP during the 2021 annual monitoring period Figure 22-23.

The LWCCP was visited a total of four (4) times during the 2021 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Updated camera firmware
- Added cover to interior solar panel

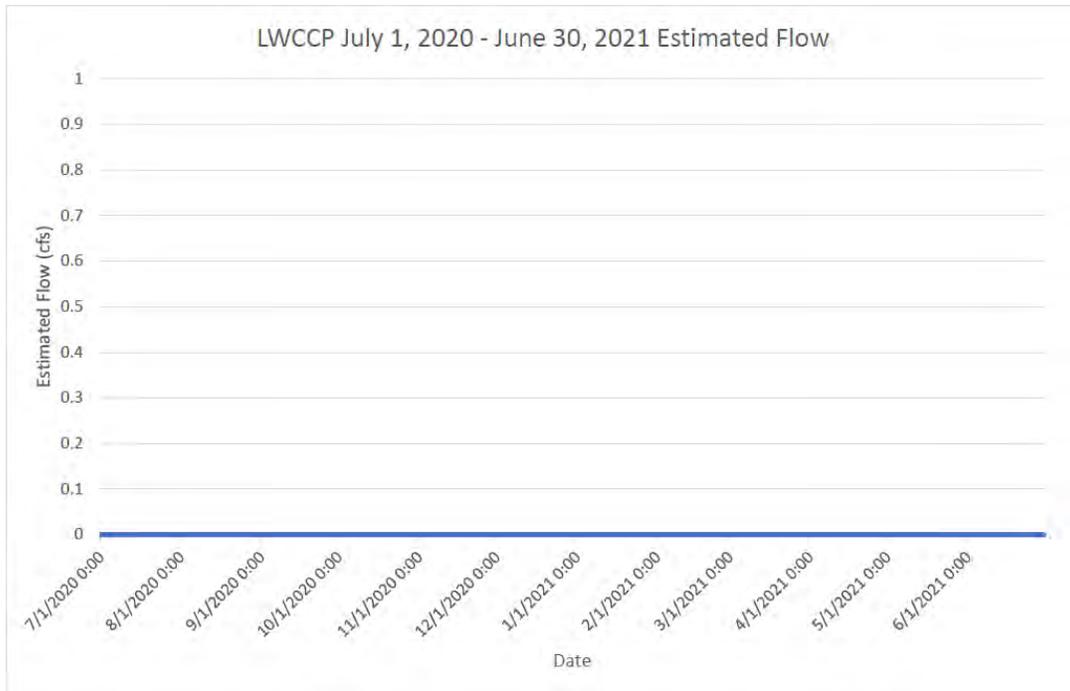


FIGURE 22. LWCCP JULY 2020 – JUNE 2021 ANNUAL FLOW EVENTS<sup>14</sup>

<sup>14</sup>Discharge is not calculated when flow exceeds the existing site rating. Flow was above the discharge rating for 2.75 hours.

LWCCP at the start of the 2021 reporting period:



LWCCP at the end of the 2021 reporting period:



FIGURE 23. LWCCP IMAGE DATA

## WILLIAMSON VALLEY WASH AT XU RANCH (WVWXU)

One (1) event with measurable flow was observed at WVWXU during the 2021 annual monitoring period. WVWXU responded to one (1) monsoon related precipitation event. Peak discharge for the event was an estimated 190 cfs observed on 8/29/2020. The event had a duration of 3.25 hours, resulting in an estimated total flow volume of 19 AF. Because this was the only event observed during the year, the 19 AF is also the estimated volume recorded at the site for the 2021 reporting period. WVWXU flow event duration and estimated flow volume for the annual reporting period are outlined in Table 6 and Figures 24-26 below.

TABLE 6. WVWXU JULY 2020 – JUNE 2021 FLOW EVENTS

Start Date	Start Time <sup>15</sup>	Duration <sup>16</sup> (hours)	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
8/29/2020	7:15 p.m.	3.25	1.3	190	19
		<b>3.25 (total hours)</b>			<b>19 (total AF)</b>

The WVWXU was visited a total of five (5) times during the 2021 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Site repaired with additional rebar and a new foundation, including a new event gage and transducer. Site survey was conducted once the new gage was installed.

<sup>15</sup> Start times are approximate and actual start time are within  $\pm 15$  minutes of the noted time. Events may also continue into the next day(s).

<sup>16</sup> Flow event duration is based on discharge calculated using the existing site rating.

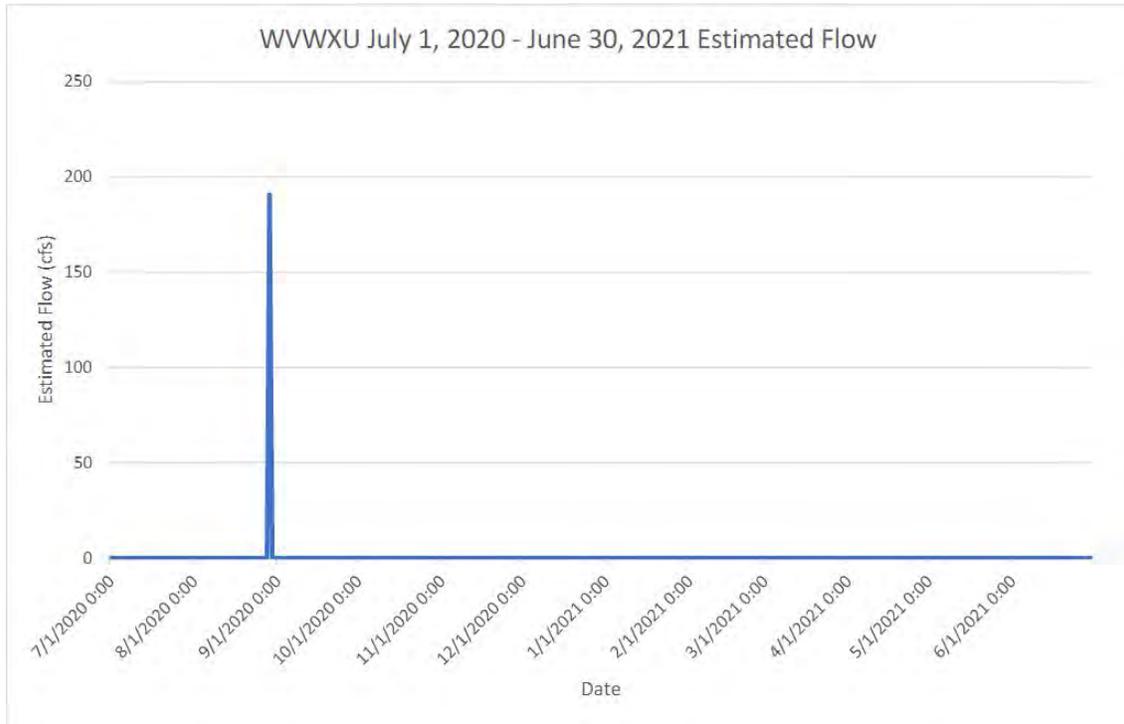


FIGURE 24. WVWXU JULY 2020 – JUNE 2021 ANNUAL FLOW EVENTS

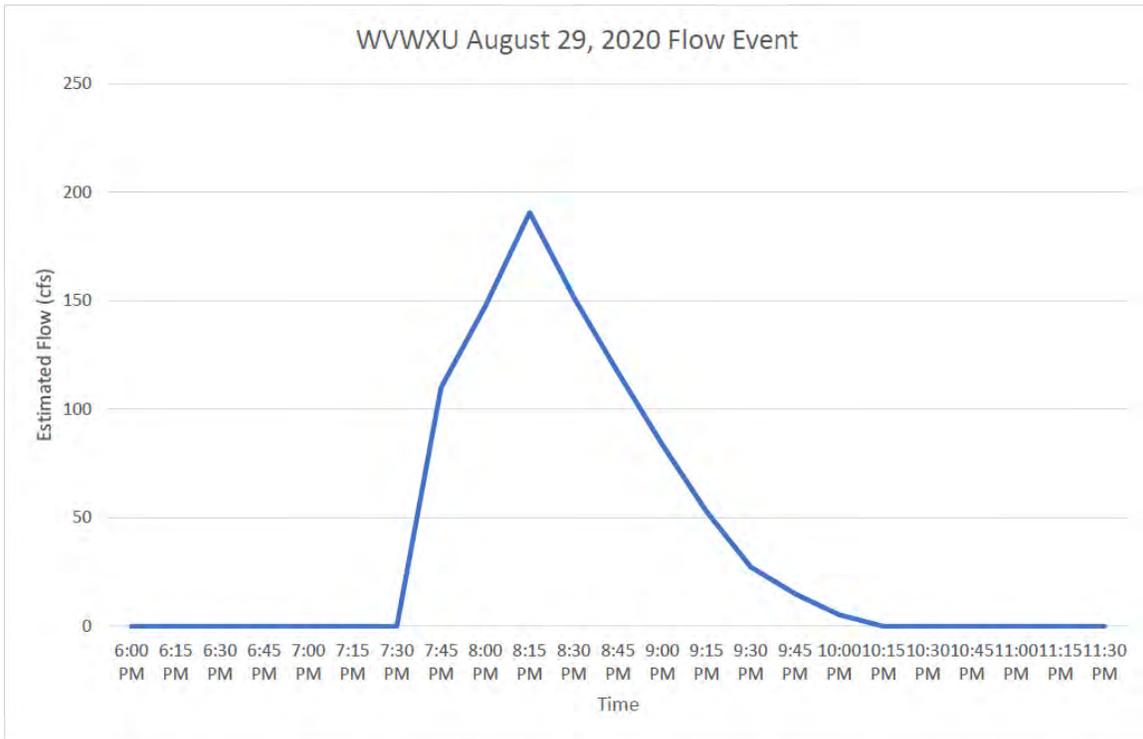


FIGURE 23. WVWXU AUGUST 29, 2020 FLOW EVENT

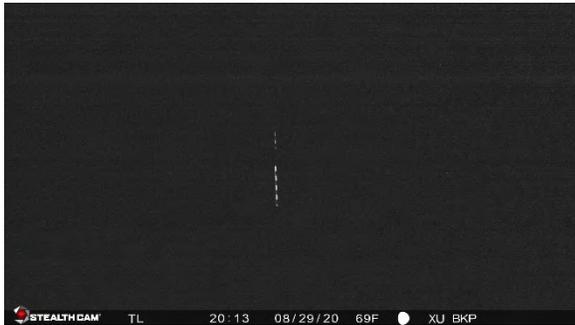
WVWXU at the start of the 2021 reporting period:



Start of 8/29/2020 flow event:



Peak of 8/29/2020 flow event:



WVWXU on 8/30/2020 during flow recession:



WVWXU at the end of the 2021 reporting period:



FIGURE 24. WVWXU IMAGE DATA

## LOWER WILLIAMSON VALLEY WASH (LWVW)

Zero (0) events with measurable flow were observed at LWCCP during the 2021 annual monitoring period, as seen in Figures 27-28 below.

The LWVW was visited a total of five (5) times during the 2021 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Site repaired with additional rebar and a new foundation, including a new event gage and transducer. Site survey was conducted once the new gage was installed.

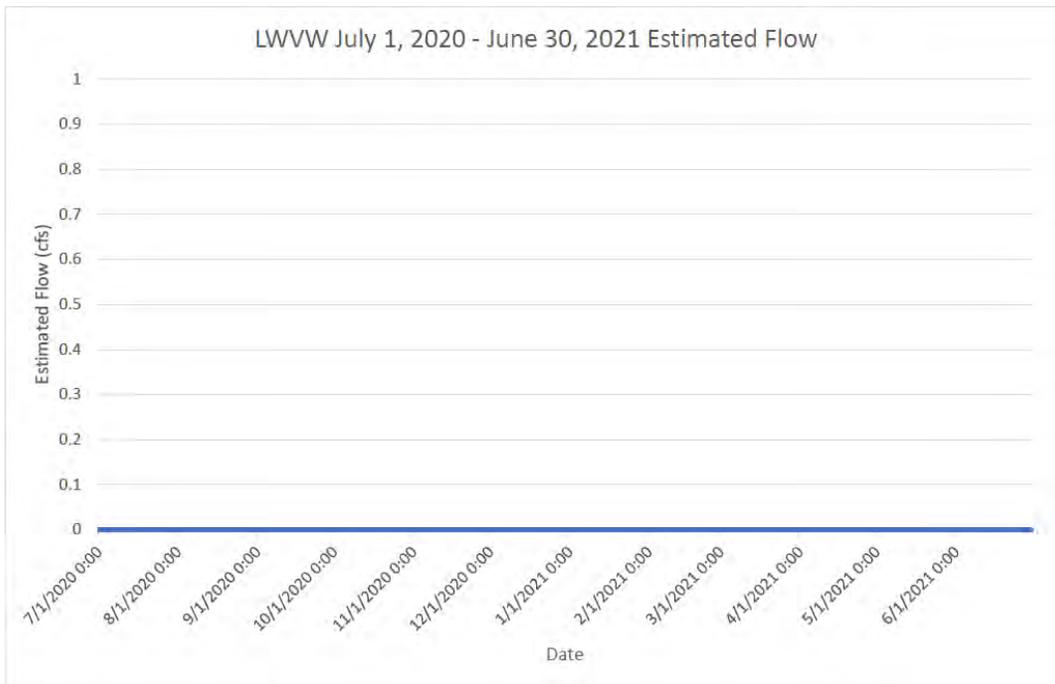


FIGURE 25. LWVW JULY 2020 – JUNE 2021 ANNUAL FLOW EVENTS<sup>17</sup>

<sup>17</sup> Discharge is not calculated when flow exceeds the existing site rating. Flow was above the discharge rating for 10.25 hours.

LWVW at the start of the 2021 reporting period:



LWVW at the end of the 2021 reporting period:



FIGURE 28. LWVW IMAGE DATA

## LOWER BIG CHINO WASH (LBCW)

Zero (0) events with measurable flow were observed at LWCCP during the 2021 annual monitoring period, as seen Figures 29-30 below.

The LBCW was visited a total of four (4) times during the 2021 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Replaced the primary and backup batteries
- Upgraded camera firmware
- Replaced camera backplate
- Added cover to interior camera solar panel

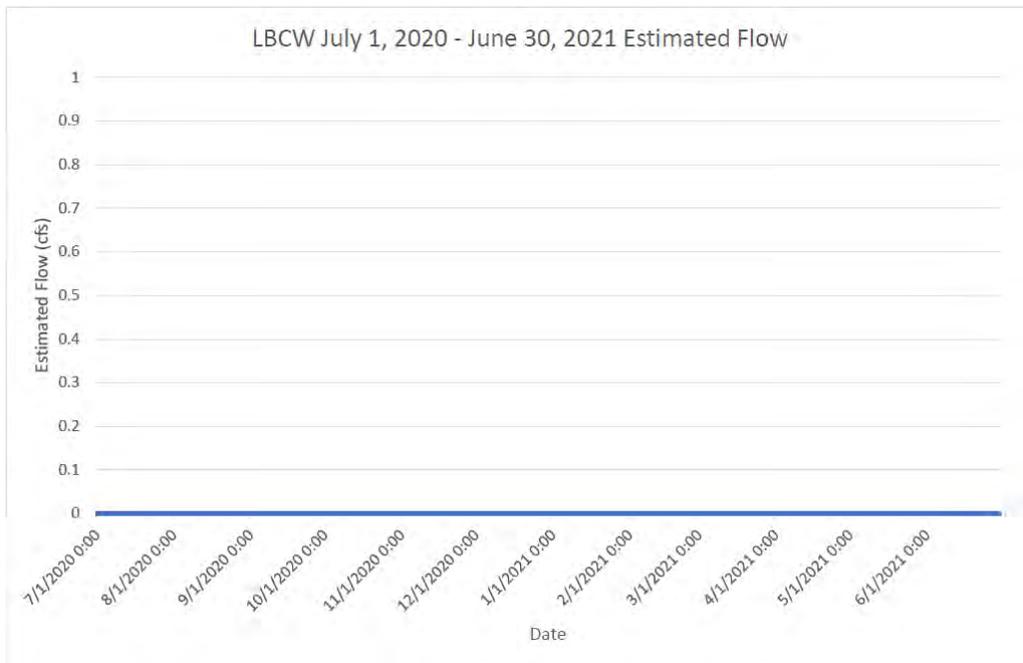


FIGURE 29. LBCW JULY 2020 – JUNE 2021 ANNUAL FLOW EVENTS<sup>18</sup>

LBCW at the start of the 2021 reporting period:



Snow the LBCW site after a winter event:



LBCW at the end of the 2021 reporting period:



FIGURE 30. LBCW IMAGE DATA

## SULLIVAN DAM (SD)

Zero (0) events were observed at SD during the 2021 annual monitoring period, as seen in Figures 31-32 below.

The SD was visited a total of four (4) times during the 2021 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Replaced solar regulator
- Recalibrated pressure transducer

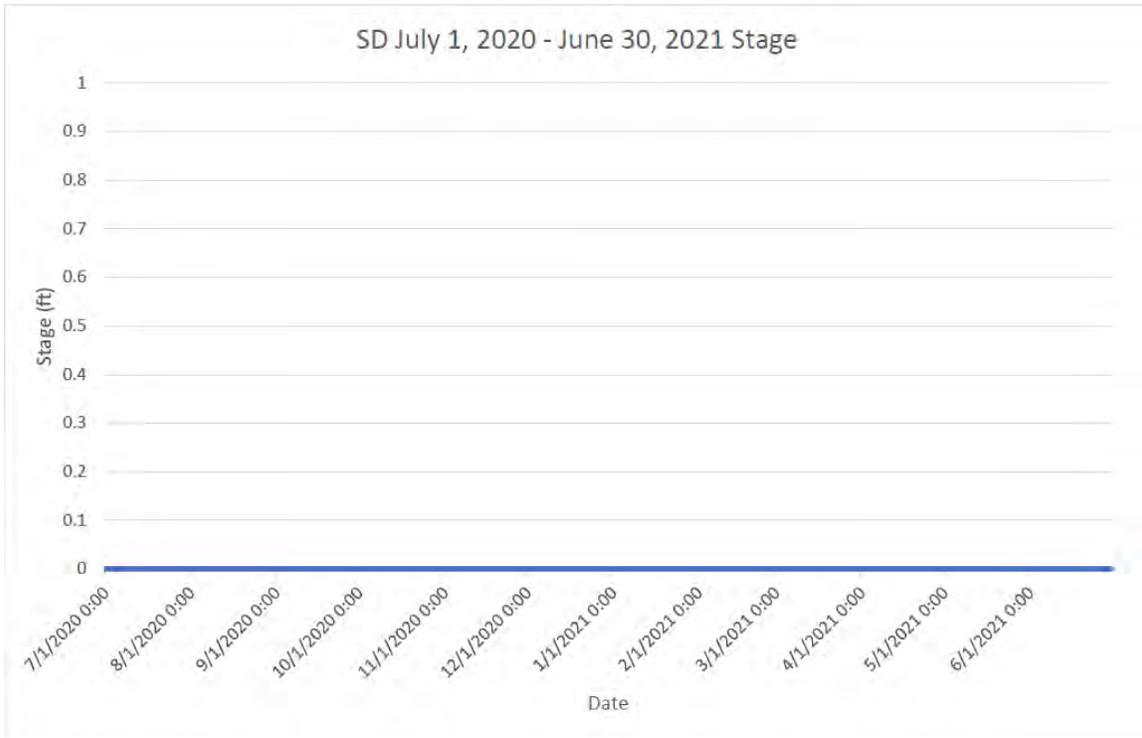


FIGURE 26. SD JULY 2020 - JUNE 2021 STAGE OVER SPILL CREST DATA

SD at the start of the 2021 reporting period:



SD at the end of the 2021 reporting period:



FIGURE 32. SD IMAGE DATA

## VERDE HEADWATERS AT CAMPBELL RANCH (VHCR)

One (1) event was observed at VHCR during the 2021 annual monitoring period (for this site and report, a flow event was defined as exceeding a flow rate of over 20 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 7 and Figure 33-36 below).

TABLE 7. VHCR AND VERDE RIVER NEAR PAULDEN, AZ USGS JULY 2020 – JUNE 2021 PEAK FLOW EVENT DATA

Date	VHCR	USGS Verde River near Paulden, AZ
6/24/2021	21.21 cfs	23.3 cfs

The VHCR was visited a total of four (4) times during the 2021 reporting period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Pumped stilling well and calibrated site

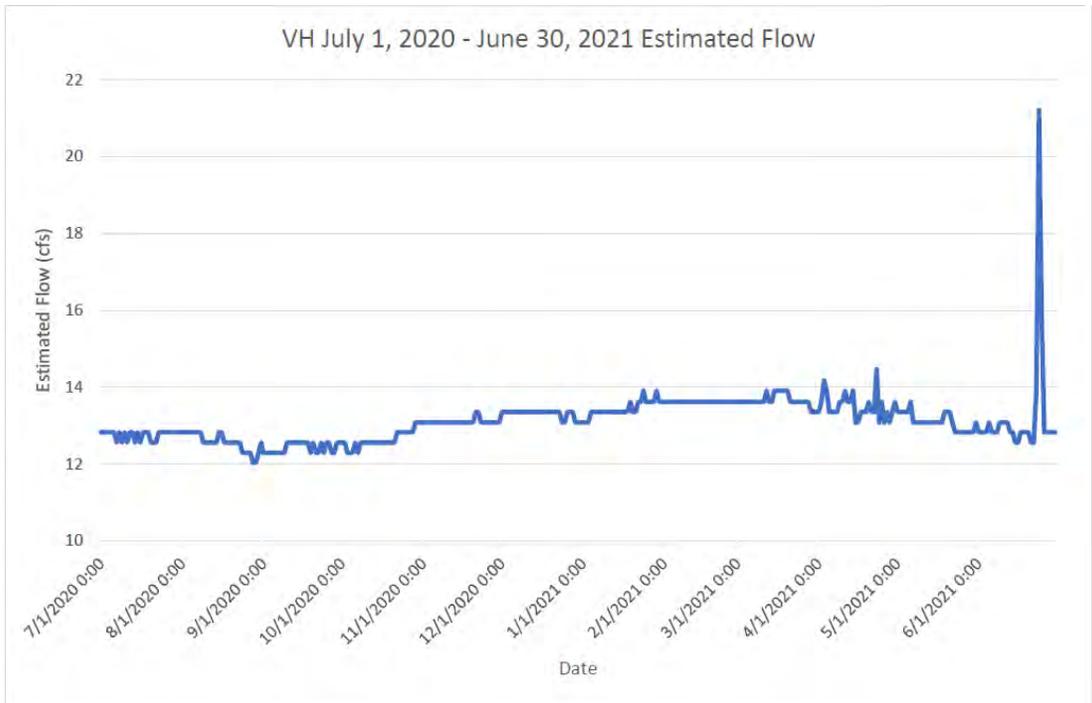


FIGURE 33. VHCR JULY 2020 – JUNE 2021 ANNUAL FLOW EVENTS<sup>19</sup>

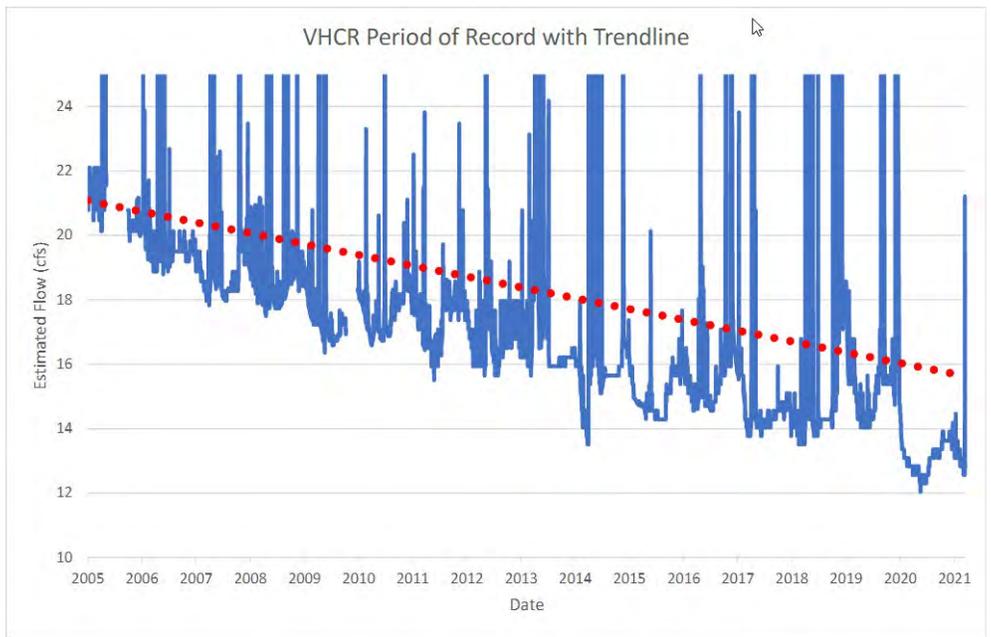


FIGURE 327. VHCR PERIOD OF RECORD FLOW EVENTS<sup>48</sup>

<sup>19</sup> Discharge is not calculated when flow exceeds the existing site rating. Flow was above the discharge rating for 238 hours from January through March 2019.

VHCR at start of 2021 reporting period:



VHCR at end of 2021 reporting period:



FIGURE 35. VHCR SITE IMAGES

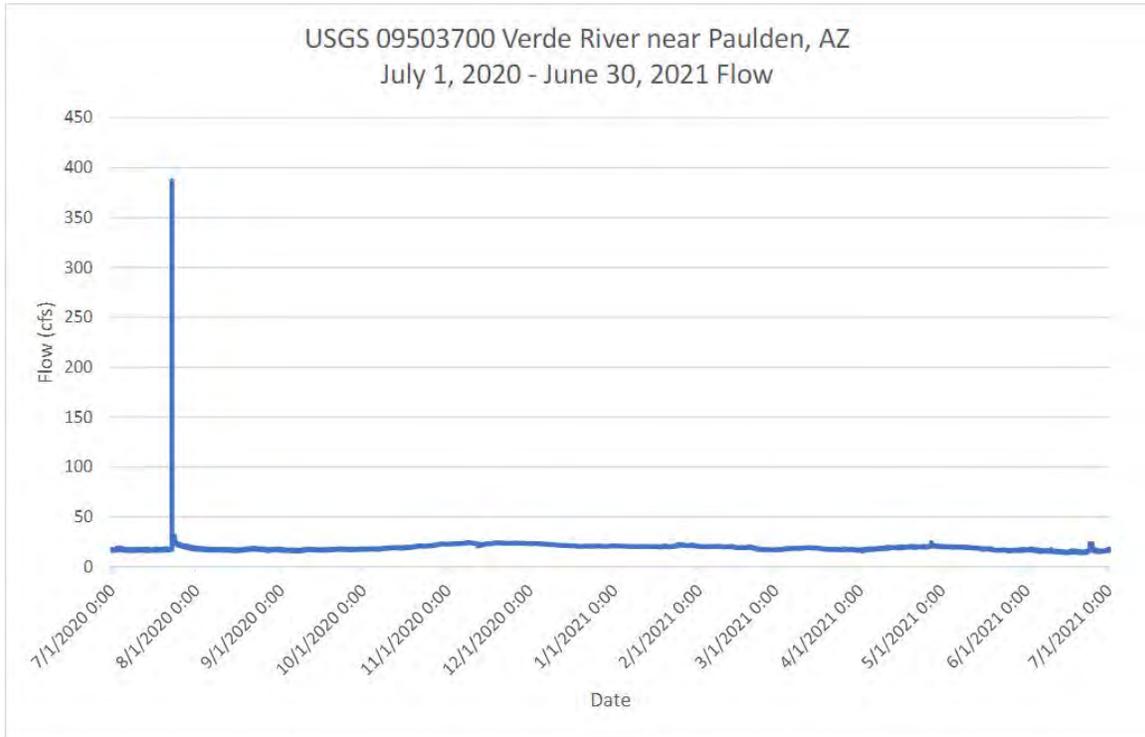


FIGURE 36. USGS VERDE RIVER NEAR PAULDEN, AZ JULY 2020 – JUNE 2021 FLOW EVENTS

## GIPE WELL (GW)

The GW location records the distance from land to water (stage in feet below land surface). Between July 2020 and June 2021, the overall depth to water level increased 1.28 feet (see Figures 37-39 below). It is important to note that due to deteriorated pipe conditions, data can no longer be collected in confidence at this site. After being instructed to stop monitoring at this site by the CA#1 monitoring committee, SRP staff stopped data collection and site visits to Gipe Well in May 2021.

The GW site was visited a total of three (3) times during the 2021 reporting period. All site visits were for routine maintenance and data collection.



*FIGURE 37. GW SITE IMAGE FOR REFERENCE*

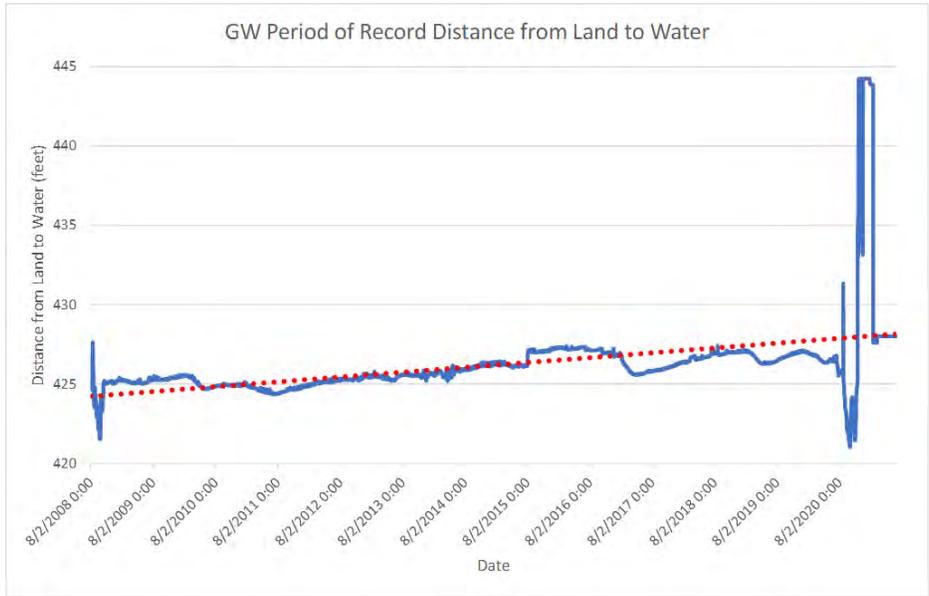


FIGURE 38. GIPE WELL PERIOD OF RECORD 8/1/2008 - 6/30/2021 DISTANCE FROM LAND TO WATER



FIGURE 39. GW JULY 2020 – JUNE 2021 DISTANCE FROM LAND TO WATER

## SUMMARY

- The July 1, 2020 – June 30, 2021 appears to be the driest year in the Big Chino sub-basin since monitoring began in 2013.
- The only measurable flow occurred during the 2020 monsoon season.
- There were only three (3) days with observable flow during the year.
- Four (4) location had observable flow during the year.
- No location experience more than one (1) flow event during the year.
- The largest estimated surface water flow volume for a single event was observed at Big Chino Wash below Partridge Creek with a total estimated flow volume of 26 AF.
- 8.51” of precipitation was observed at GWC.
- No water flowed over Sullivan Dam during the reporting period.
- The total flow volume observed in the sub-basin for the reporting period was approximately 58 AF.
- According to the data, the depth to water level increased approximately 1.28 feet during the period.
- 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	228472	Arizona State Land Department	B(17- 02)11ABA	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)01ABD	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) E02DCA	500	Not cased	328.3	GWSI
MW-4f.1 (Patton) <sup>1</sup>	803378	Southwest Land and Cattle Co.	B(18-03) 26BDD	92	25 to 60 and 80 to 90	15.5 to 18.3	GWSI
MW-4f.2 (Johnson) <sup>1</sup>	557247	Southwest Land and Cattle Co.	B(18-03) 26BDB1	320	37 to 320	119.4 to 141.8	GWSI
WMW-1 (Pump 7) <sup>2</sup>	624116	City of Prescott	B-20-04 19CBA	600	unk	66.2 to 103	GWSI

WMW-2 (200' N of Pump 3) <sup>2</sup>	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) <sup>2</sup>	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) <sup>2</sup>	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

<sup>1</sup>Southwest Groundwater Consultants, January 4, 2017

<sup>2</sup>Southwest Groundwater Consultant, December 23, 2004

Stream flow Monitoring

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

<b>Name</b>	<b>Completion Date</b>	<b>Comments</b>
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 Big Chino Water 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**

<b>Agency Name</b>	<b>Data Portal</b>
YCFCD	<a href="https://yavapaiaz.gov/ycflood/">https://yavapaiaz.gov/ycflood/</a>
USGS Arizona	<a href="http://waterdata.usgs.gov/az/nwis/rt">http://waterdata.usgs.gov/az/nwis/rt</a>
NWS-HADS - Camp Wood – CPWA3 - Ashfork – ASFA3	<a href="https://hads.ncep.noaa.gov/">https://hads.ncep.noaa.gov/</a>  <a href="https://hads.ncep.noaa.gov/cgi-bin/hads/interactiveDisplays/displayMetaData.pl?table=dc&amp;nesdis_id=CE2280DC">https://hads.ncep.noaa.gov/cgi-bin/hads/interactiveDisplays/displayMetaData.pl?table=dc&amp;nesdis_id=CE2280DC</a>

	<a href="https://hads.ncep.noaa.gov/cgi-bin/hads/interactiveDisplays/displayMetaData.pl?table=dcp&amp;nesdis_id=F001D610">https://hads.ncep.noaa.gov/cgi-bin/hads/interactiveDisplays/displayMetaData.pl?table=dcp&amp;nesdis_id=F001D610</a>
Historic Climatic Data	<a href="http://www.wrcc.dri.edu/summary/climsmaz.html">http://www.wrcc.dri.edu/summary/climsmaz.html</a>

### Existing Weather Stations in the Big Chino Sub-basin<sup>1</sup>

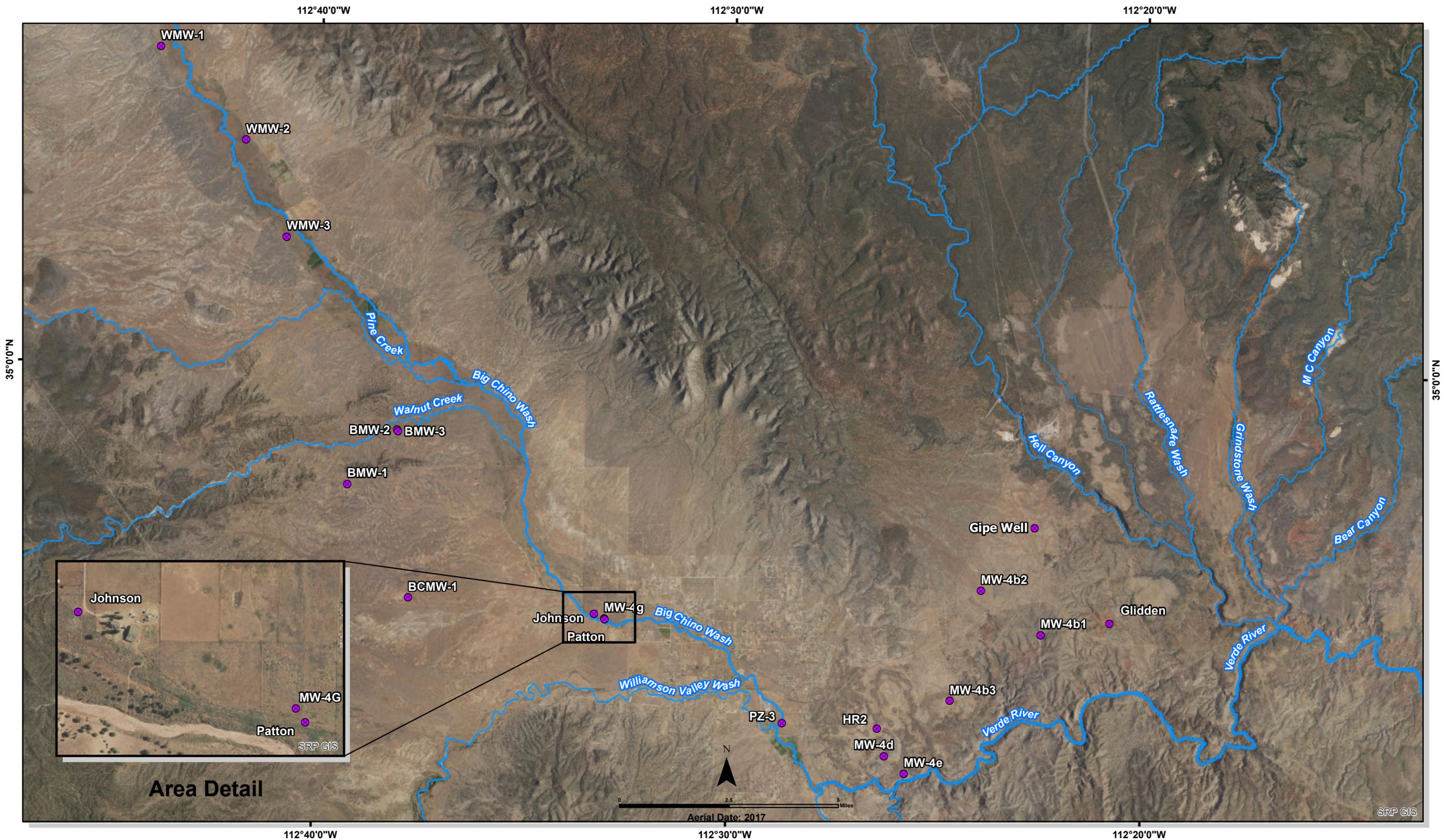
Station Name	Responsible Agency	Data Collected
Granite Basin	YCFCD	Precipitation
Walnut Creek	YCFCD	Precipitation/Stage
Big Chino Wash @ SR 89	YCFCD	Precipitation/Stage
CYFD @ Outer Loop Rd	YCFCD	Precipitation
Hyde Mountain	YCFCD	Precipitation
Williamson Valley FD	YCFCD	Precipitation
Seligman Airport	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 <sup>1</sup>	YCFCD	Precipitation/Weather

<sup>1</sup> Not all Weather Stations are included on Maps 7 and 7a.

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

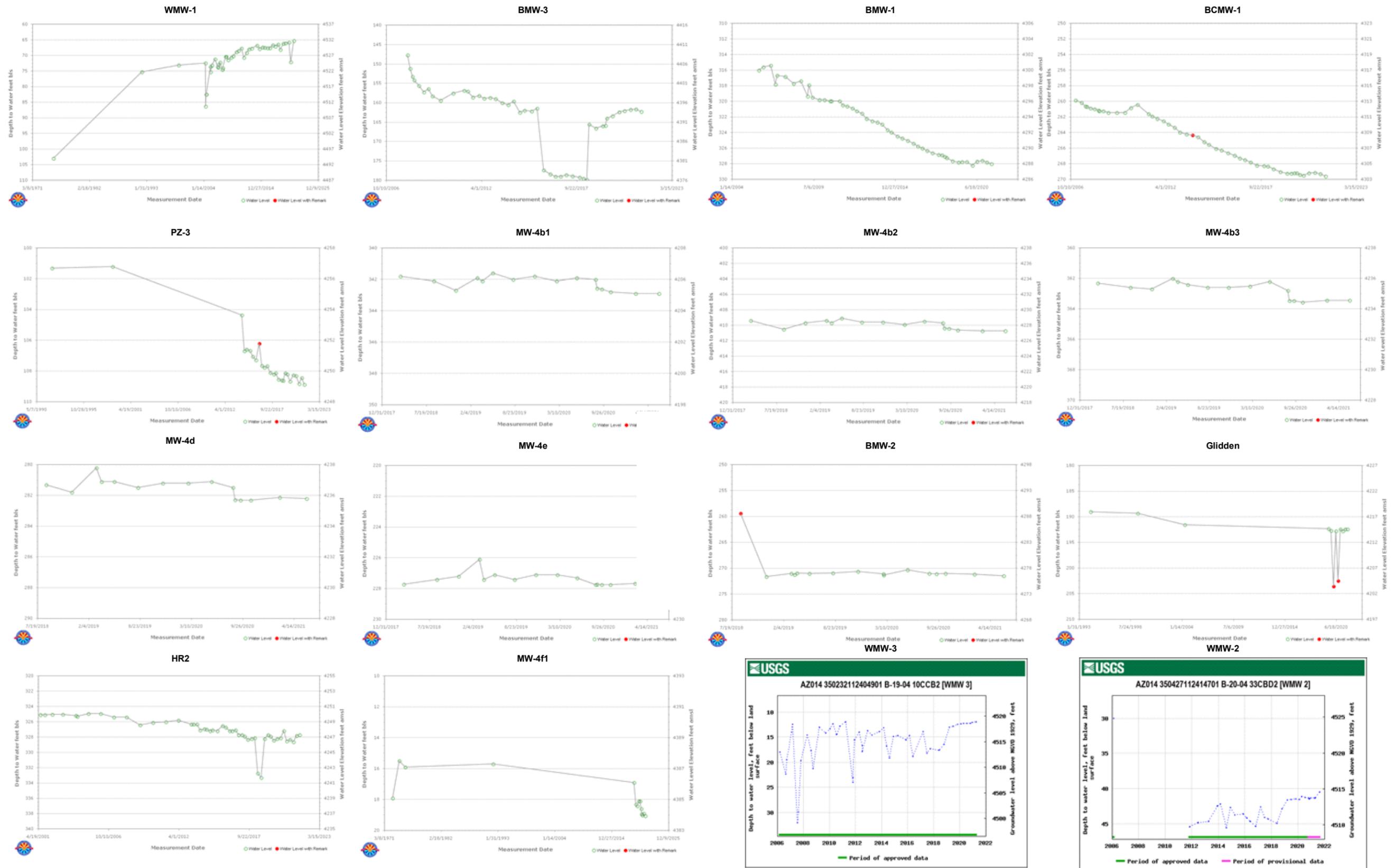
# *APPENDIX III*

## *Maps*

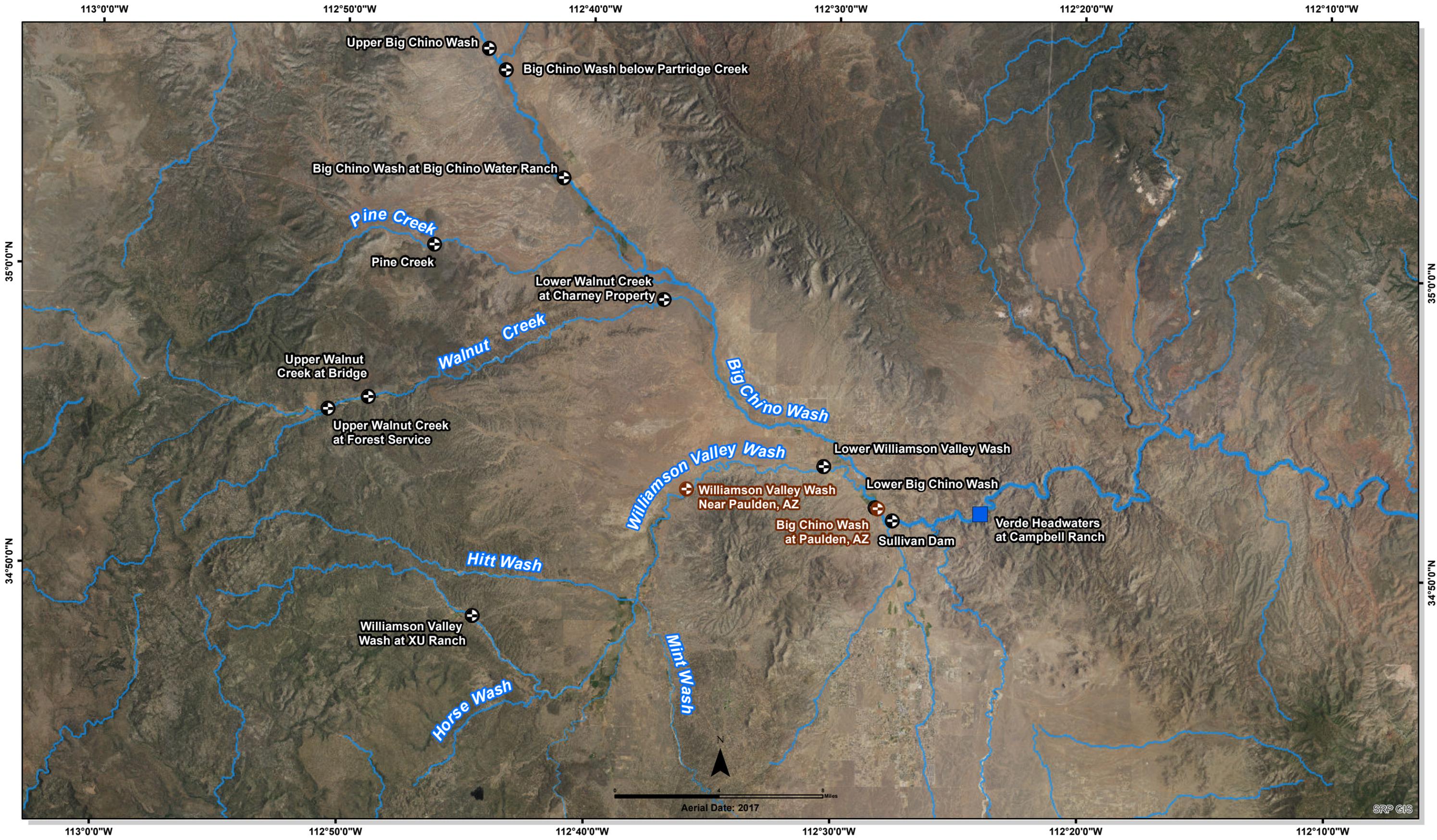


Existing Monitor Well

**Map 1**  
**Big Chino Sub-basin Water Monitoring Project**



## Map 2 Big Chino Sub-Basin Well Hydrographs



-  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)

113°0'0"W

112°50'0"W

112°40'0"W

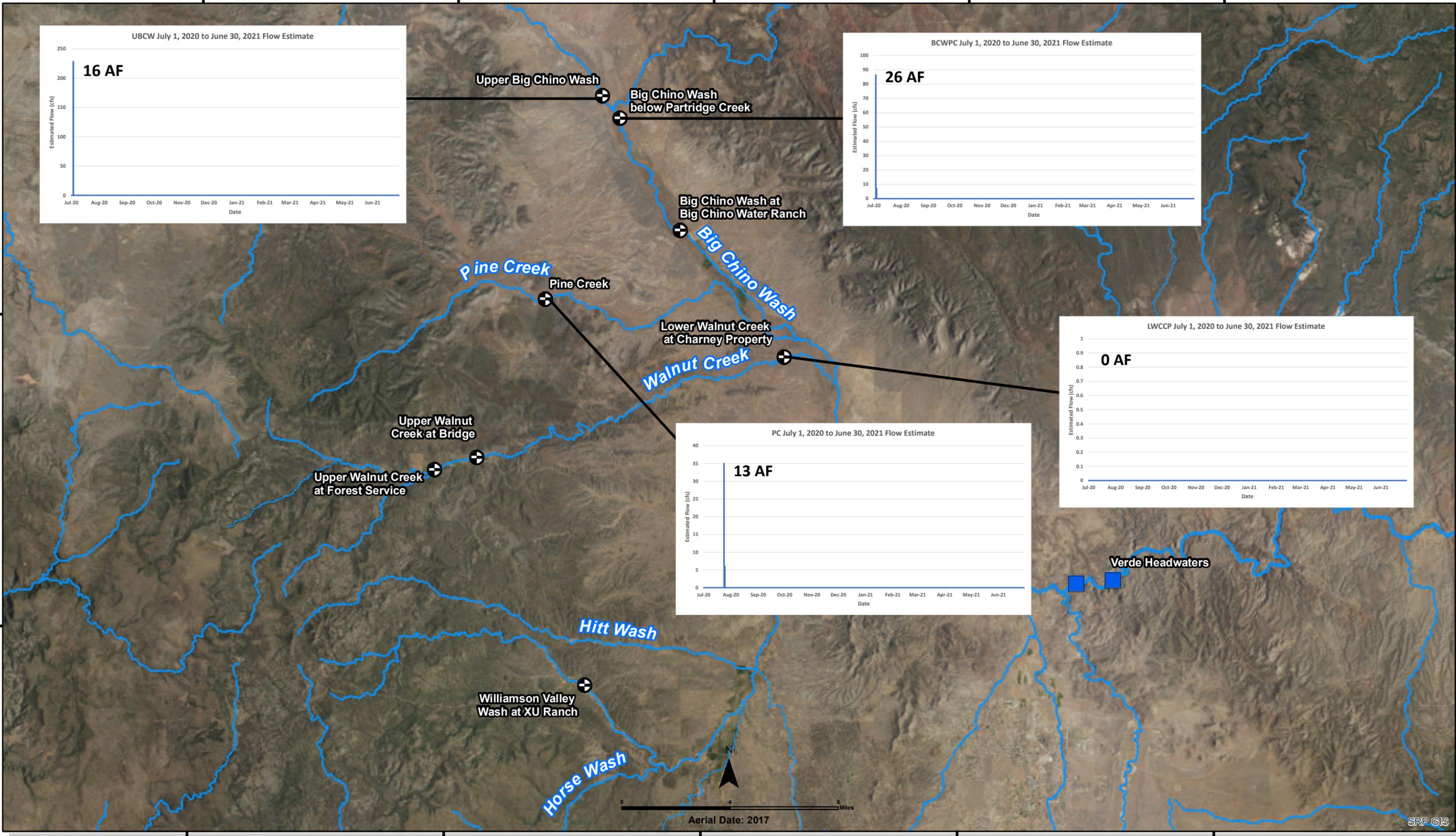
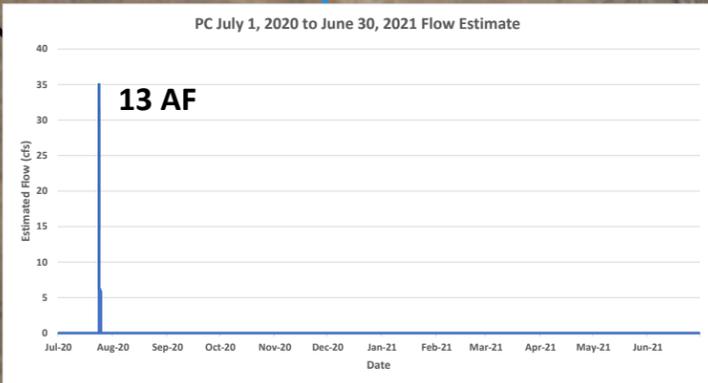
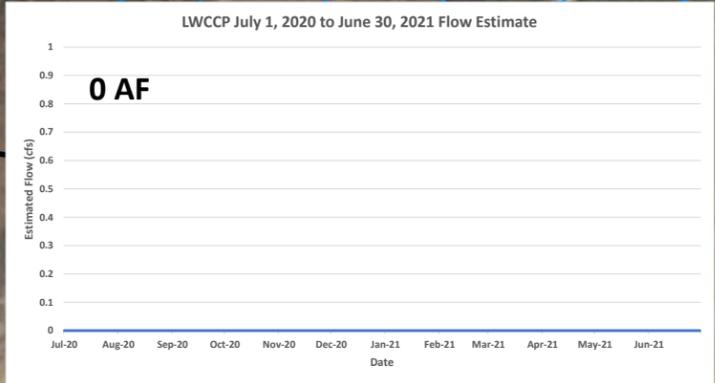
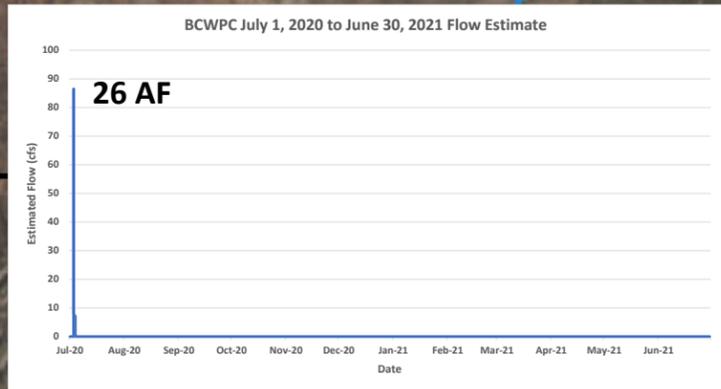
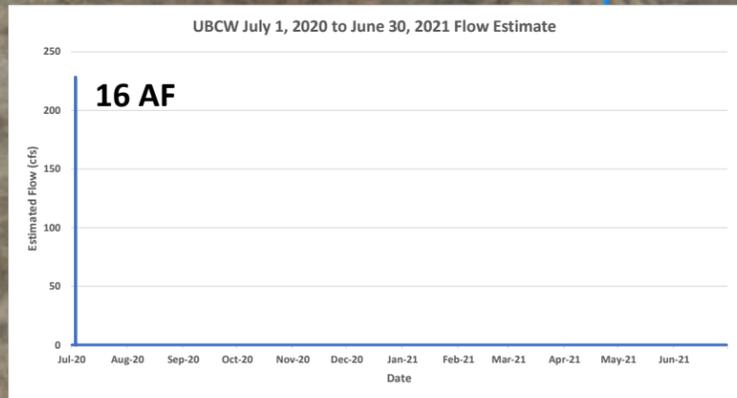
112°30'0"W

112°20'0"W

35°10'0"N

35°0'0"N

34°50'0"N



113°0'0"W

112°50'0"W

112°40'0"W

112°30'0"W

112°20'0"W

~ Creeks & Washes

⊕ Surface Water Monitoring Location

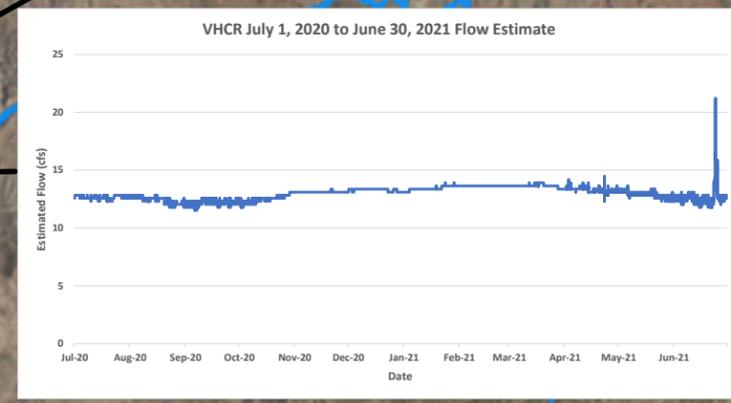
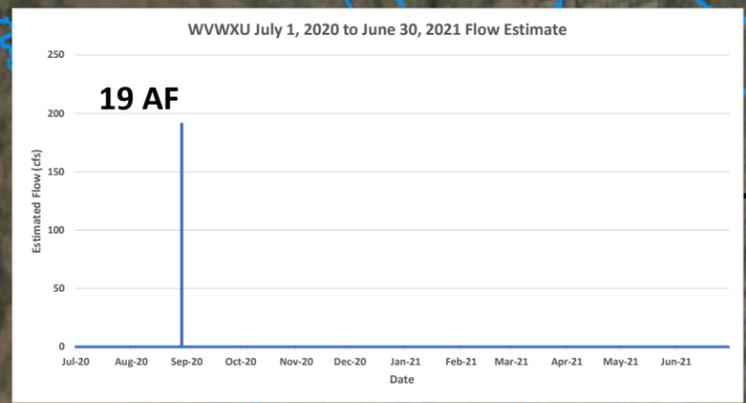
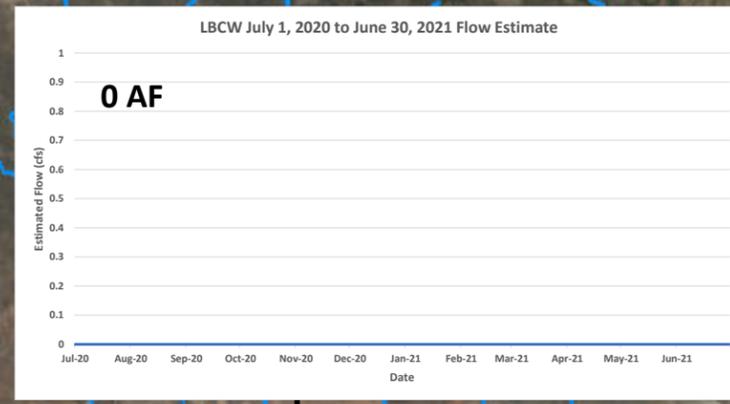
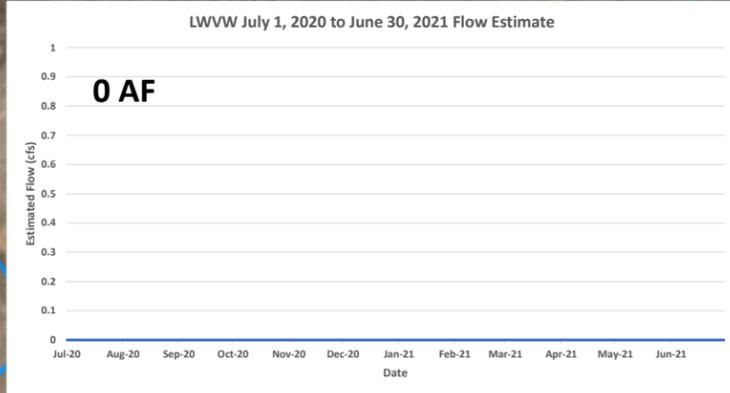
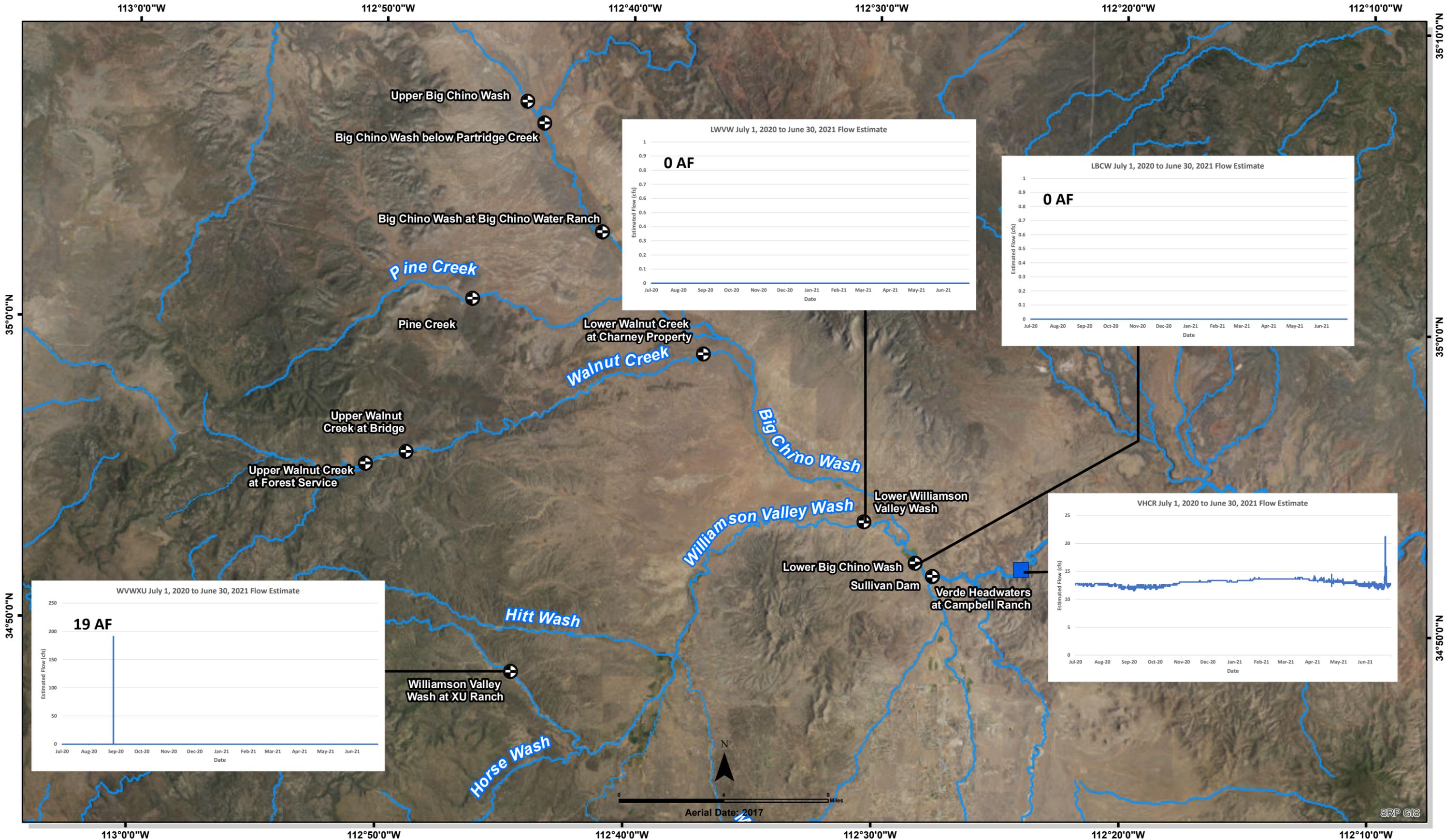
■ Verde Headwaters

### Map 4

## Big Chino Sub-basin - Surface Water Monitoring Northern Hydrographs



Map Courtesy of  
**SRP**  
BIGCHINO\_MAP4\_21.mxd  
9/15/2021



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

**Map 5**  
**Big Chino Sub-basin - Surface Water Monitoring**  
**Southern Hydrographs**

113°0'0"W

112°50'0"W

112°40'0"W

112°30'0"W

112°20'0"W

112°10'0"W

35°0'0"N

34°50'0"N

34°40'0"N

35°0'0"N

34°50'0"N

34°40'0"N



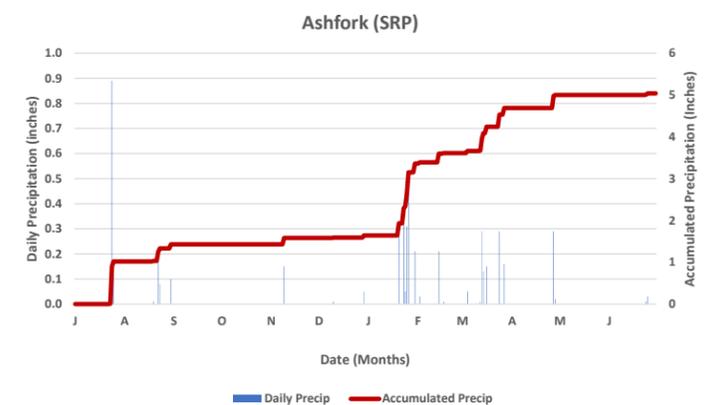
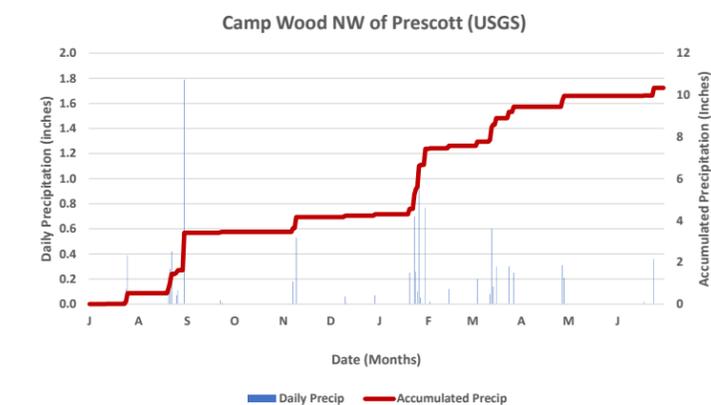
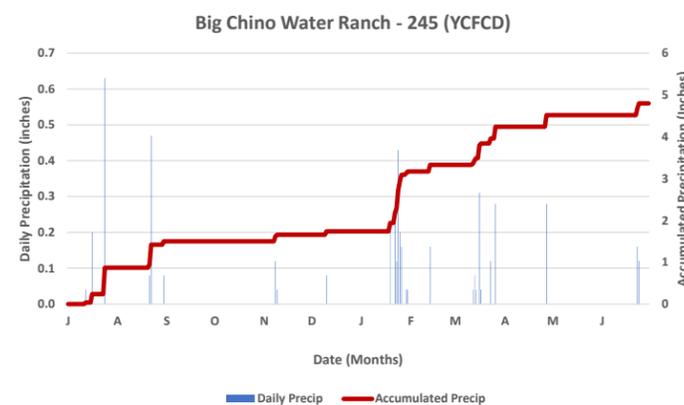
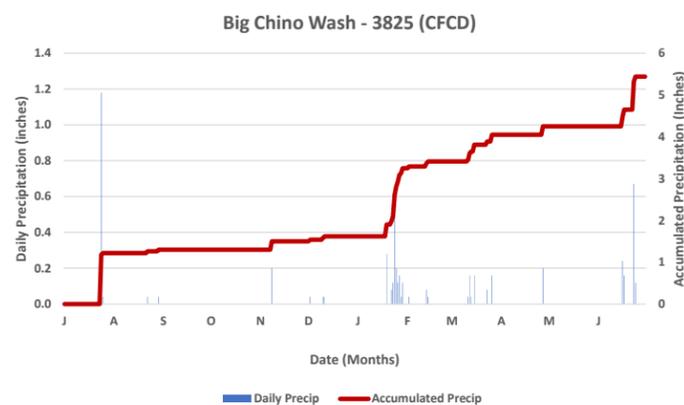
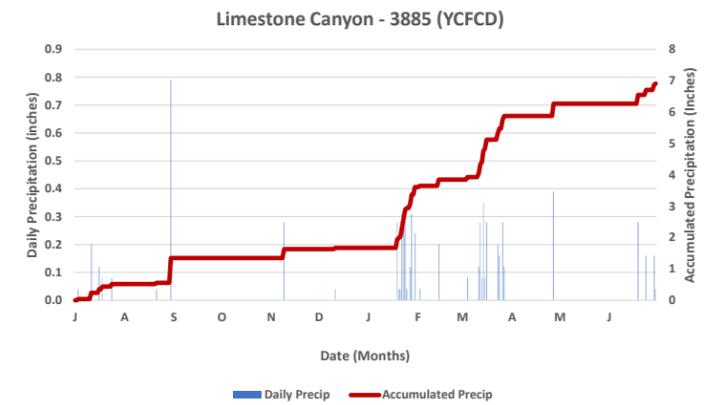
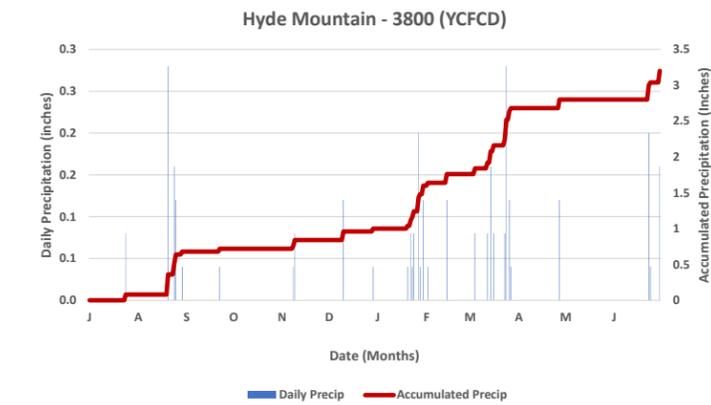
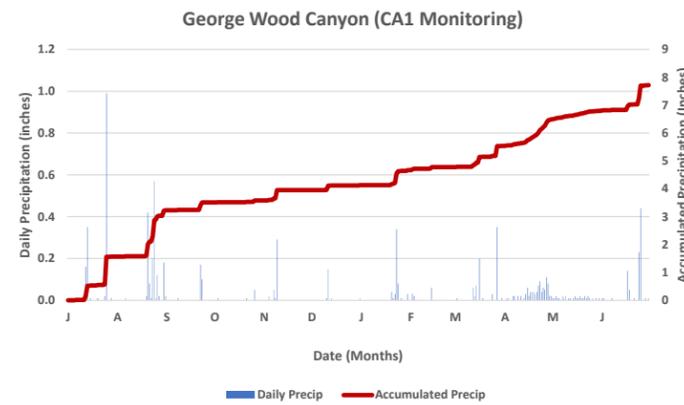
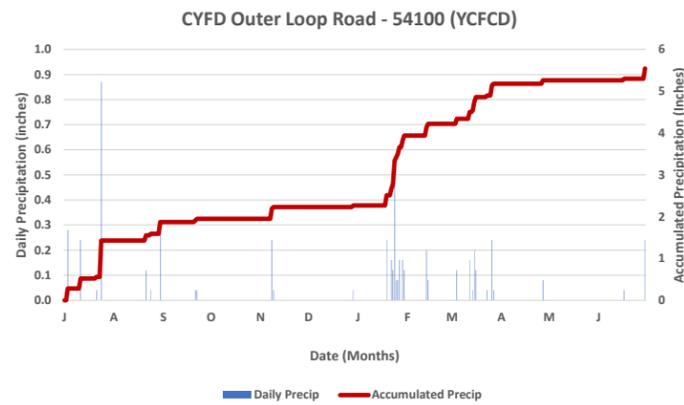
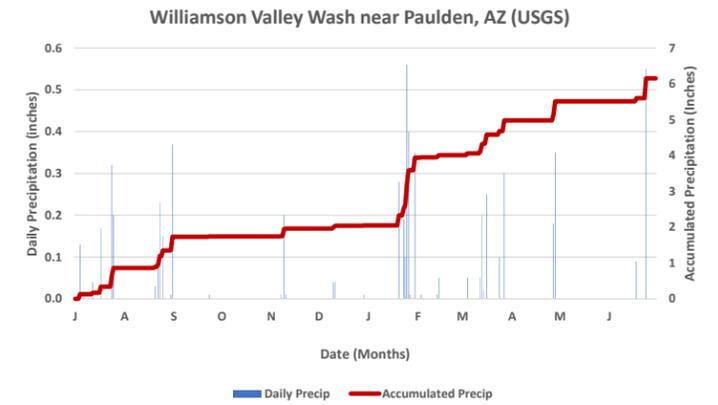
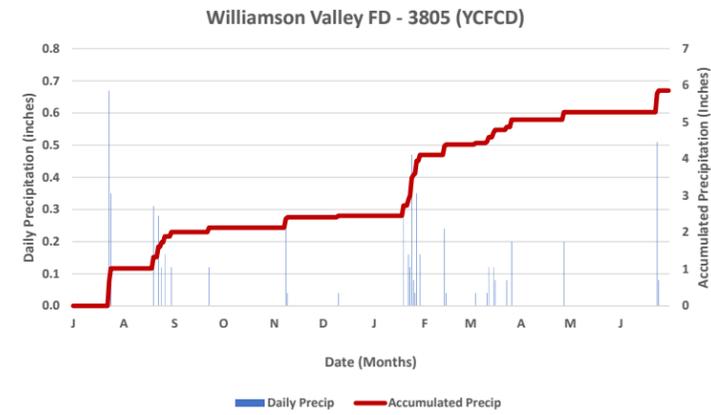
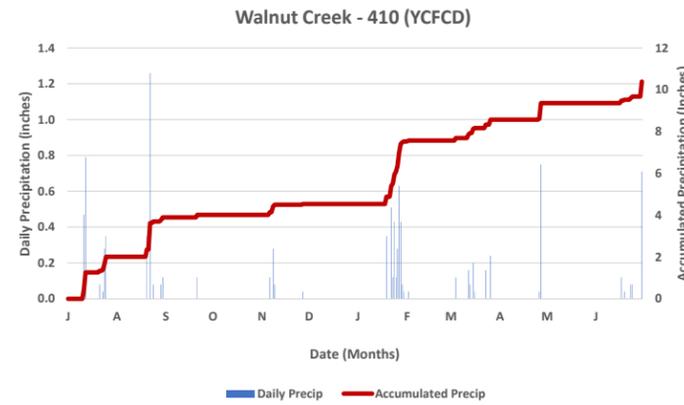
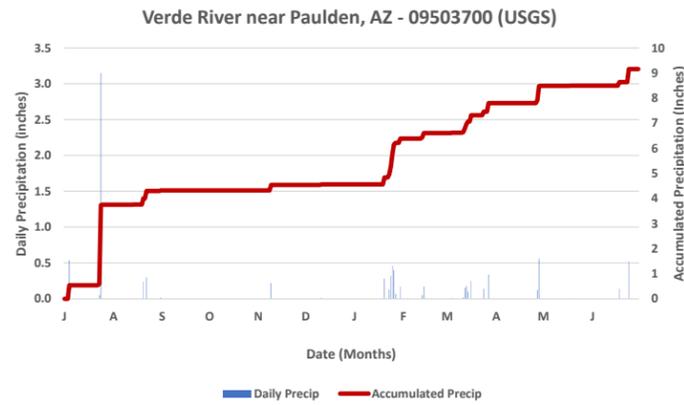
- Yavapai County Flood Control District Weather Station
- National Weather Service Hydrometeorological Automated Data System Station
- USGS Weather Station
- SRP Weather Station

### Map 6 Big Chino Area Weather Stations



Map Courtesy of  
**SRP**  
BIGCHINO\_MAP6\_21.mxd  
9/15/2021

SRP GIS

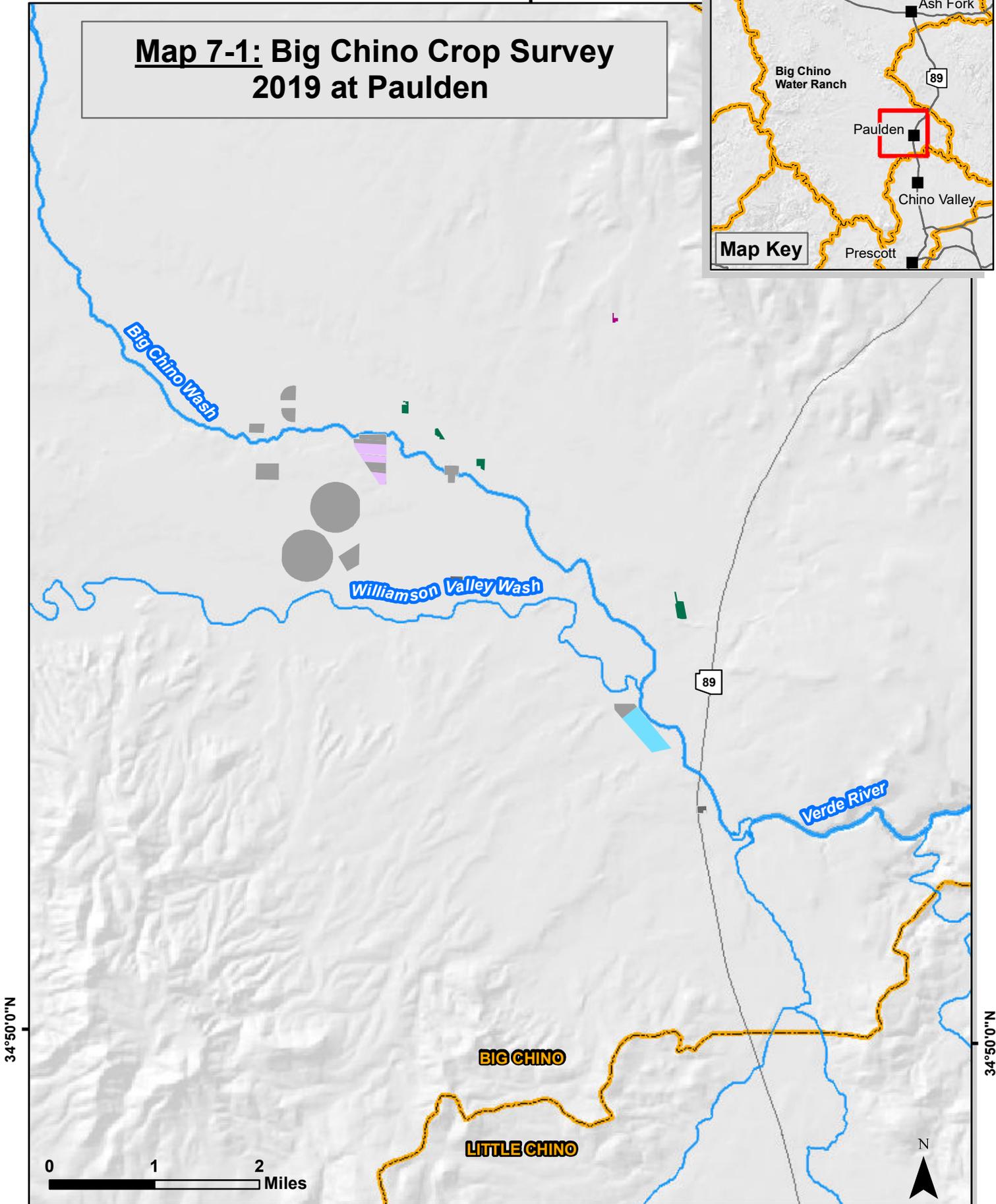
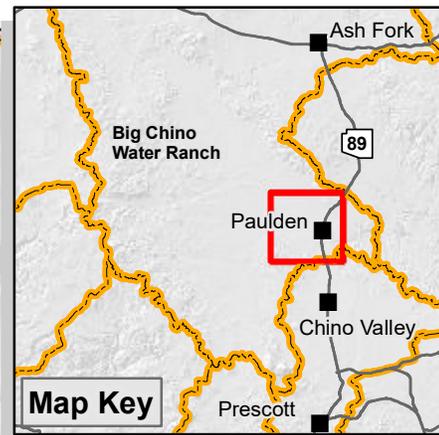


**Map 6a  
Big Chino Area  
Weather Station Data (2021)**



112°30'0"W

# Map 7-1: Big Chino Crop Survey 2019 at Paulden

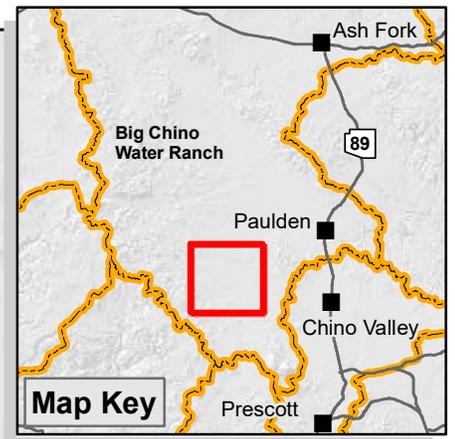


- Alfalfa
- Pasture
- Vegetable
- No Crop Evident (Abandoned/Fallow)
- Grass
- Sod
- Vinyard
- Groundwater Sub-basin (ADWR)



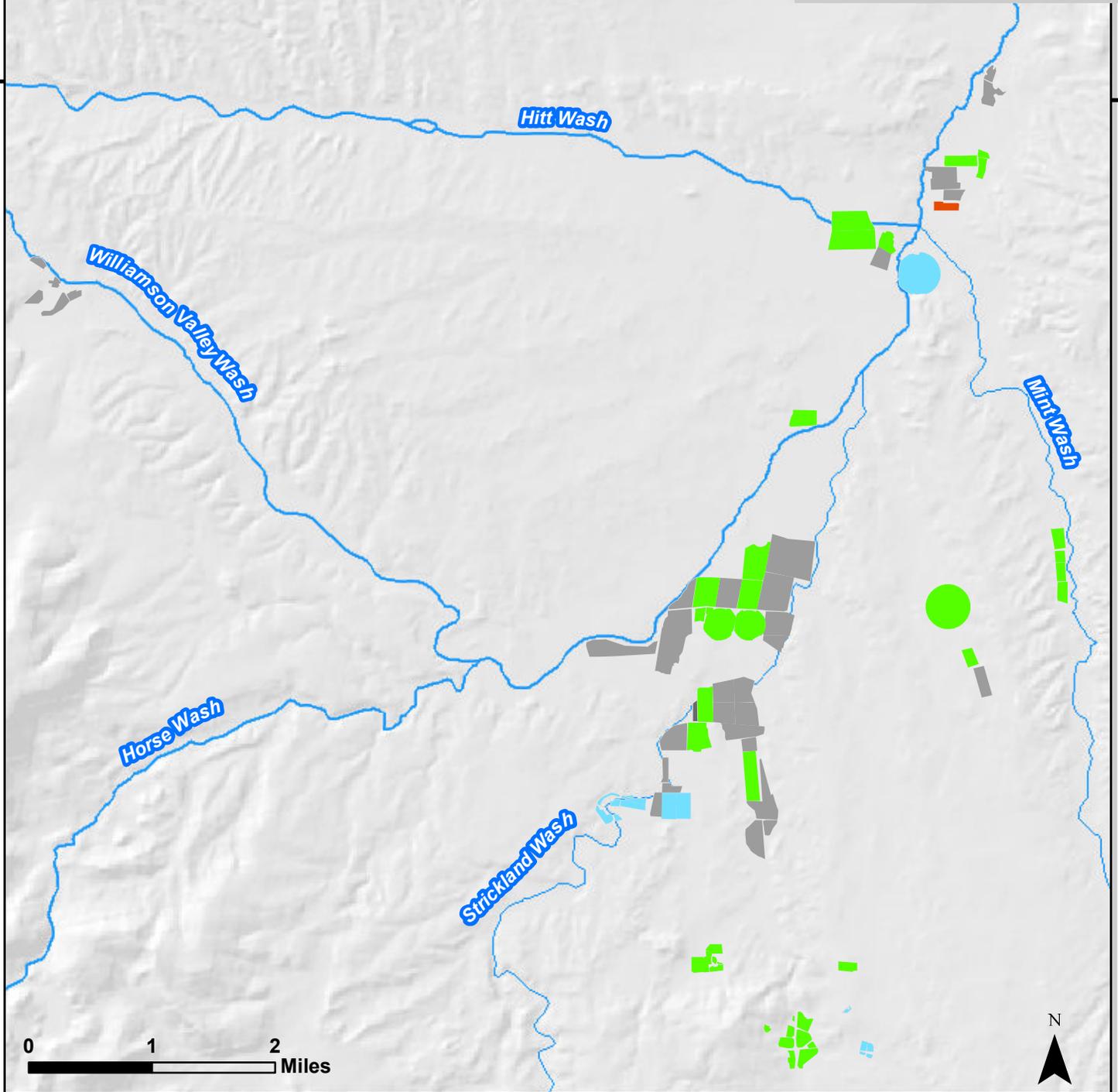
112°40'0"W

# Map 7-2: Big Chino Crop Survey 2019 at Williamson Valley



34°50'0"N

34°50'0"N



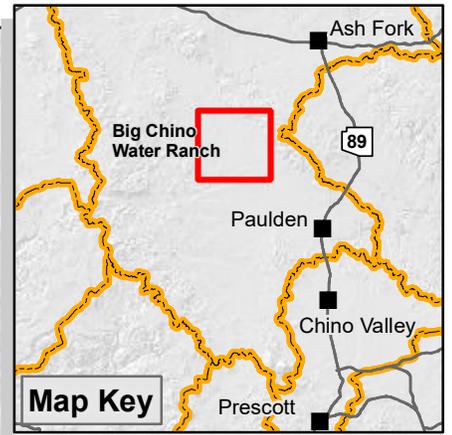
112°40'0"W

- Alfalfa
- Pasture
- Vegetable
- No Crop Evident (Abandoned/Fallow)
- Grass
- Sod
- Vinyard
- Groundwater Sub-basin (ADWR)

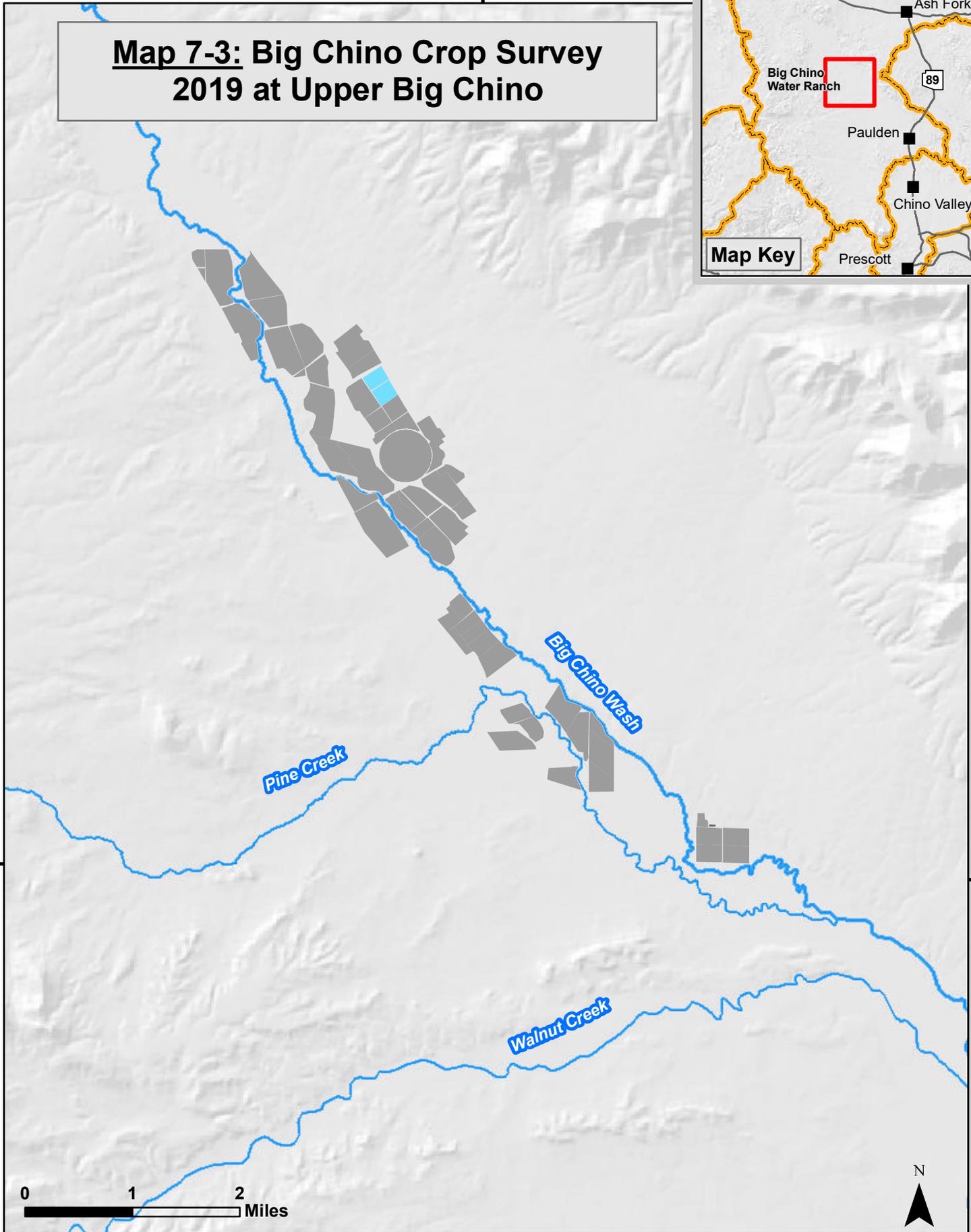


112°40'0"W

# Map 7-3: Big Chino Crop Survey 2019 at Upper Big Chino



35°0'0"N



35°0'0"N

112°40'0"W

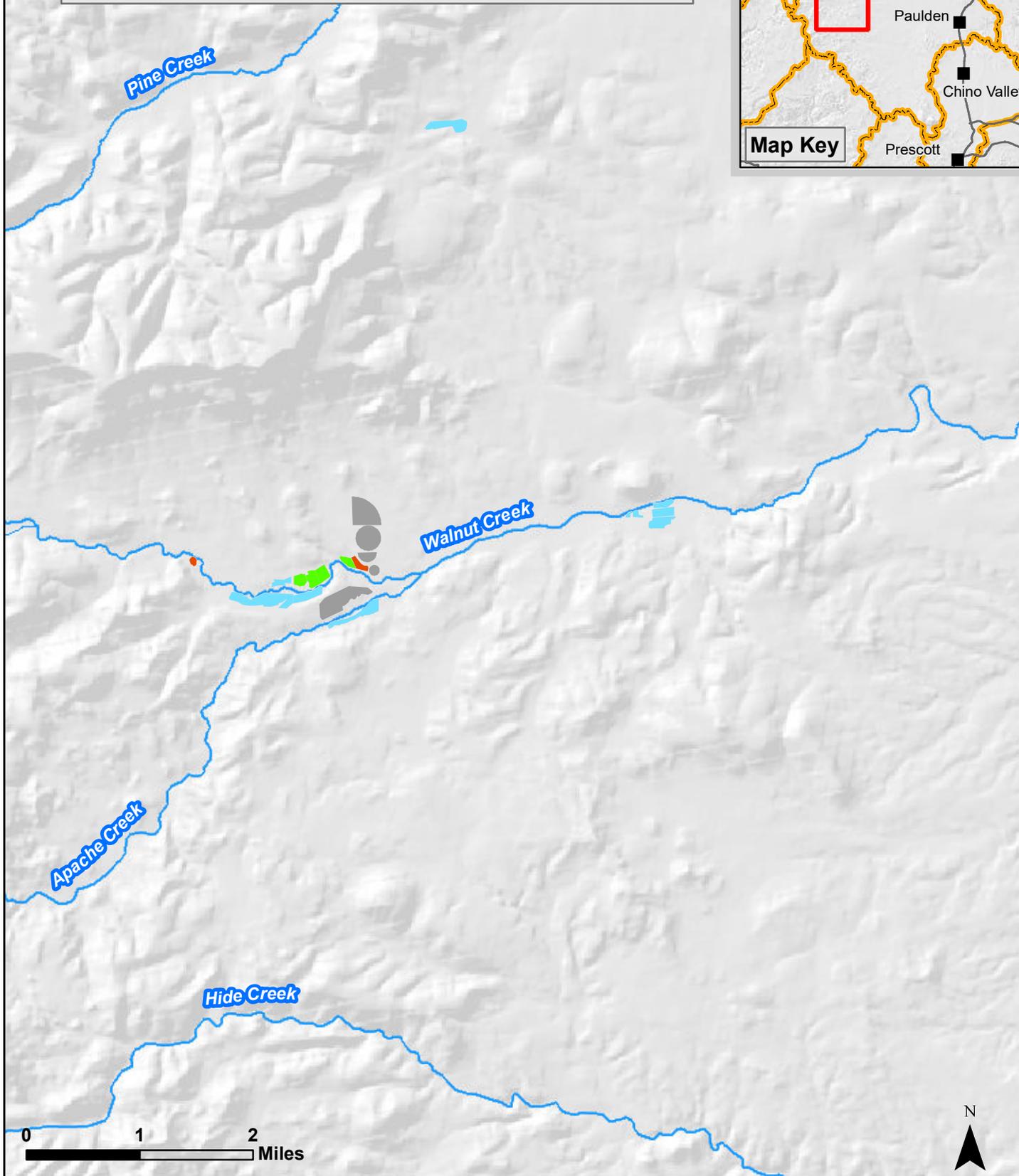
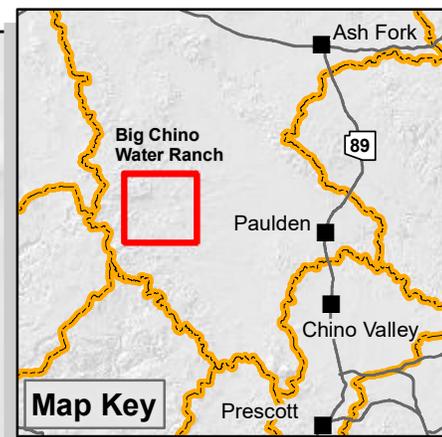
- Alfalfa
- Pasture
- Vegetable
- No Crop Evident (Abandoned/Fallow)
- Grass
- Sod
- Vinyard
- Groundwater Sub-basin (ADWR)



112°50'0"W

35°0'0"N

# Map 7-4: Big Chino Crop Survey 2019 at Walnut Creek

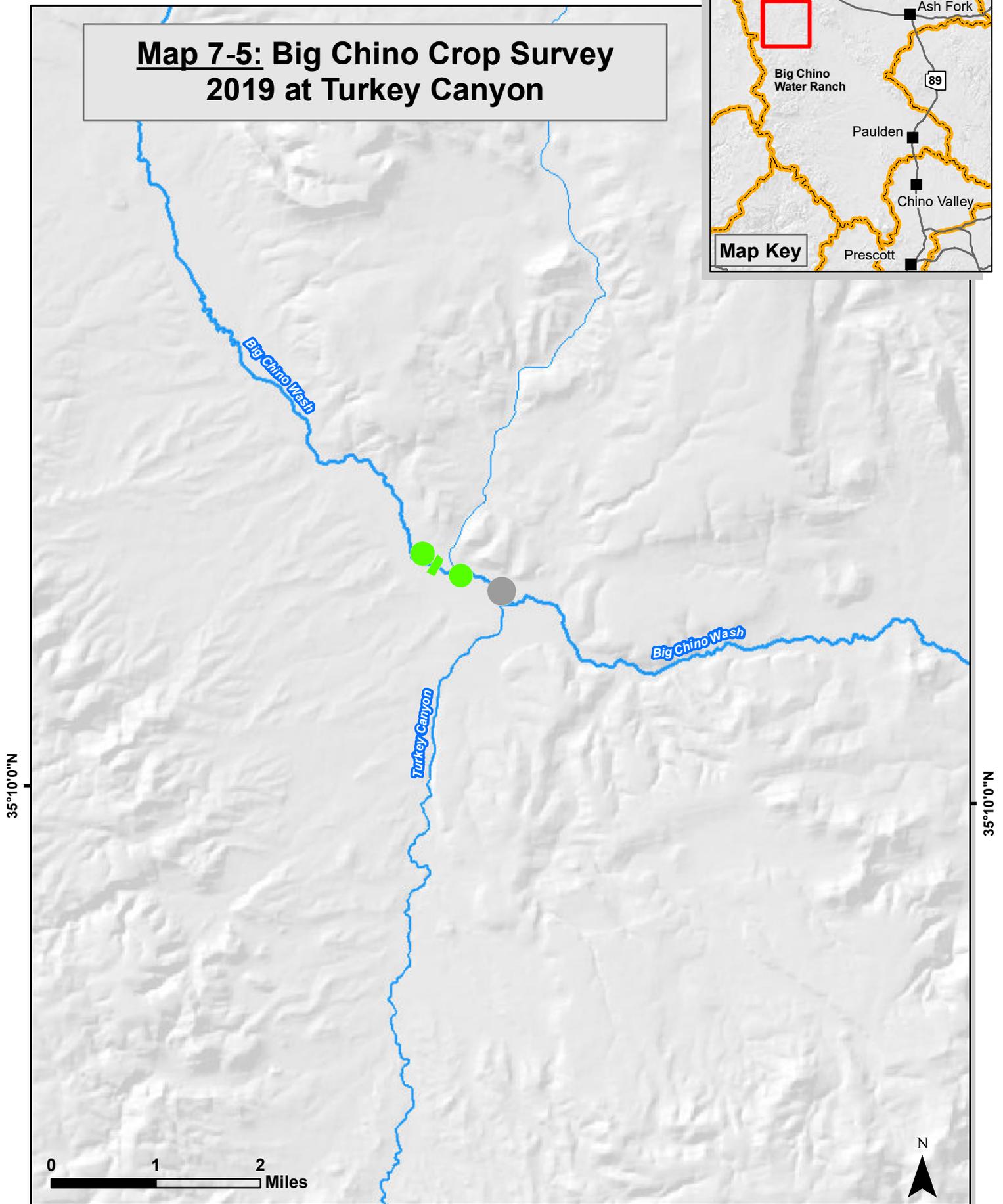
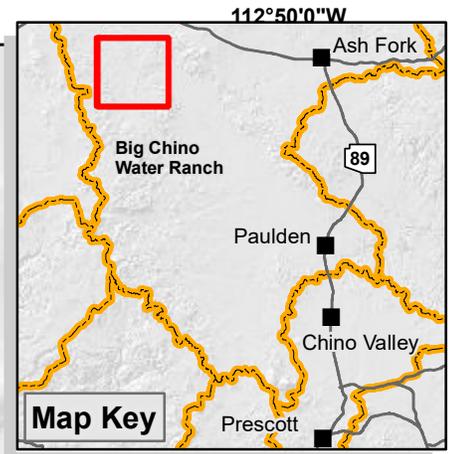


112°50'0"W

- Alfalfa
- Pasture
- Vegetable
- No Crop Evident (Abandoned/Fallow)
- Grass
- Sod
- Vinyard
- Groundwater Sub-basin (ADWR)



# Map 7-5: Big Chino Crop Survey 2019 at Turkey Canyon



- Alfalfa
- Pasture
- Vegetable
- No Crop Evident (Abandoned/Fallow)
- Grass
- Sod
- Vinyard
- ⬭ Groundwater Sub-basin (ADWR)

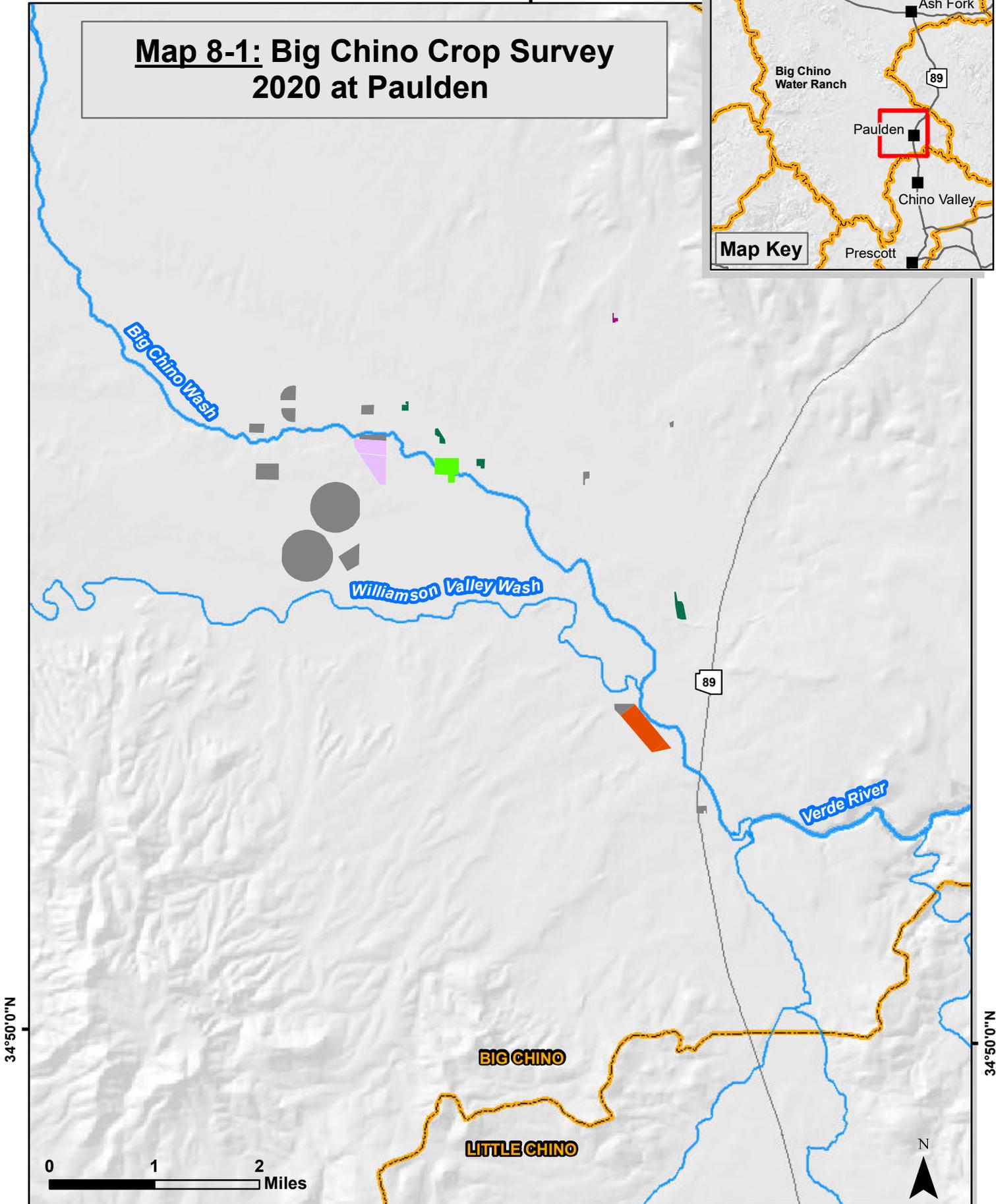
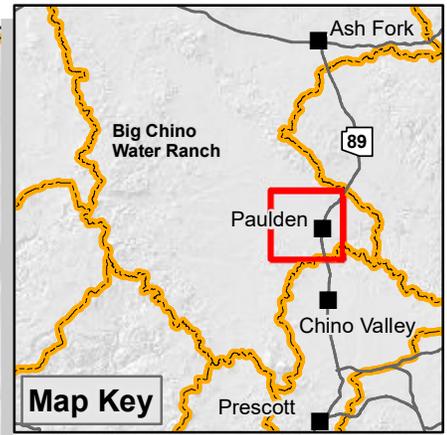


112°50'0"W



112°30'0"W

# Map 8-1: Big Chino Crop Survey 2020 at Paulden



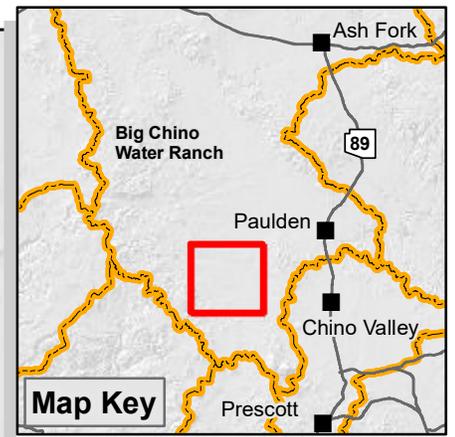
-  Alfalfa
-  Pasture
-  Vegetable
-  No Crop Evident (Abandoned/Fallow)
-  Grass
-  Sod
-  Vinyard
-  Groundwater Sub-basin (ADWR)



BIGCHINO\_CROPSURVEY\_21.mxd 9/23/2021

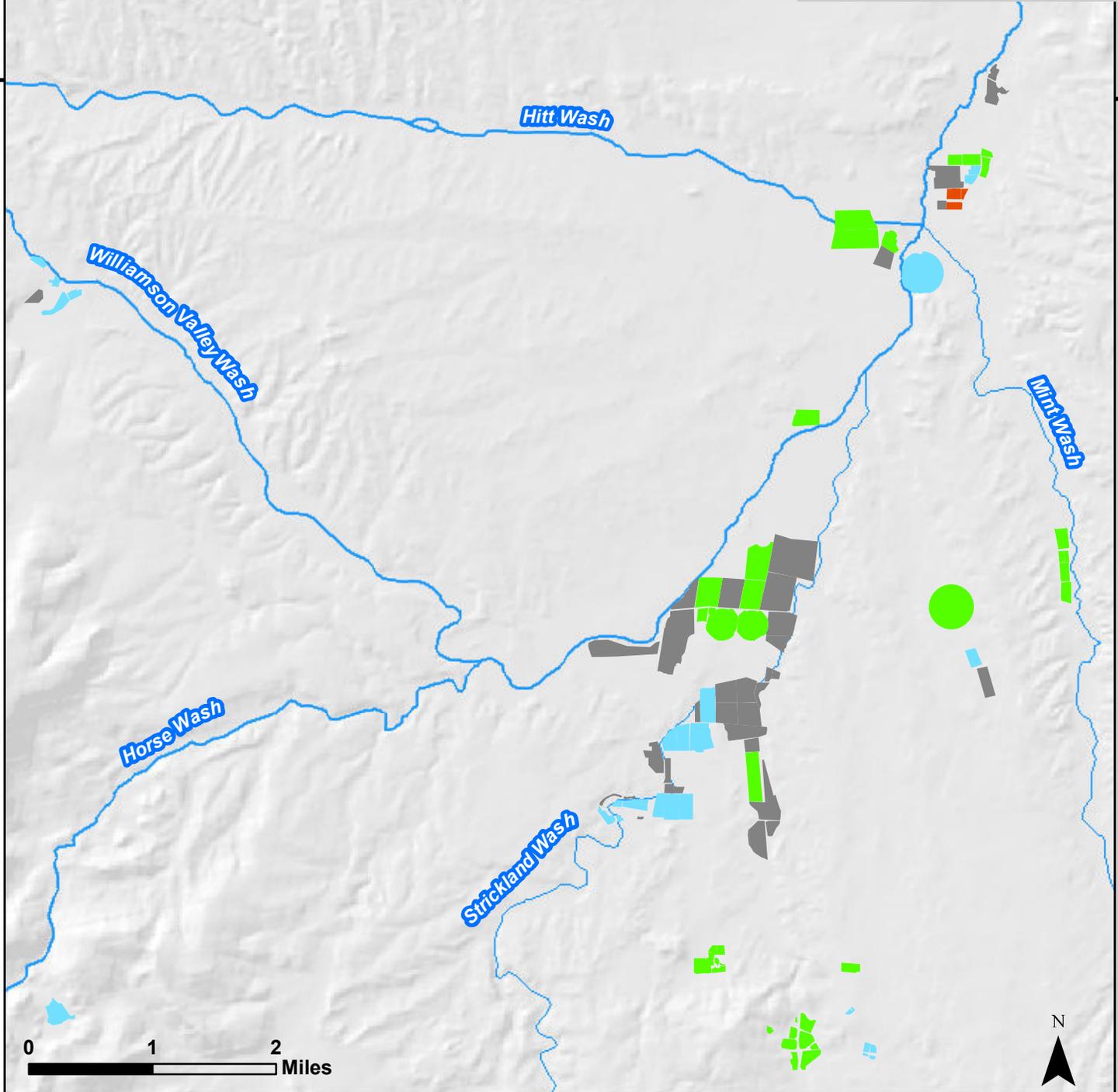
112°40'0"W

# Map 8-2: Big Chino Crop Survey 2020 at Williamson Valley



34°50'0"N

34°50'0"N



112°40'0"W

- Alfalfa
- Pasture
- Vegetable
- No Crop Evident (Abandoned/Fallow)
- Grass
- Sod
- Vinyard
- Groundwater Sub-basin (ADWR)



BIGCHINO\_CROPSURVEY\_21.mxd 9/23/2021

112°40'0"W

# Map 8-3: Big Chino Crop Survey 2020 at Upper Big Chino



35°0'0"N

35°0'0"N

112°40'0"W

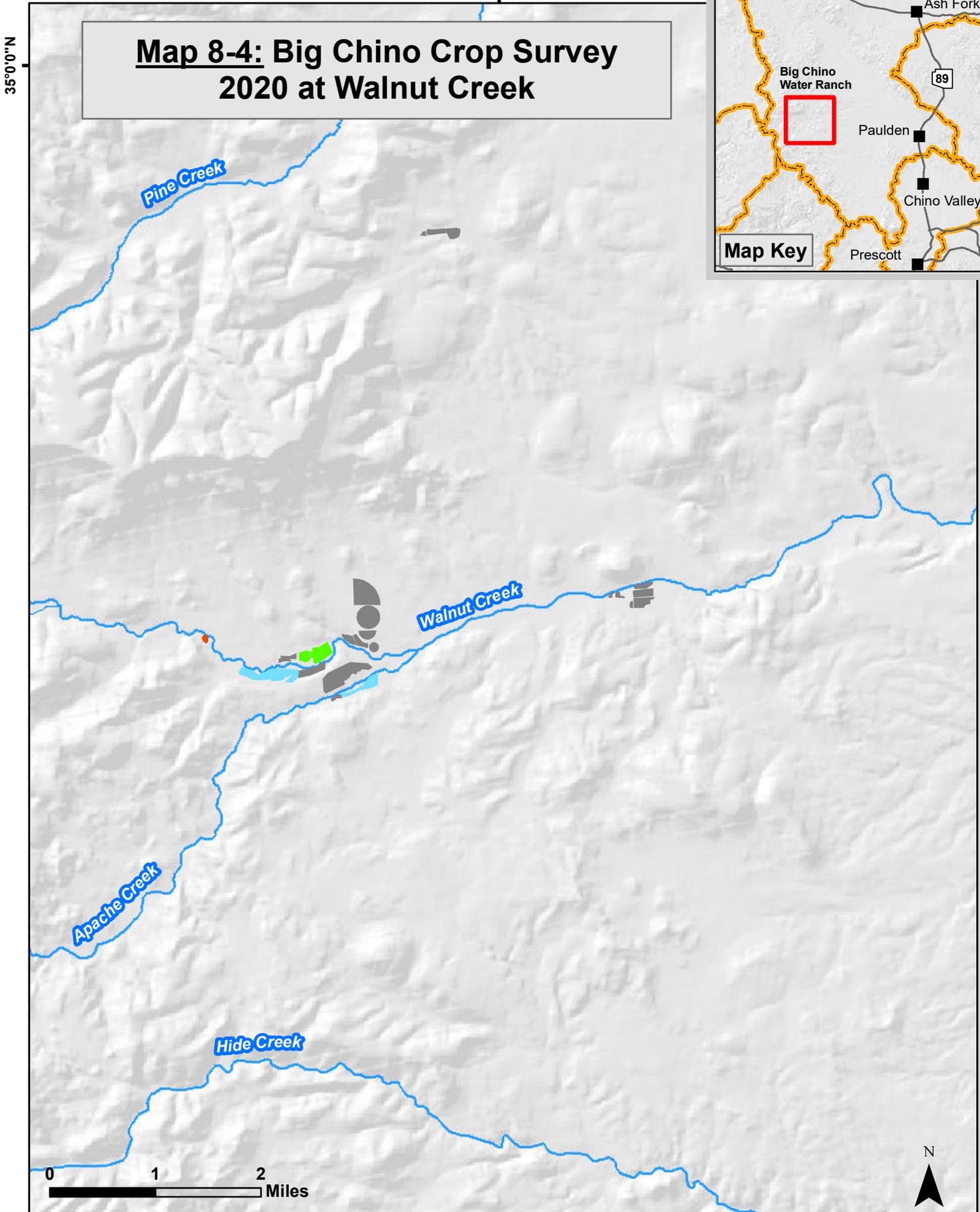
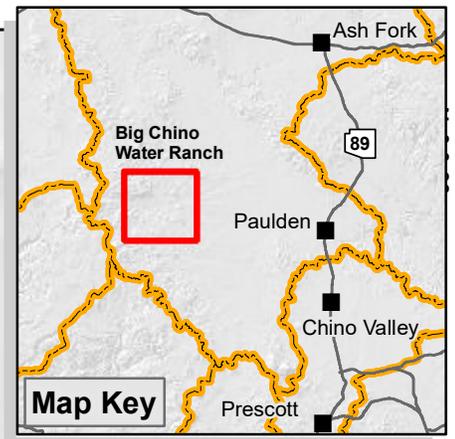
0 1 2 Miles



- Alfalfa
- Pasture
- Vegetable
- No Crop Evident (Abandoned/Fallow)
- Grass
- Sod
- Vinyard
- S Groundwater Sub-basin (ADWR)



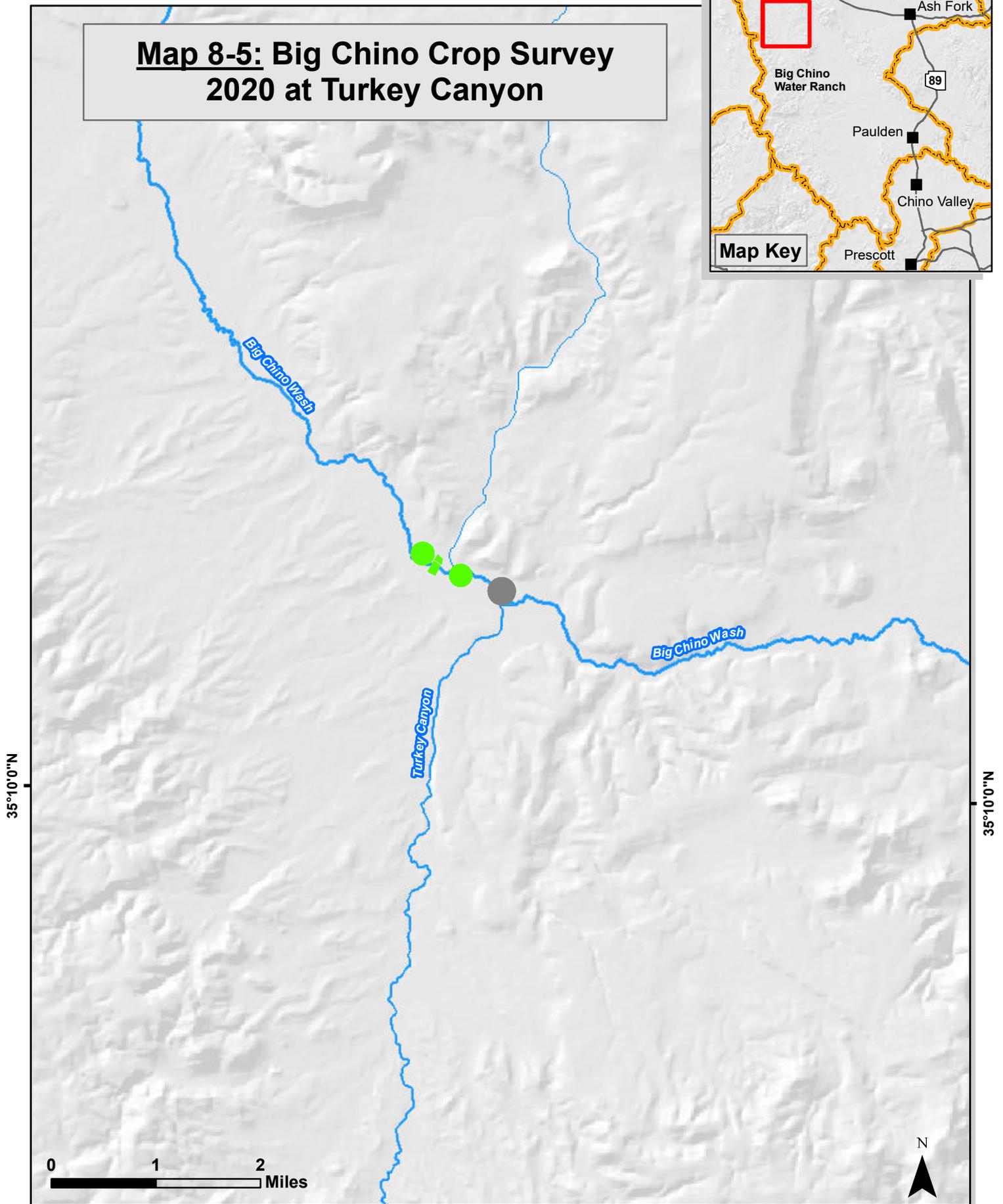
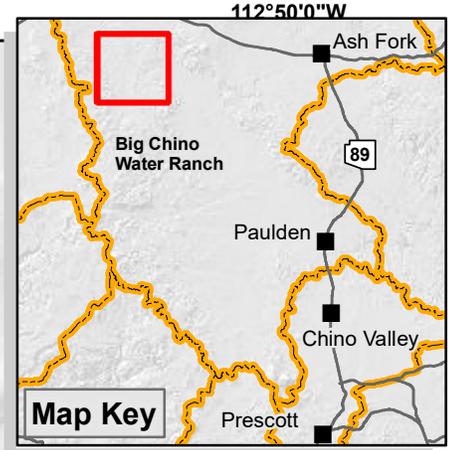
# Map 8-4: Big Chino Crop Survey 2020 at Walnut Creek



- Alfalfa
- Pasture
- Vegetable
- No Crop Evident (Abandoned/Fallow)
- Grass
- Sod
- Vinyard
- Ⓢ Groundwater Sub-basin (ADWR)



# Map 8-5: Big Chino Crop Survey 2020 at Turkey Canyon



- Alfalfa
- Pasture
- Vegetable
- No Crop Evident (Abandoned/Fallow)
- Grass
- Sod
- Vinyard
- Groundwater Sub-basin (ADWR)



112°50'0"W

