Comprehensive Agreement No. 1

Tenth Annual Report

FY23
(July 1, 2022 – June 30, 2023)

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

Prepared by:

CITY OF PRESCOTT ARIZONA

PRESCOTT VALLEY

SRP®

10/31/2023

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Introduction

The tenth annual report documents activities that occurred during the July 1, 2022, to June 30, 2023, timeframe for both the Monitoring and Modeling Committees (Committees) established by Comprehensive Agreement #1 (CA#1). This contractual agreement was scheduled to be an eight-year project with all Parties contributing a total of $5.6 million dollars to monitor, model, and document the hydrology of the Big Chino Sub-basin and the headwaters of the Upper Verde River. Although it was expected the overall project would result in a completed groundwater flow model by this time, the work continues.

Since late 2012, the Committees have worked to implement the Data Collection and Monitoring Plan (DCMP) for the purpose of developing an improved numerical groundwater flow model of the Big Chino Sub-basin as described in the exhibits attached to CA#1 (City Contract No. 2013-058). Monitoring continues for this project in an effort to better characterize the hydrology of the Big Chino Sub-basin and provide support for modeling efforts. Few monitoring contracts from the 2012-2020 timeframe remain active, but those that are active continue to yield additional high-quality data for the model project. Earlier annual reports contain detailed information related to those earlier monitoring contracts. Only active monitoring contracts are presented in this annual report.

Groundwater modeling work commenced with Golder Associates Inc., now known as WSP USA, Inc. (WSP) in February 2017. The project is outlined in City Contract No. 2017-246 and its amendments. This portion of the project has been as intensive as the monitoring contracts. Modeling project delays continued through the FY23 fiscal year, and these delays are discussed in this report. This report provides greater focus on the modeling contract and its associated activities.

The overall report is comprised of the following sections:

- project background,
- Fiscal Year 2023 (FY23) accomplishments,
- financial summaries, and
- updates on monitoring and modeling activities required to fully execute CA#1 objectives.

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 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), City Contract No. 2010-128. 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 between the Parties regarding plans to pump groundwater from the Big Chino Sub-basin as authorized by Arizona Revised Statutes - §45-555, and required the Communities to mitigate their impact from Big Chino Sub-basin water withdrawals on the flow in the Upper Verde River.

CA#1 established 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 DCMP (City Contract No. 2013-058, Exhibit 4) 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 natural system variability and the impacts of groundwater pumping by others.
- 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.

The primary objective of the numerical groundwater flow model is to, "...develop a multilayered numerical groundwater flow model of the Big Chino Sub-basin and surrounding area that can inform resource managers about potential effects of groundwater pumping on the potentiometric surface, evapotranspiration, stream baseflow, and spring discharge" (Source: City Contract No. 2013-058, Exhibit 3). Further, the specific objectives are as follows:

- Test the validity of alternative conceptual flow-system models using iterative recalibration of a specified region in the Northern Arizona Regional Groundwater Flow Model.

- Define and collect the hydrogeologic data needed to discern between ambiguous conceptual models tested during the first objective.
- Conduct a model-based analysis of stream and spring discharge depletion that may result from groundwater pumping at identified locations and specified amounts in the Big Chino Sub-basin and from changes in climate conditions.
- Determine the proportional impacts to groundwater levels and discharge to surface water sources caused by various sources of pumping in the Big Chino Sub-basin.
- Use the model to select three or more locations for monitoring wells that could be used in conjunction with the model, as alert or action indicators for alternative management of groundwater resources in the Big Chino Sub-basin.

Note these objectives were part of the original CA#1, Exhibit 3 where the USGS would be the lead investigator. The work was ultimately completed through a competitive process where WSP was selected.

Summary of FY23 Accomplishments

Meetings

- Monthly meetings of the Monitoring and Modeling Committees continued. Those monthly meetings frequently included WSP, and the Specialized Technical Consultants (STCs), (i.e., LRE Water and Matrix New World Engineering) to discuss progress-to-date on the various hydrologic conceptual models, and their corresponding draft numerical groundwater flow model.

Meetings – WSP Focused

- From April 2022 into late summer of 2022, meetings increased substantially to discuss questions and concerns about the modeling work products that were being developed by both WSP and the STCs. WSP prepared and submitted to the CA#1 Parties the document, “Responses to Comments and Path Forward, Big Chino Sub-basin Groundwater Flow Model” dated August 11, 2022, to address comments made during the listening sessions.
- The Parties, with their STCs, reviewed the August 11, 2022, document and two additional meetings were held on August 26, 2022, and August 29, 2022. The Parties then provided feedback related to the “path-forward” in a table format where each WSP Proposed Change was listed and a corresponding column of Short Notes for Discussion (STC recommendations) explained how those proposed changes were viewed.

- The Parties, with their STCs and WSP, met on Friday, September 9, 2022, to discuss the table of concerns submitted to WSP. During this meeting WSP requested additional data from the STCs.
- WSP emailed and requested a copy of "Phase 2 – Big Chino Sub-basin Data Collection and Monitoring Program, March 2019" on Wednesday, November 9, 2022. WSP also provided comments on data requests from the STCs during the September 9, 2022, meeting. WSP stated the Contract Allowance Authorization No. 4 will be submitted by November 16, 2022.
- On November 18, 2022, the Parties emailed WSP with comments from the STCs addressing the requests from WSP in their email dated November 9, 2022.
- The Parties and WSP held a meeting on January 19, 2023, requesting an update on the Contract Allowance Authorization No. 4 that was expected to arrive in November 2022.
- On January 31, 2023, WSP emailed the Contract Allowance Authorization No. 4 which included an updated project schedule and budget.
- The STCs joined the monthly modeling meeting on February 8, 2023, to discuss WSP's Contract Allowance Authorization No. 4.
- On March 1, 2023, the Parties emailed WSP comments on the Contract Allowance Authorization No. 4 submitted on January 31, 2023, before finalizing the contract for signatures and approval.
- On May 4, 2023, the Contract Allowance Authorization No. 4 was finalized, signed and submitted by WSP to the Parties.
- On May 17, 2023, the Parties, STCs and WSP had a meeting to "kick-off" the new Contract Allowance Authorization No. 4. WSP agreed to submit an updated project schedule and begin work on Conceptual Model #4 immediately after this date.

Note, during this timeframe the project's main contact changed to Mr. Adam Finch, WSP Vice President, Commerical Management. The project continued to be supported by WSP scientific staff David Carr and Joanna Morena, with consultant Betsy Semmens of BAS Groundwater Consulting performing subcontracting work.

Meetings – Principal Focused

- On December 5, 2022, the project held a meeting of the Principals identified in the CA#1 contract. Those Principals were City of Prescott Manager Michael Lamar, Town of Prescott Valley Manager Gilbert Davidson, and SRP Director of Water Rights and Contracts Chuck Podolak. Each Parties' Technical Representative attended in-person, and the Specialized Technical Consultants joined virtually to address model questions.

Executed Documents or Coordinated Activities

- City Contract No. 2017-046 was executed on May 4, 2023. This contract was with WSP USA, Inc. for Contract Allowance Authorization No. 4 – Hydrogeological Modeling Services for Big Chino Sub-basin Groundwater Flow Model dated January 31, 2023

Public Information

- City of Prescott website: https://www.prescott-az.gov/water-sewer/water-management/big-chino-water-ranch-project/
- Town of Prescott Valley website: https://www.prescottvalley-az.gov/1260/Water-Resource-ManagementStrategy
- 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, 2022 – June 30, 2023 (**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 had been paid into this project as of FY19.

The overall monitoring project account balance and FY23 expenditures as of June 30, 2023, were $682,297.64 and $116,823.76, respectively. Similarly, the overall modeling project account balance and FY23 expenditures as of June 30, 2023, were $0 and $0, respectively. Most remaining CA#1 funds now reside in the monitoring portion of the budget, as the modeling funds have been used at a higher rate in recent years, but the modeling budget can continue to be infused with the funds remaining within the monitoring budget as needs arise. Over the course of the project $386,936.48 has been transferred from the monitoring funds to the modeling funds. These overall project funds have limited encumbrances with ongoing contracts, but those encumbrances are not reflected above nor in the values shown in **Table 1**. A detail of expenditures for FY23 only is shown in **Table 1**.

Table 1 – Contract Expenditures in FY23

Contractor Name, Number	Description	Amount
SRP, Contract No. 2022-154[1] (formerly 2014-001, 001A1, and 001A2)	New Stream Gages (Flowtography and weather equipment)	$90,579.06
SRP, Contract No. 2022-154[1] (formerly 2014-001)	Existing Stream Gage (Headwaters)	$25,822.07
SRP, Contract No. 2022-154[1] (formerly 2014-001)	Existing Monitor Well (Gipe)	$0
USGS, 23ZFJFA0041800[2]	SW Gauging (WV)	$0
ADWR IGA Contract No. 2020-136	Installation of monitoring equipment and data collection	$422.63
	Monitoring Total	**$ 116,823.76**
Golder Associates (WSP), Contract No. 2017-246 with Amendment 1-6, and Contract Allowance Authorizations[3]	Modeling Contract	$0
	Modeling Total	**$ 0**
	Combined Total	**$116,823.76**

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

1 On June 23, 2022, the City and SRP executed a new agreement that maintained equipment sites that will now become longer-term data collection points. Some equipment will be phased out including the Gipe well that was removed from the monitoring network due to becoming inaccessible.

2 Work was completed under Contract 2014-160A4. On January 13, 2022, the USGS and City entered a new Fixed Cost Agreement (23ZFJFA0041800) for ongoing operation of the Williamson Valley Wash gauge (station number 09502800) for one-year, October 1, 2022, to September 30, 2023. The new agreement states the billing will be no later than 30-days after the end of the billing period (September 30, 2023).

3 The last contract amendment (2017-246A6) was executed on June 2, 2023. The last contract allowance authorization (4) was executed on February 27, 2023.

The initial timeframe for contributions has expired. As a result of overall project savings, funds are available for ongoing expenses in the near-term, subject to the Parties consensus for use. Future contributions may be necessary if additional work is planned and approved by the CA#1 Parties.

Monitoring Project – Equipment

Since the commencement of the project, the Parties and their STCs have worked with ADWR, USGS, Yavapai County Flood Control District, and others to develop a network of monitoring

equipment in the Big Chino Sub-basin. This equipment, and the resulting data inventory, supports the development and testing of the groundwater flow model.

No new equipment was installed in FY23 except where needed to replace broken or missing equipment due to run-off events. Existing data collection types are listed below, and their basic details are shown in maps, figures, and tables in the appendices.

- Streamflow Monitoring – See **Appendix I** for SRP's Big Chino Sub-basin Water Monitoring Project, July 1, 2022 – June 30, 2023, Annual Report for CA#1 Monitoring Committee. Additional references are made to this report's equipment in **Appendices II and III, Figures 4-6**.
- Groundwater Level Monitoring – See **Appendix II** for tabular information and **Appendix III, Figures 1-3** for figures showing location and basic data
- Weather Monitoring – See **Appendix II** for tabular information and **Appendix III, Figures 7-8** for figures showing locations and basic data
- Crop Survey and Estimated Crop Water Use – See **Appendix III, Figures 9-1 to 9-5**.

Monitoring Project – Analytical Results and Data Collected

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

Groundwater Monitoring – Groundwater level monitoring efforts continued to be completed through traditional water level monitoring efforts (index lines and basin sweeps) by the Arizona Department of Water Resources (ADWR). ADWR annually collects water levels at select wells (Index lines) in the project area as part of their Basic Data program and basin-wide sweeps that are generally scheduled every five (5) years. The last "sweep" of the Big Chino Sub-basin occurred during February through May 2022. The Parties hold a contract with ADWR, IGA Contract No. 2020-136, for additional measurements at the new monitoring wells that were drilled as part of CA#1 (generally identified with "MW-4b to 4g"). This IGA remains in effect until June 30, 2024.

Streamflow Monitoring – monitoring of streamflow in the Big Chino Sub-basin is conducted by SRP Aquifer Management and Data Analytics, and USGS under contract with the CA#1 project. The USGS also maintains other stream gauges in the area, but those efforts are outside of the CA#1 contract. Further, flow stage data is collected by Yavapai County Flood Control District

(YCFCD) for their flood warning purposes, and several new locations were installed that were deemed beneficial to both YCFCD and CA#1 needs. The Parties appreciated that YCFCD assumed the cost of these gauges.

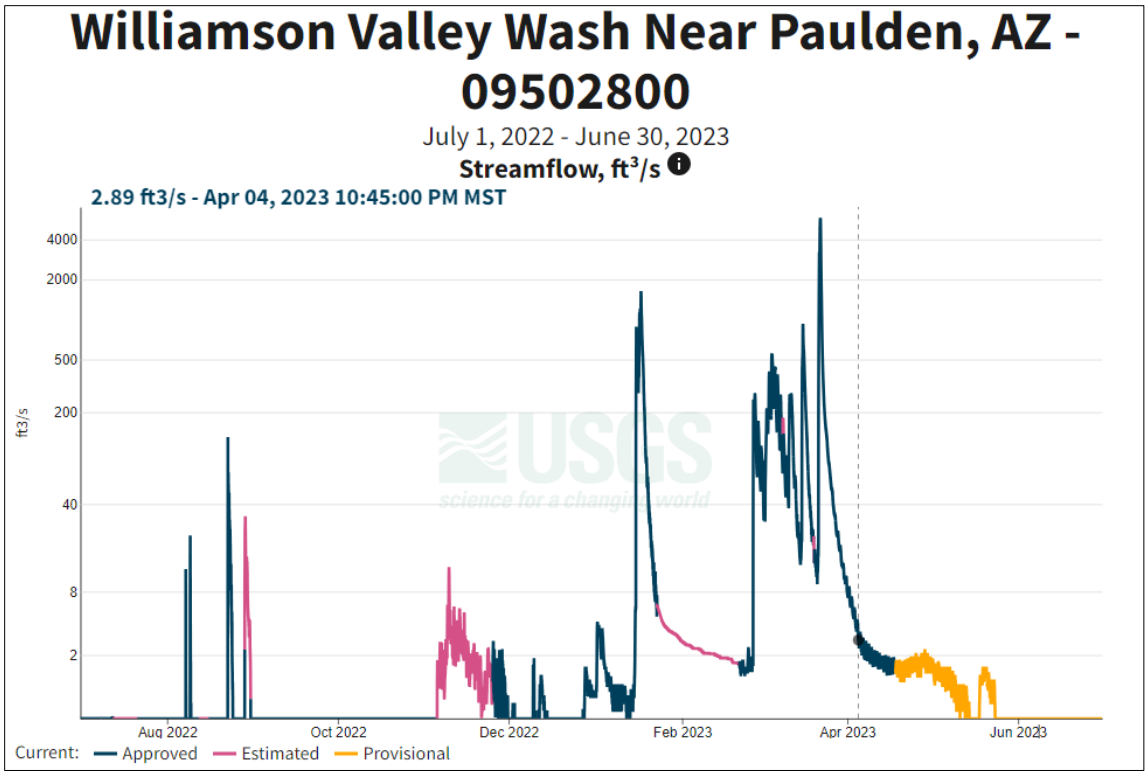
- Efforts by SRP

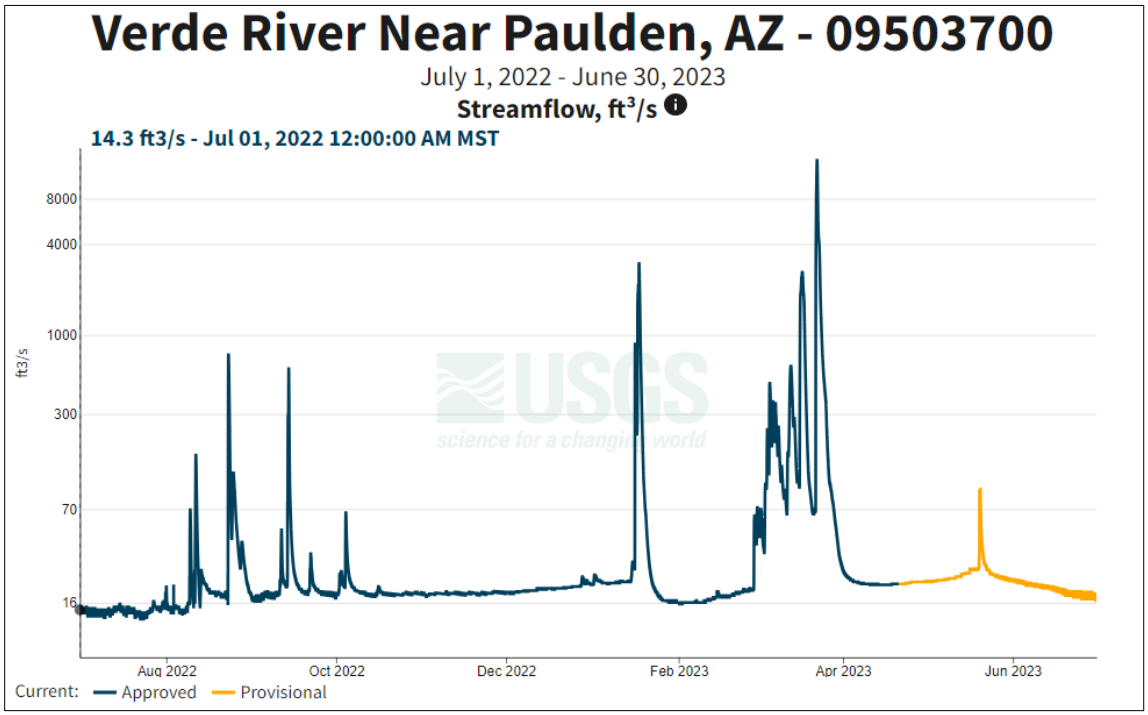
  SRP Aquifer Management and Data Analytics collects streamflow data and other information at ten (10) locations in the Big Chino Sub-basin under the previously noted contract with the Parties. During July 2022-June 2023, flows were observed at all locations. In March 2023, an intense weather system over existing snowpacks in the higher elevations resulted in 5 monitoring locations sustaining equipment damage or channel modification. The complete FY23 report is attached as **Appendix I**. The annual hydrographs are in **Appendix III**.

- Efforts by USGS

  The USGS operates several stream gauges in the Big Sub-basin. The Williamson Valley Wash near Paulden, AZ gauge (station number 09502800) is funded through the CA#1 program (renewed annually), and the Verde River near Paulden, AZ gauge (station number 09503700) is funded through a separate program with SRP, the USFS, and the USGS. In 2017, USGS installed the Big Chino Wash at Paulden, AZ gauge (station number 09502830). This gauge is shown to be currently unfunded by the USGS and was subject to be discontinued on May 7, 2023. Streamflow records for these sites are maintained by the USGS in their online database, https://waterdata.usgs.gov/az/nwis/current/?type=flow

  Site locations for the first two gauges are shown on **Appendix III, Figure 4**.


Williamson Valley Wash Near Paulden, AZ - 09502800
July 1, 2022 - June 30, 2023
Streamflow, ft³/s
2.89 ft3/s - Apr 04, 2023 10:45:00 PM MST
4000
2000
500
200
40
8
2
ft3/s
Aug 2022
Oct 2022
Dec 2022
Feb 2023
Apr 2023
Jun 2023
Current:
Approved
Estimated
Provisional


Verde River Near Paulden, AZ - 09503700
July 1, 2022 - June 30, 2023
Streamflow, ft³/s
14.3 ft3/s - Jul 01, 2022 12:00:00 AM MST
8000
4000
1000
300
70
16
ft3/s
Aug 2022
Oct 2022
Dec 2022
Feb 2023
Apr 2023
Jun 2023
Current:
Approved
Provisional

- Efforts by YCFCD
  YCFCD collects flow stage data at four (4) locations in the Big Chino Sub-basin: Ashfork Draw at I-40 (ID 3868), Partridge Creek at I-40 (ID 3873), Big Chino Wash at Highway 89 (ID 3828), and Walnut Creek at Walnut Creek Bridge (ID 410). The CA#1 Committee and SRP Aquifer Management and Data Analytics 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 has been used for calculating streamflow. In FY23, the Walnut Creek site had significant channel alterations which will require the radar sensor to be relocated to a new location on the bridge (personal communication with M. Massis on 9/15/2022).

Climate and Weather Monitoring – The CA#1 Parties reference other agencies that collect and make climate assessments. Those are listed in **Appendix II, Climate Monitoring, Publicly Accessible Repositories for Climate Data**. Efforts to track specific weather stations, both installed with CA#1 funds or in partnerships with other agencies, are listed in **Appendix II, Climate Monitoring, Existing Weather Stations in the Big Chino Sub-basin**. These weather stations are also shown in **Appendix III, Figures 7-8**. During FY23 the accumulated precipitation in the CA#1 study area ranged from approximately 14 inches to 31 inches.

Crop Surveys and Estimated Crop Water Use – The USGS and ADWR have had a longstanding contract to conduct crop surveys in what ADWR determines to be critical basins for observation. The Big Chino Sub-basin is not a location that is monitored every year. As such, the USGS, in contract with SRP, conducts crop surveys in the Big Chino Sub-basin. The results for 2022 are shown in **Table 2** and illustrated in **Appendix III, Figures 9-1 through 9-5**. Each year the CA1 Parties seek the compiled data for inclusion in their annual report. The basic conclusions that can be drawn from 2022 data include:

- Approximately 24% of the irrigable lands that were surveyed were being irrigated in 2022 (991 acres cropped).
- Approximately 1,320 acre-feet were calculated based on consumptive use to irrigate this year's cropping pattern.
- Approximately 1.3 acre-feet was used per crop acre.

Table 2 – 2022 Crop Survey (Acres Irrigated)

Crops	Upper Big Chino	Paulden	Walnut Creek	Williamson	Turkey Canyon	Total
ALFALFA	0	0	3	0	9	12
GRASS	0	55	99	635	0	789
GRAIN	0	0	0	6	0	6
PASTURE	0	0	8	92	0	100
SOD	0	61	0	0	0	61
VEGETABLE	0	23	0	0	0	23
Total Crop Acres	**0**	**139**	**110**	**733**	**9**	**991**
No Crop Evident	**1878**	**343**	**142**	**636**	**91**	**3090**
Calculated Consumptive Use (acre-feet)	**0**	**191**	**136**	**974**	**19**	**1320**

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, City Contract No. 2017-246 with WSP was executed.

The contract and its amendments are listed in **Table 3**. Original cost estimates were generated based on 2007 costs which remained in place when the CA#1 contract was executed in 2012, and increased costs have been addressed in subsequent contract amendments, which are also shown in **Table 3**. Other conditions addressed in the amendments include greater than expected volume of data sets, extended completion dates for monitoring contracts, increased review, increased coordination between WSP and the STCs, challenges related to attempting to develop and test three (3) conceptual models, and administrative changes needed as Golder became/was acquired by WSP.

Table 3 – Contracts and Associated Costs of the CA1 Project

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
2017-246A4	7/20/2021	$0	8/30/2022
2017-246A5	9/8/2022	$0	4/30/2023
2017-246A6	5/4/2023	$0	7/18/2024
Final Cost		**$1,668,719.00**	**Anticipated FY23**

As detailed in the Meeting – WSP Focused section above, there was an extended work-stoppage concurrent with the agreement between the Parties and WSP on the "Path Forward" document. Although the Parties responded March 2023 with Contract Amendment 6, WSP didn't fully execute it until May 4, 2023. This work-stoppage on the project during preparation and review of documents, and associated meetings is also discussed in the above report section, Financial Summary. No invoices were received from WSP during FY23. When the original contract is compared to the current contract amendment, the project timeline overall has been extended by 4 years and required additional funding. Based on WSP's June 14, 2023, Gantt chart the final report is identified with an anticipated completion date of August 14, 2024.

Conclusions

Activities for the FY23 project year continued to focus on development of the groundwater flow model, and the newly amended timeline for completion of the Big Chino Sub-basin model is early FY25. The reasons for this extension centered around the STC's concerns about the groundwater models as drafted in June 2022. As of the date of this annual report, the contract with WSP has been extended (City Contract No. 2017-246A6) to July 15, 2023, due to delays by WSP in their signing of the contract amendment. The end of their working timeline has moved to August 15, 2024.

Monitoring will continue through the coming fiscal year. All monitoring contracts are in order and operating as planned as of the date of this report.

The project's financial position remains strong and cost savings measures continue to be assessed and taken when possible. Communication among the Parties, with their STCs, and with the relevant contracted agencies (e.g., ADWR, USGS, etc.) will continue as planned or as needs arise.

Future work includes both the monitoring and modeling components of CA#1. The existing monitoring contracts will continue but will need assessment as those contracts expire or data collection is no longer needed at those sites. As the model development advances, the Parties will begin planning for model scenario development and execution. The Parties technical representatives plan to reestablish a timetable and the documents for regular presentation to the CA#1 Principals.

APPENDIX I

Big Chino Sub-basin

Water Monitoring Project

July 1, 2022 – June 30, 2023

Annual Report

BIG CHINO SUB-BASIN WATER MONITORING PROJECT

July 1, 2022 – June 30, 2023 annual report for CA1 Monitoring Committee

Prepared by SRP Data Analytics

September 1, 2023

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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. 2022-154) in collaboration with the City of Prescott, Town of Prescott Valley, and Salt River Project (SRP).

For this report, the ***2023 monitoring period*** refers to July 1, 2022, through June 30, 2023. A summary of flow events observed during the period are contained within this report.

SEASONAL FLOW SUMMARY

Surface water flow was observed at each site during the 2023 monitoring period. The following are details observed:

- Flow was observed at all sites within the sub-basin.
- The most observed flow events at a site were fourteen (14) at Williamson Valley Wash at XU Ranch.
- The fewest observed flow events at a site were four (4) at Big Chino Wash below Partridge Creek. There were likely more events at the site, but due to a camera issue, the events occurring after September 2022 were not recorded.
- Two sites experienced flow events that exceeded the channel rating: Williamson Valley Wash at XU Ranch and Lower Williamson Valley Wash.
- The flow event resulting in the highest flow volume occurred on 3/21/2023 at Lower Williamson Valley Wash. 6,144.6 acre-feet (AF) were observed during this flow event, and the channel rating was exceeded.
- There was an estimated 12,482.3 AF observed at the Lower Williamson Valley Wash site, the largest total estimated flow volume observed during the 2023 monitoring period at a single site.
- There was an estimated 598.7 AF observed at the Pine Creek site, the lowest total estimated flow volume observed during the 2023 monitoring period at a single site.

Flow event details including event start date, an estimate of the magnitude of flow, and the locations where surface water flow was observed are shown in Table 1 and Figure 1 below.

TABLE 1. BIG CHINO SUB-BASIN JULY 1, 2022, THROUGH JUNE 30, 2023 FLOW EVENT SUMMARIES INCLUDING THE ESTIMATED TOTAL ACRE-FEET (AF)

Start Date[1]	Upper Big Chino Wash (UBCW)	Big Chino Wash below Partridge Creek (BCWPC)[2]	Pine Creek (PC)	Upper Walnut Creek at Bridge (UWCB)[2]	Lower Walnut Creek at Charney property (LWCCP)	Williamson Valley Wash at XU Ranch (WVWXU)	Lower Williamson Valley Wash (LWVW)	Lower Big Chino Wash (LBCW)[2]	Sullivan Dam (SD)[3]
7/16/2022					6.3				
7/27/2022	32.8	Yes							
7/30/2022			56.3			0.6			
7/31/2022			14.8			37.5			
8/1/2022	493.9	Yes	13.4						
8/4/2022							12.7	Yes	
8/7/2022						12.2			
8/9/2022		Yes	4.4			6.0	13.6	Yes	
8/10/2022	11.1		165.0				10.2	Yes	Yes
8/12/2022			45.5						
8/13/2022		Yes							
8/14/2022			0.1			6.4			
8/19/2022	7.5								
8/21/2022			123.2	Yes	358.4	199.4			
8/22/2022	654.7								Yes
8/24/2022					5.7	33.6			
8/26/2022						0.5			
8/29/2022							10.9	Yes	
9/1/2022			2.9						
9/13/2022	316.0[4]				4.9	2.4	1.1	Yes	Yes
10/1/2022	5.3								Yes
10/3/2022	801.3								
1/1/2023	0.5					58.8			
1/2/2023					0.1				
1/6/2023						0.2			
1/15/2023						1,330.1	3,685.0	Yes	Yes
1/16/2023			31.2						
1/21/2023				Yes	367.0				
1/22/2023						0.3			
2/25/2023						5,645.7[4]			
2/26/2023							2,604.2	Yes	
2/27/2023									Yes
3/3/2023			52.1						
3/4/2023					15.0				
3/11/2023					39.8				
3/15/2023			22.2		536.1				
3/21/2023			67.6	Yes	1,004.8		6,144.6[4]	Yes	
Total AF	**2,323.1**		**598.7**		**2,338.1**	**7,333.7**	**12,482.3**	**Yes**	

[1] Flow events may start just prior to the date indicated or continue into the following day.
[2] This is a camera only site. A Yes or No will indicate whether flow was present on that date.
[3] Sullivan Dam spill crest is not rated for discharge measurement estimates. If 'Yes' is noted, spill was observed over the crest of the dam.
[4] The flow exceeded the channel rating during this event.

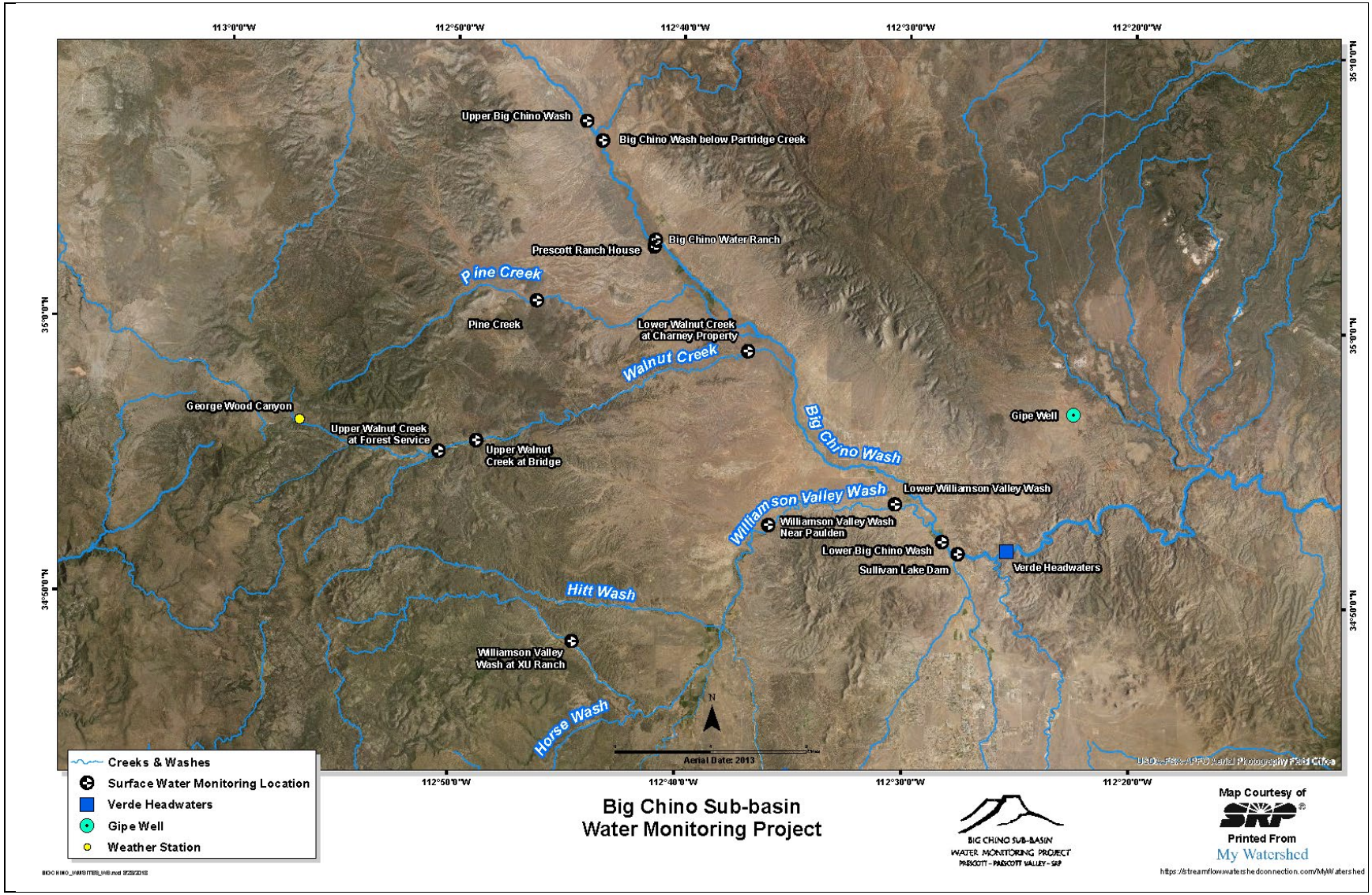


FIGURE 1. BIG CHINO SUB-BASIN MAP

Delivering water and power™

LOCATION SUMMARIES

UPPER BIG CHINO WASH (UBCW)

Nine (9) events with measurable flow were observed at UBCW. Some highlights of those events are as follows:

- The flow event starting on 8/22/2022 was the longest, lasting 112.8 hours.
- The flow event starting on 9/13/2022 had a peak recorded discharge of 1,076 cfs, the highest discharge observed at the site for the 2023 monitoring period. Flow during this event exceeded the site rating.
- The flow events starting on 10/3/2022 had the largest estimated flow volume at 801.31 AF, 34% of the total flow observed at the site for the reporting period.
- One (1) of the Nine (9) events observed at the site exceeded the channel rating.

Flow event data including duration and estimated flow volume for the 2023 monitoring period are outlined in Table 2 and Figures 2 and 3, and image data from the site can be seen in Figure 4.

TABLE 2. UBCW JULY 1, 2022 - JUNE 30, 2023, FLOW EVENTS

Start Date	Start Time[5]	Duration (hours)[6]	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
7/27/2022	17:45	9.25	2.0	228.30	32.8
8/1/2022	4:00	64.75	3.0	531.80	493.9
8/10/2022	10:30	15.5	1.0	33.43	11.1
8/19/2022	16:45	10.5	1.0	33.43	7.5
8/22/2022	19:15	112.8	2.5	361.80	654.7
9/13/2022	12:00	20.25	5.0	1076.00[7]	316.0
10/1/2022	16:15	5.75	1.0	33.43	5.3
10/3/2022	13:45	30	4.0	975.60	801.3
1/1/2023	9:45	7.75	0.29	1.12	0.5
Total		276.55			2,323.1

The UBCW site was visited a total of five (5) times during the 2023 monitoring period. In addition to routine quarterly maintenance and data collection, the following adjustments were made at the site:

- New whip event gage and 60’ pressure transducer installed.

[5] Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the following day(s).
[6] Flow event duration is based on discharge calculated using the existing rating.
[7] Flow exceeded the channel rating maximum of 1,100 cfs during this flow event.

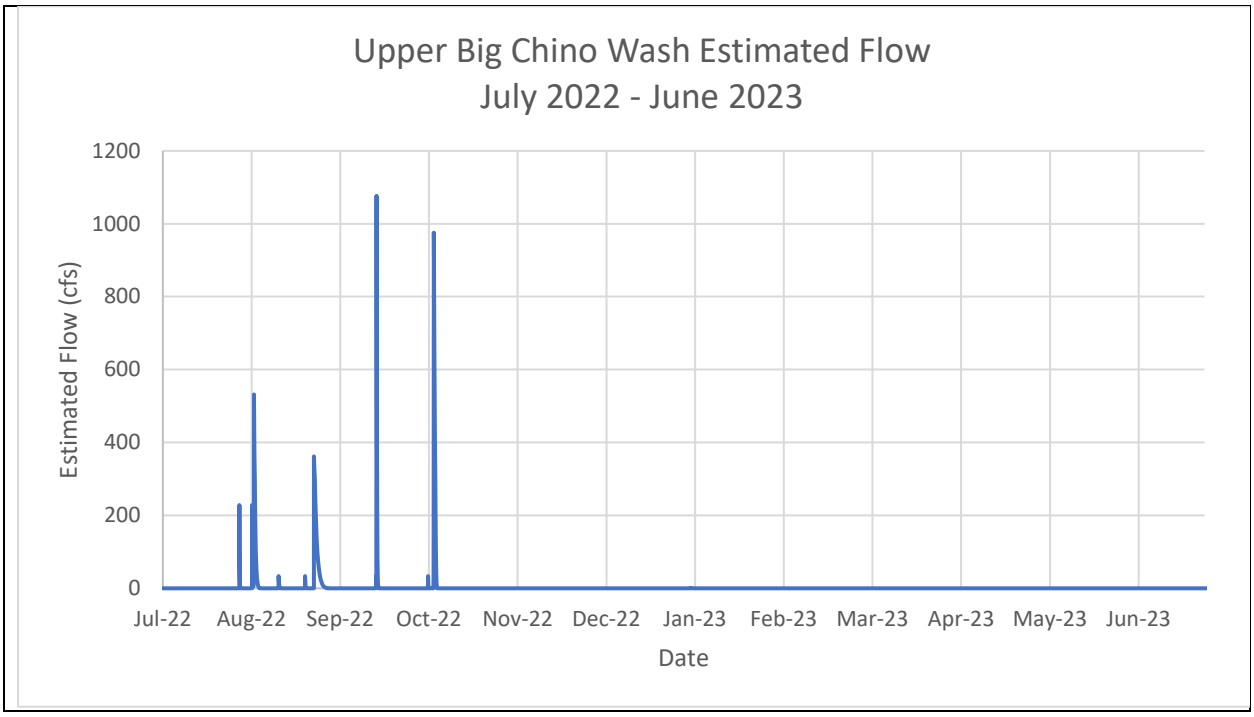
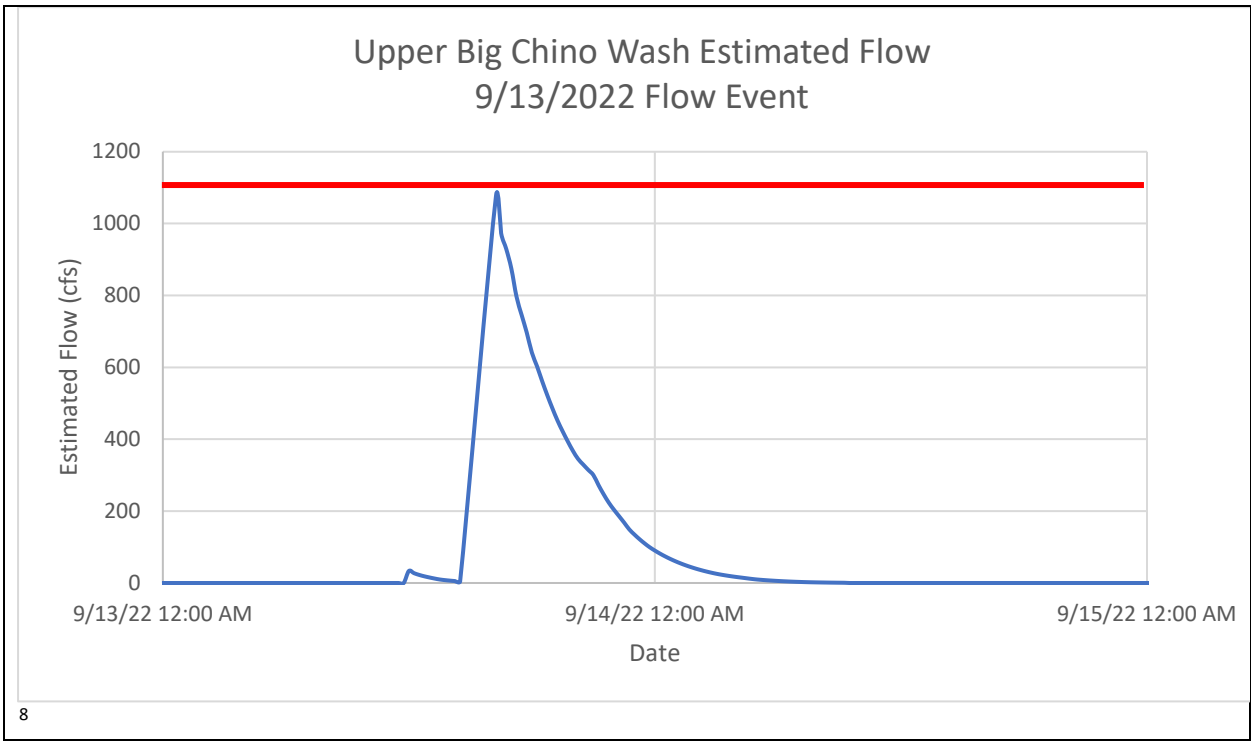


FIGURE 2. UBCW JULY 1, 2022 - JUNE 30, 2023, ANNUAL FLOW EVENTS



[8]

FIGURE 3. UBCW SEPTEMBER 2022 HIGH FLOW EVENT

[8] Flow exceeded the channel rating during this flow event. Maximum flow for the rating is 1,100 cfs, marked by the red line in the graph.

UBCW at the start of the 2023 monitoring period

UBCW at the end of the 2023 monitoring period

UBCW at the peak of the 9/13/2022 flow event

FIGURE 4. UBCW IMAGE DATA

BIG CHINO WASH BELOW PARTRIDGE CREEK (BCWPC)

Four (4) events were observed at BCWPC. Because this site is a camera only site, there are no estimates of flow observed. Flow event duration for events observed during the 2023 monitoring period are outlined in Table 3, and image data from the site can be seen in Figure 5.

TABLE 3. BCWPC JULY 1, 2022 - JUNE 30, 2023, FLOW EVENTS

Start Date	Start Time[9]	Duration (hours)[10]	Peak Stage (feet)	Peak Discharge (cfs)[11]	Total Volume (AF)
7/27/2022	18:15	15.25			
8/1/2022	3:45	80.25			
8/9/2022	22:00	31			
8/13/2022	20:45	9			
Total		135.5			

The BCWPC site was visited a total of four (4) times during the 2023 monitoring period. In addition to routine quarterly maintenance and data collection, the following adjustments were made at the site:

- Camera was replaced at the site.

[9] Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the following day(s).
[10] Flow event duration is based on discharge calculated using the existing rating.
[11] Where there is an *, the flow exceeded the rating for the channel.

BCWPC at the start of the 2023 monitoring period

Last recorded image of BCWPC for the 2023 monitoring period

BCWPC during the 8/9/2022 flow event

FIGURE 5. BCWPC IMAGE DATA

BIG CHINO WATER RANCH (BCWR)

The BCWR site is a camera only site. There were no days where flow from the Big Chino Wash was observed to exceed the channel and flow into the valley below the camera. The BCWR site was visited a total of four (4) times during the 2023 monitoring period. All site visits were for routine maintenance and data collection.

BCWR site images for the reporting period can be seen in Figure 6.

BCWR at the start of the 2023 monitoring period

BCWR at the end of the 2023 monitoring period

BCWR site image

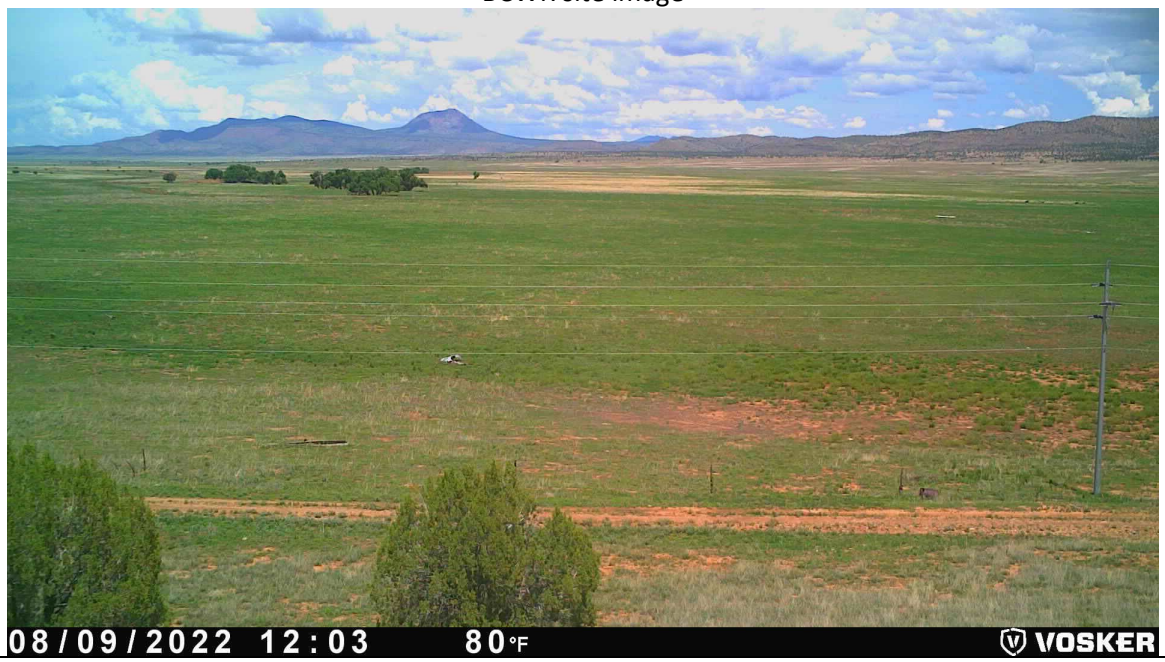


FIGURE 6. BCWR IMAGE DATA

PINE CREEK (PC)

Thirteen (13) events with measurable flow were observed at PC. Some highlights of those events are as follows:

- The flow event starting on 3/21/2023 was the longest lasting, lasting 101.5 hours.
- The flow event starting on 8/10/2022 had a peak discharge of 437.42 cfs, the highest discharge observed at the site for the 2023 monitoring period.
- The flow events starting on 8/10/2022 had the largest estimated flow volume at 165.0 AF, 28% of the total flow observed at the site for the reporting period.
- None of the thirteen (13) events observed at the site exceeded the channel rating.

Flow event data including duration and estimated flow volume for the 2023 monitoring period are outlined in Table 4 and Figures 7 and 8, and image data from the site can be seen in Figure 9.

TABLE 4. PC JULY 1, 2022 - JUNE 30, 2023, FLOW EVENTS

Start Date	Start Time[12]	Duration (hours)[13]	Peak Stage (feet)	Peak Discharge (cfs)[14]	Total Volume (AF)
7/30/2022	11:45	8.25	2.5	413.64	56.3
7/31/2022	15:30	8.25	1.25	88.57	14.8
8/1/2022	15:45	8.00	1.25	88.57	13.4
8/9/2022	15:45	4.25	0.9	45.31	4.4
8/10/2022	16:00	21.5	1.8	437.42	165.0
8/12/2022	12:00	22.75	3.1	397.41	45.5
8/14/2022	17:45	10.50	0.2	2.48	0.1
8/21/2022	15:45	17.00	3.0	432.79	123.2
9/1/2022	17:00	6.5	0.5	15.08	2.9
1/16/2023	10:45	69.5	0.48	14.12	31.2
3/3/2023	20:00	101.25	0.44	11.90	52.1
3/15/2023	17:00	56.75	0.4	9.78	22.2
3/21/2023	7:30	101.5	0.6	21.19	67.6
Total		437.0			598.7

The PC site was visited a total of five (5) times during the 2023 monitoring period. In addition to routine quarterly maintenance and data collection, the following adjustments were made at the site:

- Event gage and pressure transducer replaced due to damage.

[12] Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the following day(s).
[13] Flow event duration is based on discharge calculated using the existing rating.
[14] Where there is an *, the flow exceeded the rating for the channel.

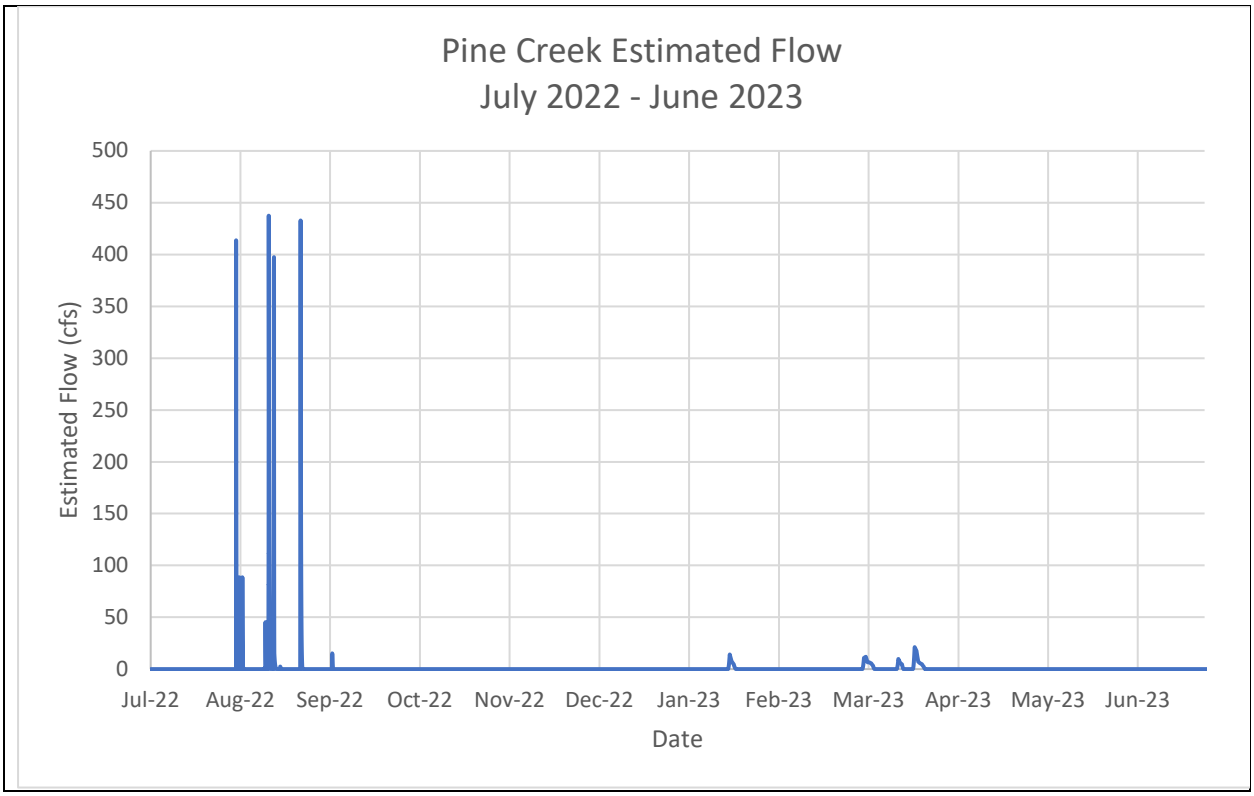


FIGURE 7. PC JULY 1, 2022 - JUNE 30, 2023, ANNUAL FLOW EVENTS

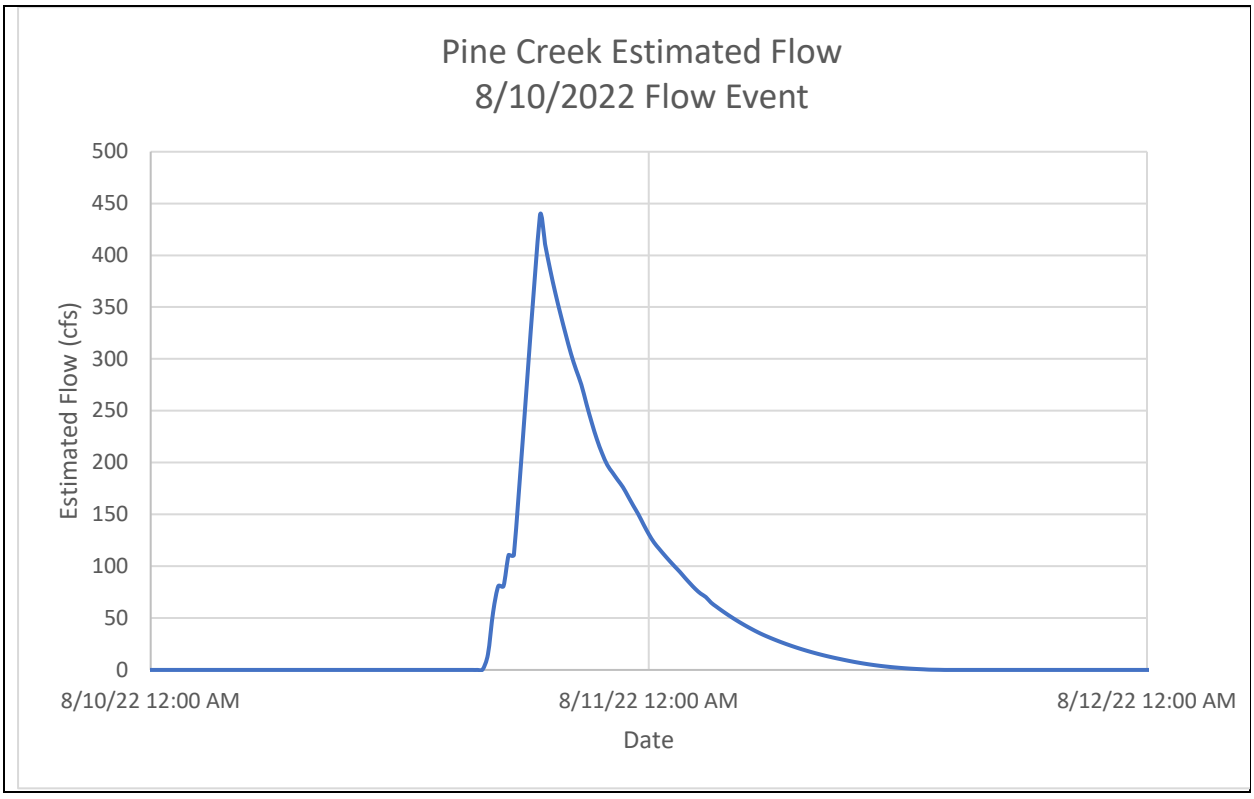


FIGURE 8. PC AUGUST 2022 HIGH FLOW EVENT

PC at the start of the 2023 monitoring period

PC at the end of the 2023 monitoring period

PC at the peak of the 8/10/2022 flow event

FIGURE 9. PC IMAGE DATA

UPPER WALNUT CREEK AT BRIDGE (UWCB)

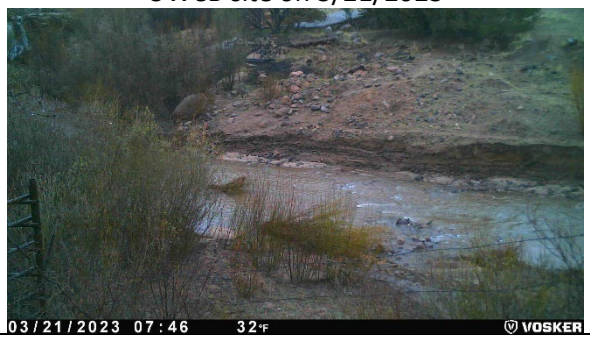
The UWCB site is a camera only site. The UWCB site was visited a total of four (4) times during the 2023 monitoring period. All site visits were for routine maintenance and data collection.

UWCB site images for the reporting period can be seen in Figure 10.

UWCB at the start of the 2023 monitoring period

UWCB at the end of the 2023 monitoring period

Before the start of flow event observed at the UWCB site on 3/21/2023



During the 3/21/2023 flow event

FIGURE 10. BCWR IMAGE DATA

LOWER WALNUT CREEK AT CHARNEY PROPERTY (LWCCP)

Eleven (11) events with measurable flow were observed at LWCCP. Some highlights of those events are as follows:

- The flow event starting on 3/21/2023 was the longest lasting, lasting 52.5 hours.
- The flow event starting on 8/21/2022 had a peak discharge of 1,715.04 cfs, the highest discharge observed at the site for the 2023 monitoring period.
- The flow event starting on 3/21/2023 had the largest estimated flow volume at 1,004.77 AF, 43 % of the total flow observed at the site for the reporting period.
- Four (4) of the Eleven (11) events observed make up 97% of the total estimated flow observed for the 2023 monitoring period. Those events occurred on 8/21/2022, 1/16/2023, 3/15/2023, and 3/21/2023.
- None of the eleven (11) events observed at the site exceeded the channel rating.

Flow event data including duration and estimated flow volume for the 2023 monitoring period are outlined in Table 5 and Figures 11 and 12, and image data from the site can be seen in Figure 13.

TABLE 5. LWCCP JULY 1, 2022 - JUNE 30, 2023, FLOW EVENTS

Start Date	Start Time[15]	Duration (hours)[16]	Peak Stage (feet)	Peak Discharge (cfs)[17]	Total Volume (AF)
7/16/2022	19:00	2	1.3	168.60	6.3
8/21/2022	19:30	14	4.16	1715.04	358.4
8/24/2022	21:00	3.75	1.0	84.18	5.7
9/13/2022	13:00	2.75	1.0	84.18	4.9
1/2/2023	0:00	0.5	0.4	5.28	0.1
1/16/2023	18:00	38.5	1.91	396.89	367.0
3/4/2023	0:45	6.75	0.78	33.74	8.9
3/4/2023	23:45	38	0.89	57.26	6.1
3/11/2023	17:00	20.75	0.9	59.49	39.8
3/15/2023	18:15	24.5	3.46	1237.72	536.1
3/21/2023	19:15	52.5	3.45	1230.15	1004.8
Total		244.5			2,338.1

The LWCCP site was visited a total of six (6) times during the 2023 monitoring period. In addition to routine quarterly maintenance and data collection, the following adjustments were made at the site:

- Event gage and pressure transducer replaced due to damage.

[15] Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the following day(s).
[16] Flow event duration is based on discharge calculated using the existing rating.
[17] Where there is an *, the flow exceeded the rating for the channel.

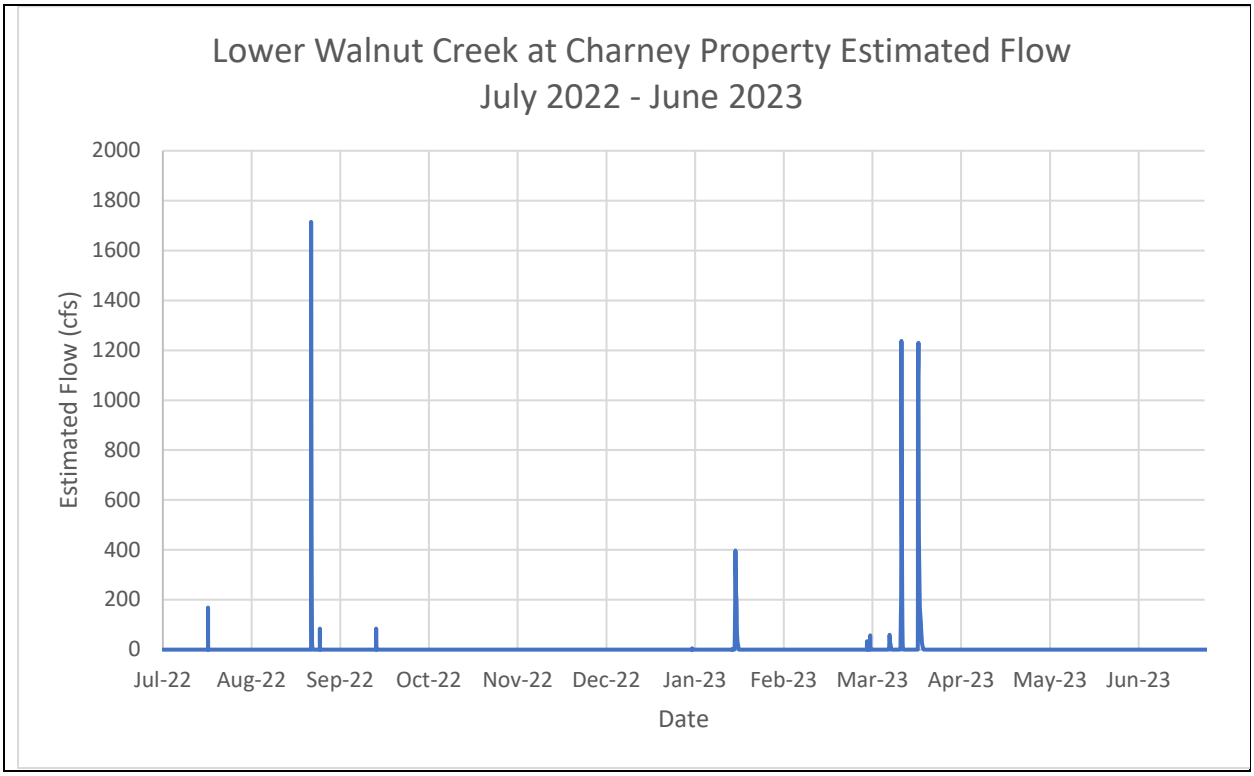


FIGURE 11. LWCCP JULY 1, 2022 - JUNE 30, 2023, ANNUAL FLOW EVENTS

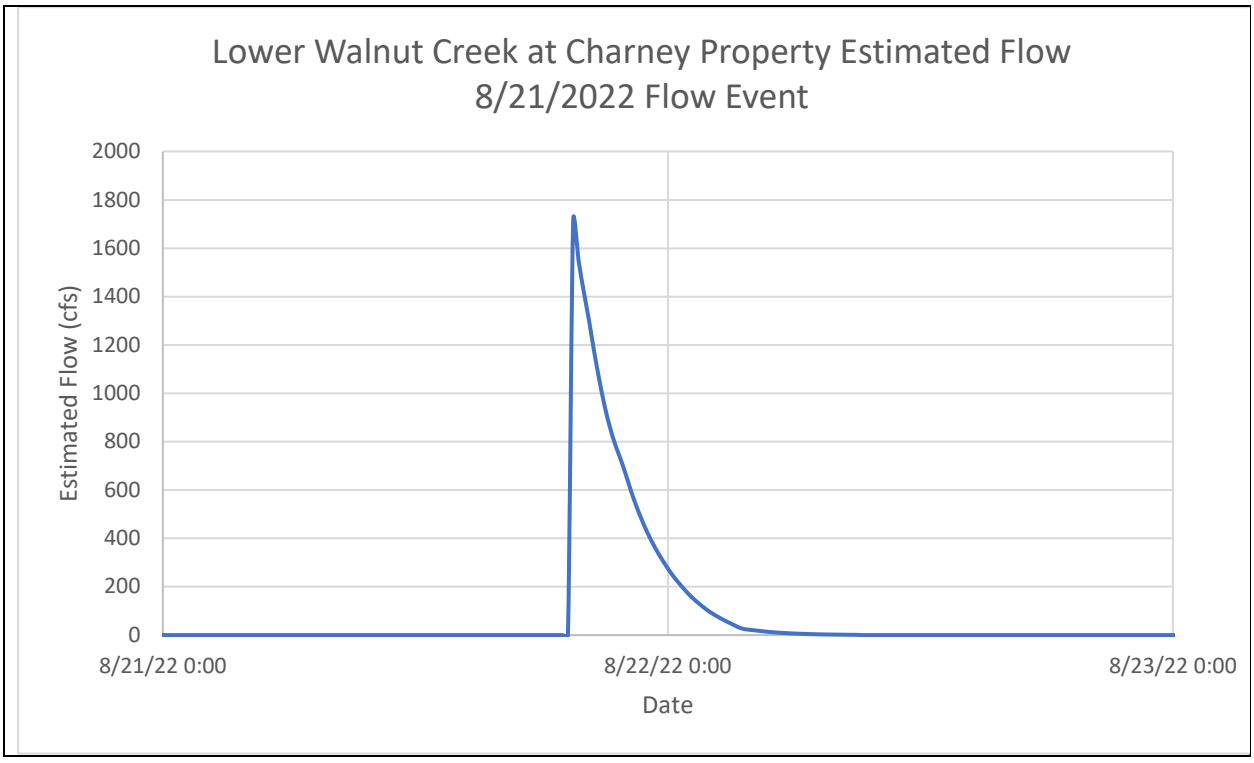


FIGURE 12. LWCCP AUGUST 2022 HIGH FLOW EVENT

LWCCP at the start of the 2023 monitoring period

LWCCP at the end of the 2023 monitoring period

LWCCP during the flow event that started on 3/21/2023:

FIGURE 13. LWCCP IMAGE DATA

WILLIAMSON VALLEY WASH AT XU RANCH (WVWXU)

Fourteen (14) events with measurable flow were observed at WVWXU. Some highlights of those events are as follows:

- The flow event starting on 2/25/2023 was the longest lasting, lasting 787.75 hours, almost 33 consecutive days.
- The flow event starting on 2/25/2023 had a peak discharge of 790.19 cfs, the highest discharge observed at the site for the 2023 monitoring period.
- The flow events starting on 2/25/2023 had the largest estimated flow volume at 5,645.7 AF, 77% of the total flow observed at the site for the reporting period.
- One (1) of the fourteen (14) events observed at the site exceeded the channel rating.

Flow event data including duration and estimated flow volume for the 2023 monitoring period are outlined in Table 6 and Figures 14 and 15, and image data from the site can be seen in Figure 16.

TABLE 6. WVWXU JULY 1, 2022 - JUNE 30, 2023, FLOW EVENTS

Start Date	Start Time[18]	Duration (hours)[19]	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
7/30/2022	12:45	2.25	0.40	8.16	0.6
7/31/2023	15:30	4.25	1.75	335.65	37.5
8/7/2023	16:45	5.0	1.00	110.0	12.2
8/9/2022	07:00	4.5	0.80	61.19	6.0
8/14/2022	14:00	7.75	0.50	15.72	6.4
8/21/2022	18:30	50.5	3.00	745.95	199.4
8/24/2022	14:45	5.0	1.80	353.47	33.6
8/26/2023	17:00	1.5	0.40	8.16	0.5
9/13/2022	14:00	2.75	0.65	31.85	2.4
1/1/2023	15:30	25.0	0.99	106.89	58.8
1/6/2023	08:00	1.75	0.25	1.41	0.2
1/15/2023	05:00	74.25	2.48	640.79	1330.1
1/22/2023	06:15	3.5	0.25	1.35	0.3
2/25/2023	00:15	787.75	3.95	790.19[20]	5,645.7
Total		975.75			7,333.7

The WVWXU site was visited a total of six (6) times during the 2023 monitoring period. In addition to routine quarterly maintenance and data collection, the following adjustments were made at the site:

- Event gage and pressure transducer replaced due to damage.

[18] Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the following day(s).
[19] Flow event duration is based on discharge calculated using the existing rating.
[20] Flow exceeded the channel rating maximum of 800 cfs during this flow event.

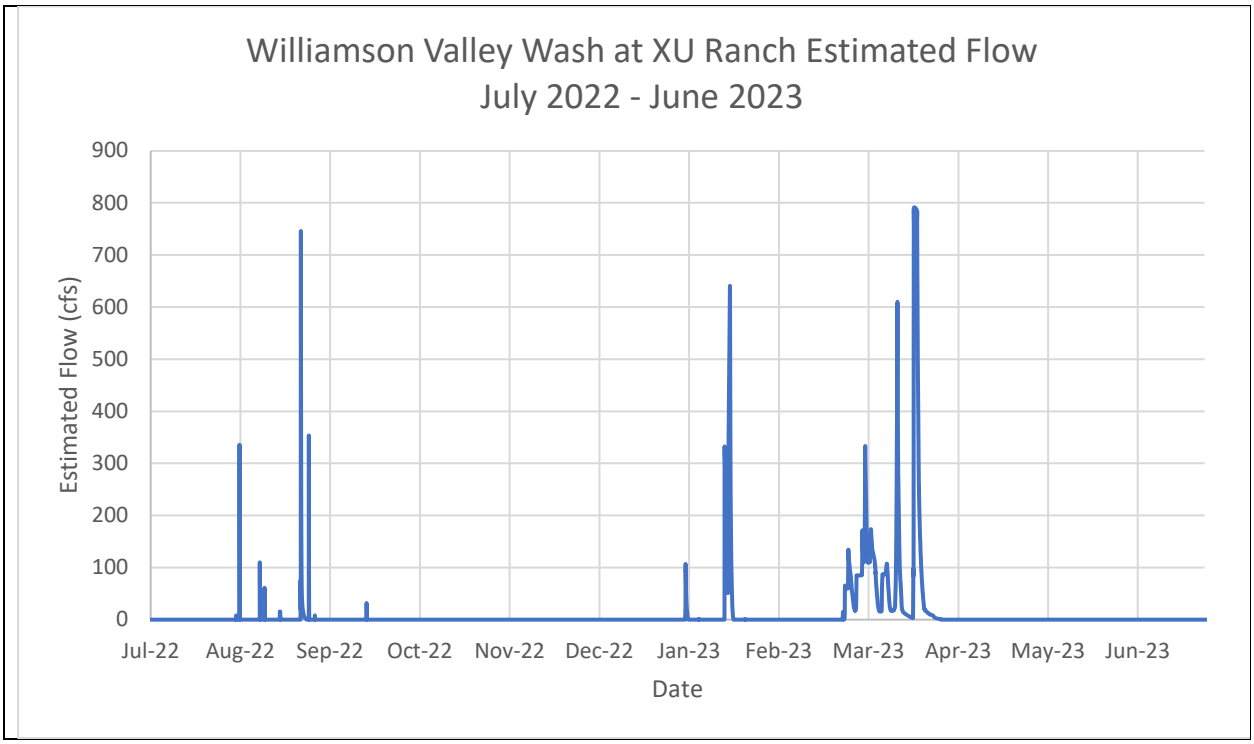
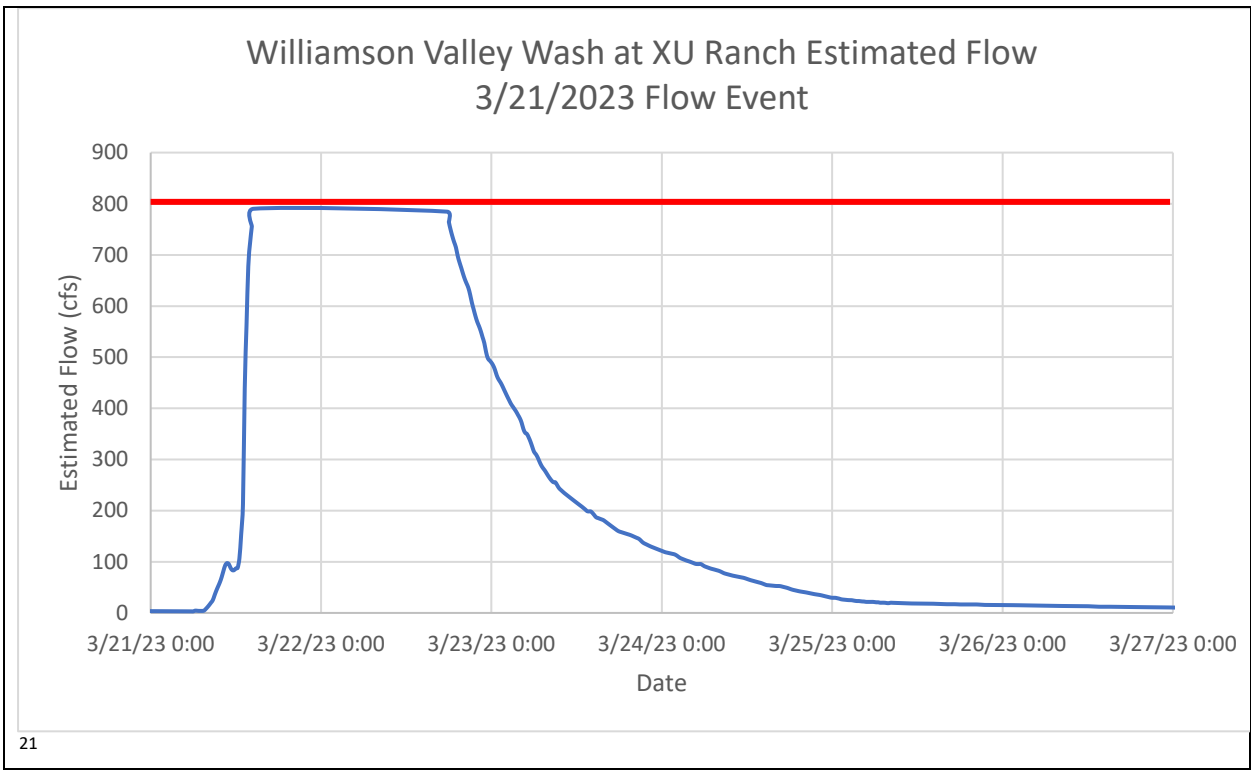


FIGURE 14. WVWXU JULY 1, 2022 - JUNE 30, 2023, ANNUAL FLOW EVENTS



[21]

FIGURE 15. WVWXU MARCH 2023 HIGH FLOW EVENT

[21] Flow exceeded the channel rating during this flow event. Maximum flow for the rating is 800 cfs, marked by the red line in the graph.

WVWXU at the start of the 2023 monitoring period

WVWXU at the end of the 2023 monitoring period

WVWXU during the flow event on 3/21/2023

FIGURE 16. WVWXU IMAGE DATA

LOWER WILLIAMSON VALLEY WASH (LWVW)

Eight (8) events with measurable flow were observed at LWVW. Some highlights of those events are as follows:

- The flow event starting on 2/26/2023 was the longest lasting, lasting 518.5 hours.
- The flow event starting on 3/21/2023 had a peak discharge of 2,499 cfs, the highest discharge observed at the site for the 2023 monitoring period.
- The flow events starting on 3/21/2023 had the largest estimated flow volume at 6,144.6 AF, 49% of the total flow observed at the site for the reporting period.
- One (1) of the eight (8) events observed at the site exceeded the channel rating.

Flow event data including duration and estimated flow volume for the 2023 monitoring period are outlined in Table 7 and Figures 17 and 18, and image data from the site can be seen in Figure 19.

TABLE 7. LWVW JULY 1, 2022 - JUNE 30, 2023, FLOW EVENTS

Start Date	Start Time[22]	Duration (hours)[23]	Peak Stage (feet)	Peak Discharge (cfs)	Total Volume (AF)
8/4/2022	06:00	13.25	1.33	69.54	12.7
8/9/2022	06:15	10.75	1.50	100	13.6
8/10/2022	17:30	12.5	1.10	42.07	10.2
8/29/2022	00:45	16.0	0.80	19.46	10.9
9/13/2022	18:45	4.25	0.50	5.90	1.1
1/15/2023	16:00	125.8	4.00	1,704	3,685.0
2/26/2023	22:00	518.5	3.13	918.1	2,604.2
3/21/2023	20:15	168.8	4.93	2,499[24]	6,144.6
Total		869.85			12,482.3

The LWVW site was visited a total of six (6) times during the 2023 monitoring period. In addition to routine quarterly maintenance and data collection, the following adjustments were made at the site:

- Event gage and pressure transducer replaced due to damage.

[22] Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the following day(s).
[23] Flow event duration is based on discharge calculated using the existing rating.
[24] Flow exceeded the channel rating maximum of 2,500 cfs during this flow event.

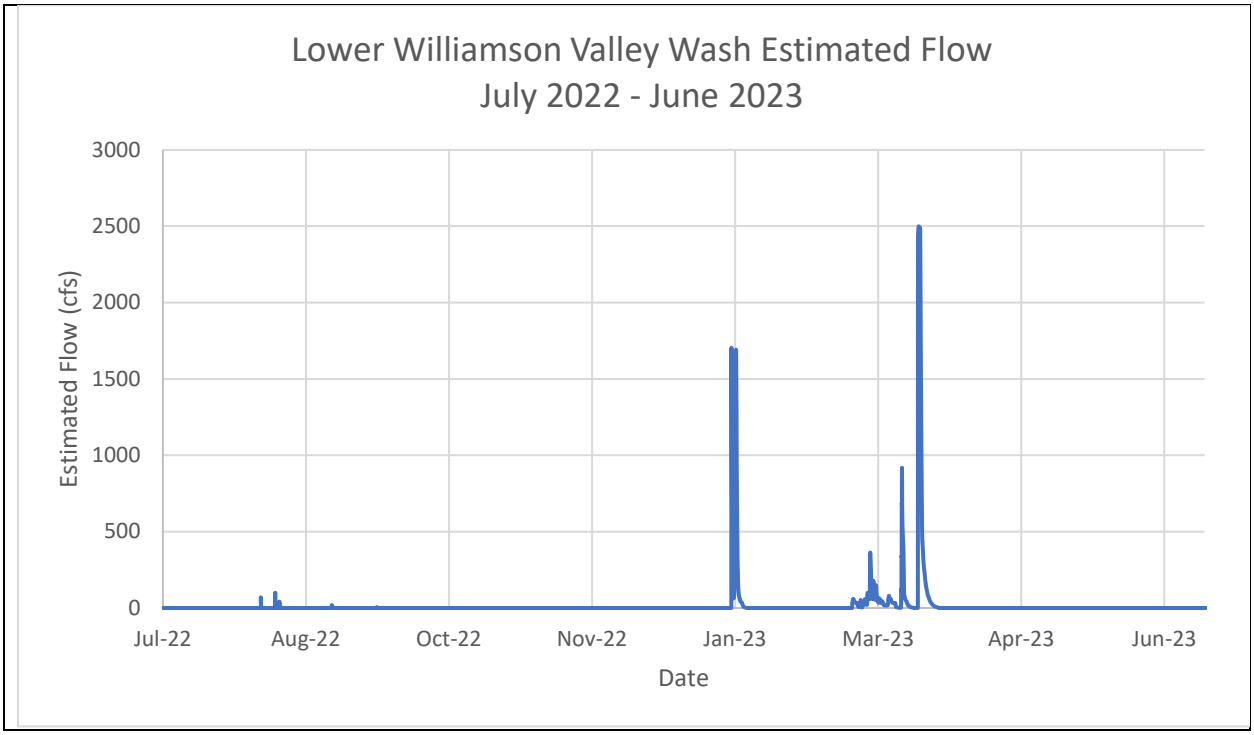
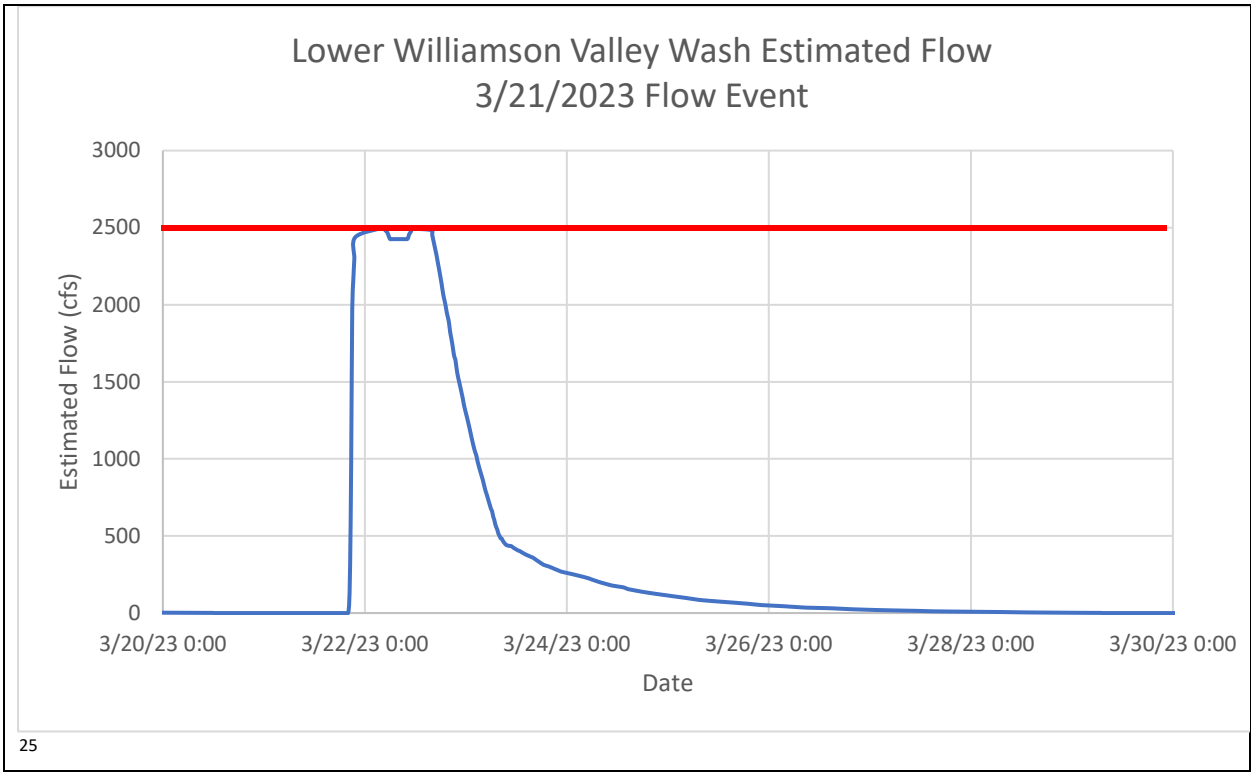


FIGURE 17. LWVW JULY 1, 2022 - JUNE 30, 2023, ANNUAL FLOW EVENTS



25

FIGURE 18. LWVW MARCH 2023 HIGH FLOW EVENT

[25] Flow exceeded the channel rating during this flow event. Maximum flow for the rating is 2,500 cfs, marked by the red line in the graph.

LWVW at the start of the 2023 monitoring period

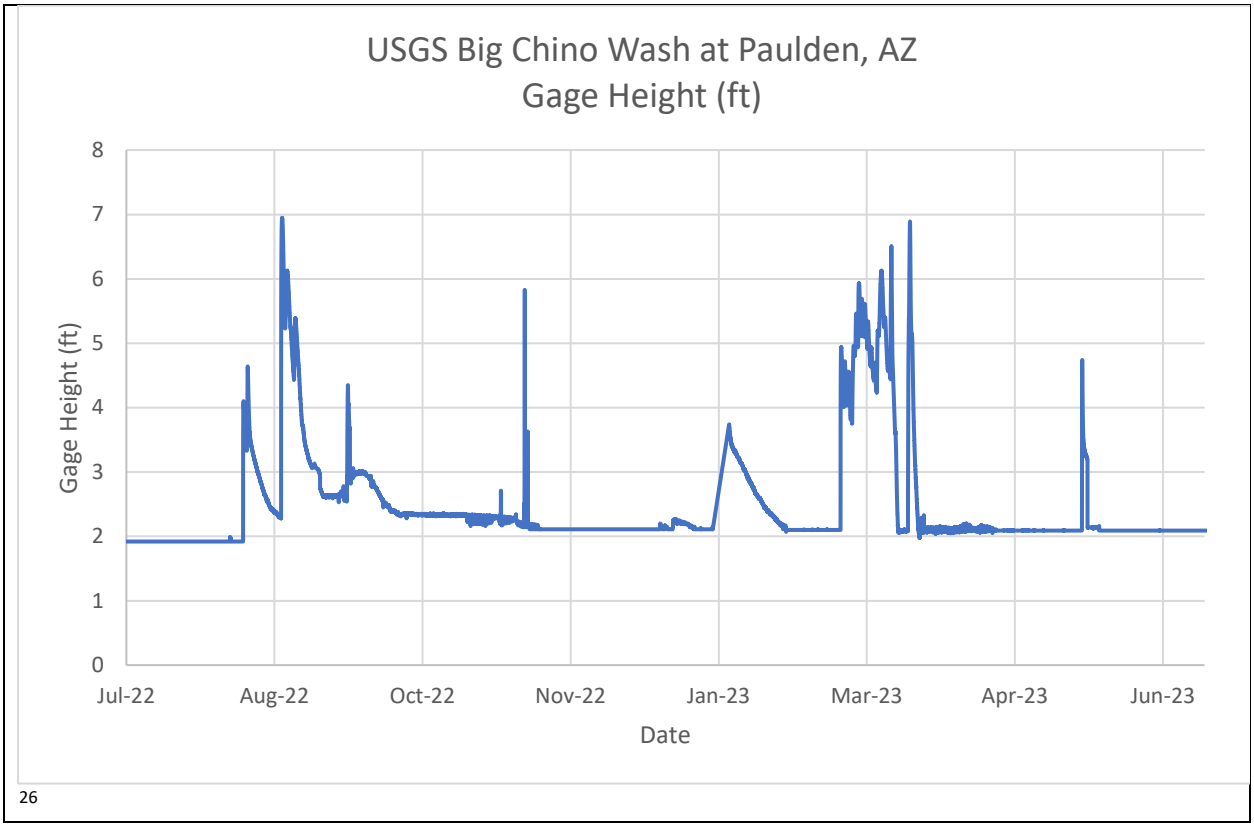
LWVW at the end of the 2023 monitoring period

LWVW during the flow event that started on 3/21/2023

FIGURE 19. LWVW IMAGE DATA

LOWER BIG CHINO WASH (LBCW)

The LBCW site is a camera only site. The USGS Big Chino Wash at Paulden, AZ stream gage is located approximately 0.15 river miles downstream of LBCW, on the other side of the road overpass. Flow data for the USGS site can be seen in Figure 20, and image data from the LBCW site can be seen in Figure 21.



[26]

FIGURE 20. USGS BIG CHINO WASH AT PAULDEN, AZ JULY 1, 2022 – JUNE 30, 2023, FLOW EVENTS

The LBCW site was visited a total of four (4) times during the 2023 monitoring period. All site visits were for routine maintenance and data collection.

[26] Due to a lack of funding, the USGS gage at this station was discontinued on May 7, 2023. Data after that date is provisional and will remain so until alternative funding can be secured. Please contact Kurt Schonauer at schonaue@usgs.gov or 928-853-0686 for more information.

LBCW at the start of the 2023 monitoring period

LBCW at the end of the 2023 monitoring period

LBCW after the start of the 3/21/2023 flow event

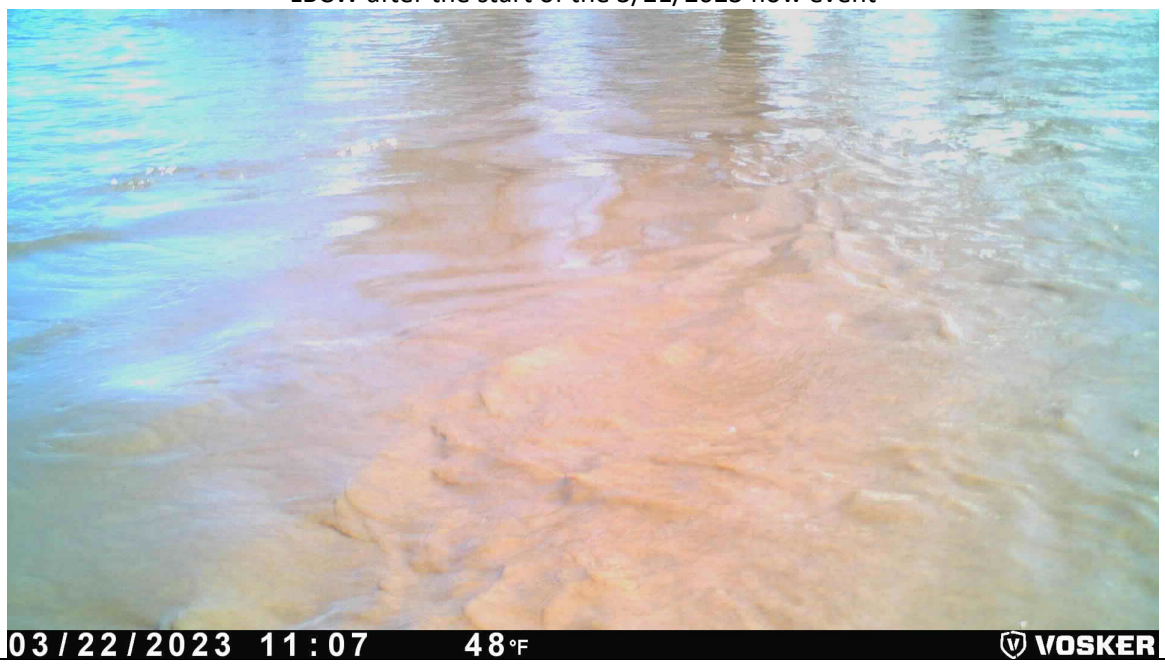


FIGURE 21. LBCW IMAGE DATA

SULLIVAN DAM (SD)

Six (6) events with flow were observed at SD. Flow event data including start time, duration, and peak flow for the 2023 monitoring period are outlined in Table 8 and image data from the site can be seen in Figure 22. The pressure transducer at the site was damaged during the 3/21/2023 flow event, and there is no stage data after that.

TABLE 8. SD JULY 1, 2022 - JUNE 30, 2023, FLOW EVENTS

Start Date	Start Time[27]	Duration (hours)[28]	Peak Stage (feet)
8/10/2022	19:00	37.0	0.46
8/22/2022	11:00	190.0	0.50
9/13/2022	17:00	51.0	0.10
10/1/2022	18:00	11.0	0.20
1/15/2023	19:30	176.0	1.49
2/27/2023	8:00	754.0	3.0[29]

The SD site was visited a total of six (6) times during the 2023 monitoring period. In addition to routine quarterly maintenance and data collection, the following adjustments were made at the site:

- Event gage replaced due to damage.

[27] Start times are approximate and actual start time are within ±15 minutes of the noted time. Events may also continue into the following day(s).
[28] Flow event duration is based on discharge calculated using the existing rating.
[29] The peak stage noted is the highest stage reading available before the loss of the event gage.

SD at the start of the 2023 monitoring period

SD at the end of the 2023 monitoring period

SD on 8/10/2022 right before the storage behind the dam fills

First spill over the dam at SD on 8/10/2022

SD on 3/23/2023, after the start of the 3/21/2023 flow event

SD on 3/23/2023

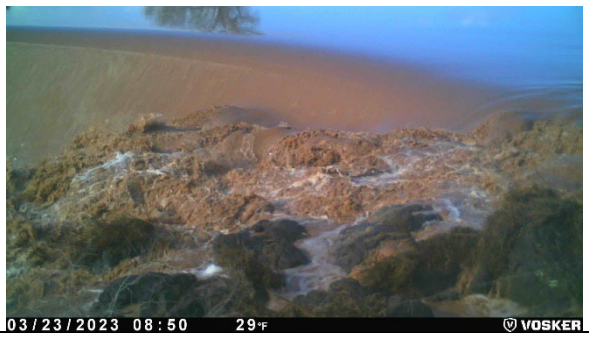


FIGURE 22. SD IMAGE DATA

VERDE HEADWATERS AT CAMPBELL RANCH (VHCR)

Fifteen (15) events with measurable flow were observed at VHCR (for this site and report, a flow event is defined as exceeding a flow rate of over 20 cfs). Some highlights of those events are as follows:

- The flow event starting on 3/22/2023 had a peak discharge of 2,944 cfs, the highest discharge observed at the site for the 2023 monitoring period. The pressure transducer housing, pressure transducer, and channel were damaged/changed during this event and there is no discharge data for the site after 03:15 hours.
- Discharge exceeded 2,000 cfs during three (3) of the fifteen (15) events observed this 2023 monitoring period. This is significant because since the start of monitoring in the Big Chino, in 2013, eight (8) flow events with discharge greater than 2,000 cfs have been observed at either the VHCR site and/or the USGS Verde River near Paulden, AZ site, and three (3) of those occurred in the last year.

The USGS Verde River near Paulden, AZ stream gage is approximately 6 river miles downstream of VHCR. Flow event data including peak flow data for the 2023 monitoring period are outlined in Table 9 and Figures 23-26, and image data from VHCR can be seen in Figure 27.

TABLE 9. VHCR AND USGS VERDE RIVER NEAR PAULDEN, AZ JULY 1, 2022 – JUNE 30, 2023, PEAK FLOW DATA

Start Date	VHCR (cfs)	USGS Verde River near Paulden, AZ (cfs)
8/8/2022	228.65	70.50
8/10/2022	223.69	157.00
8/22/2022	589.51	776.00
9/10/2022	51.32	49.50
9/13/2022	822.42	1,230.0
9/21/2022	32.92	30.40
10/1/2022	28.21	19.90
10/2/2022	24.49	21.10
10/3/2022	61.41	75.20
1/16/2023	2,385.83	4,680.00
2/27/2023	74.63	107.00
3/3/2023	683.00	990.00
3/10/2023	823.54	1,280.00
3/16/2023	2,496.13	4,210.00
3/22/2023	2,944.75[30]	16,000.00

[30] Equipment failure at this point, no further discharge measurements.

The VHCR site was visited a total of twelve (12) times during the 2023 monitoring period. In addition to routine quarterly maintenance and data collection, the following adjustments were made at the site:

- Nine (9) current meter measurements were performed to verify flow at the site and calibrate the equipment.
- After the site incurred some damage due to large flows in March 2023, field specialists met at the site several times to resurvey the channel and discuss measures to bring the site back into operations. Additional activities related to the March 2023 damage included repairing the channel and restoring it to conditions before the flow events. The flume in nonoperational at the end of the monitoring period. See Figure 28 below.

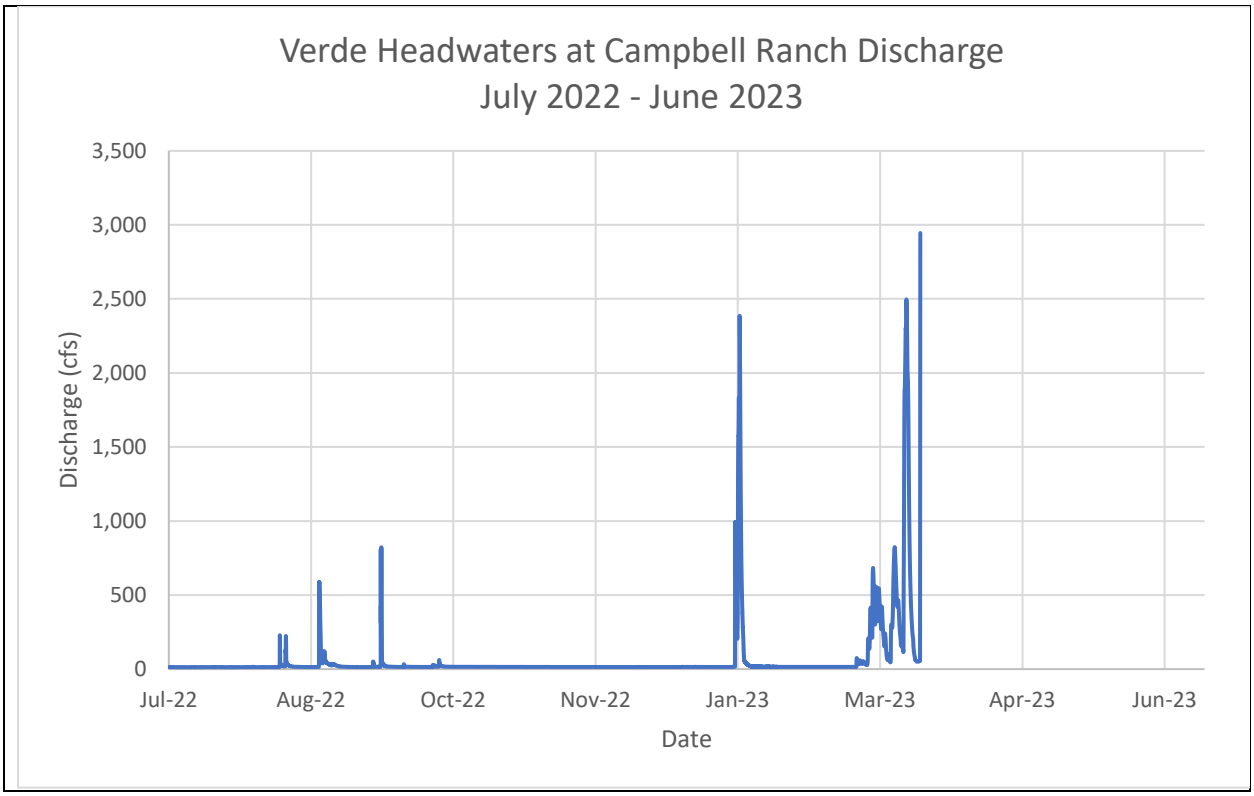


FIGURE 23. VHCR JULY 1, 2022 - JUNE 30, 2023, ANNUAL FLOW EVENTS

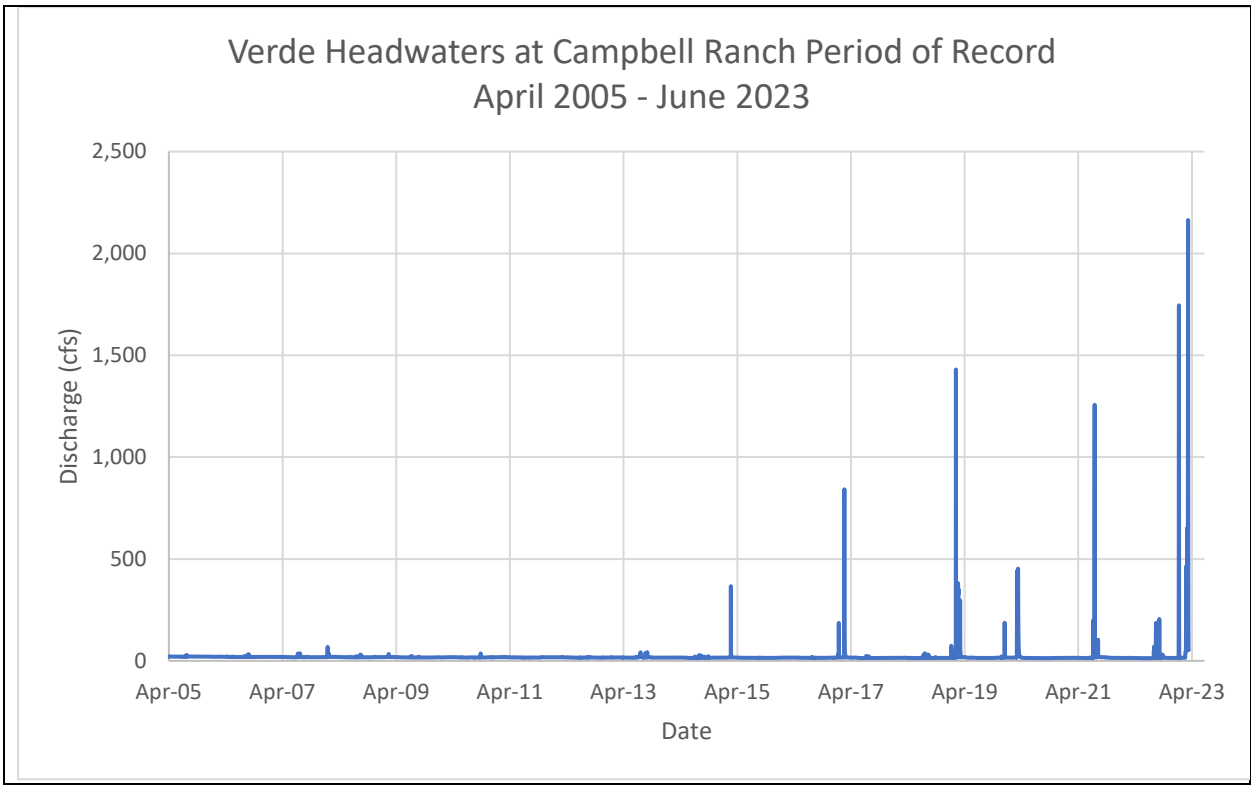


FIGURE 24. VHCR PERIOD OF RECORD

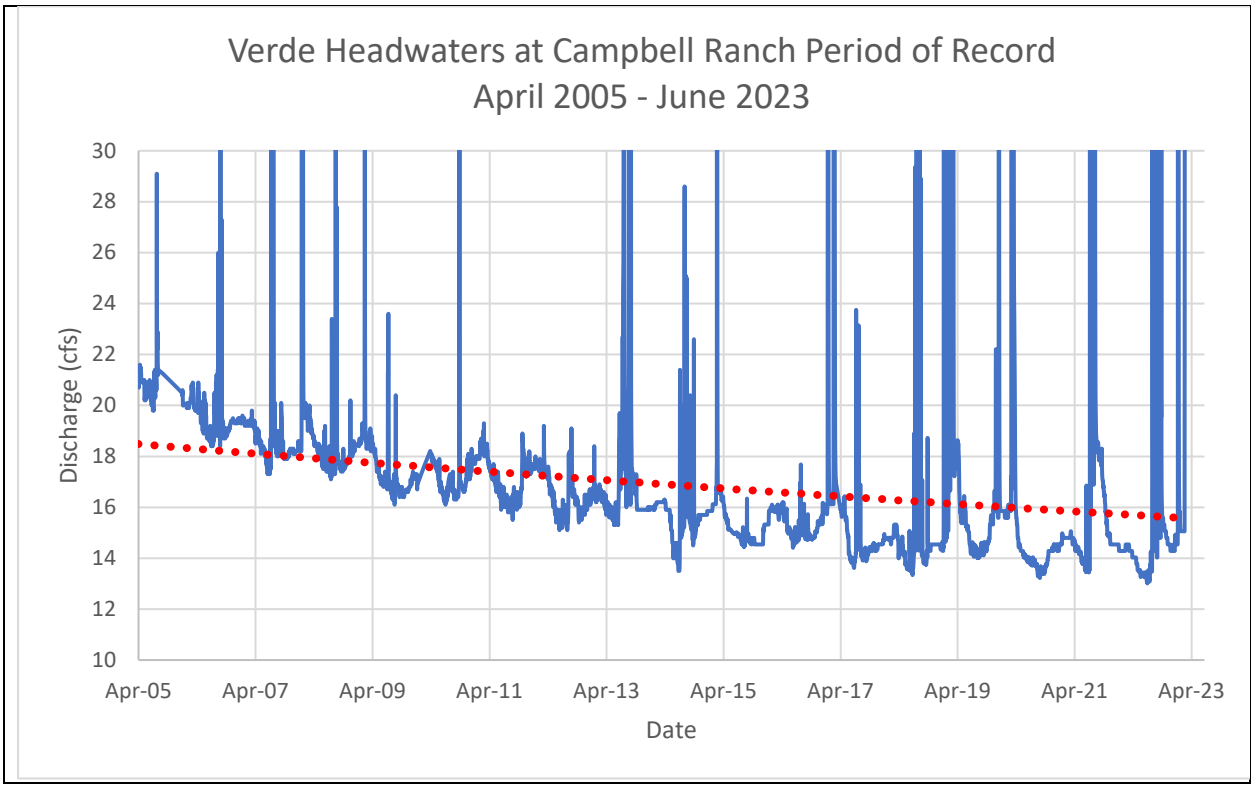


FIGURE 25. VHCR PERIOD OF RECORD

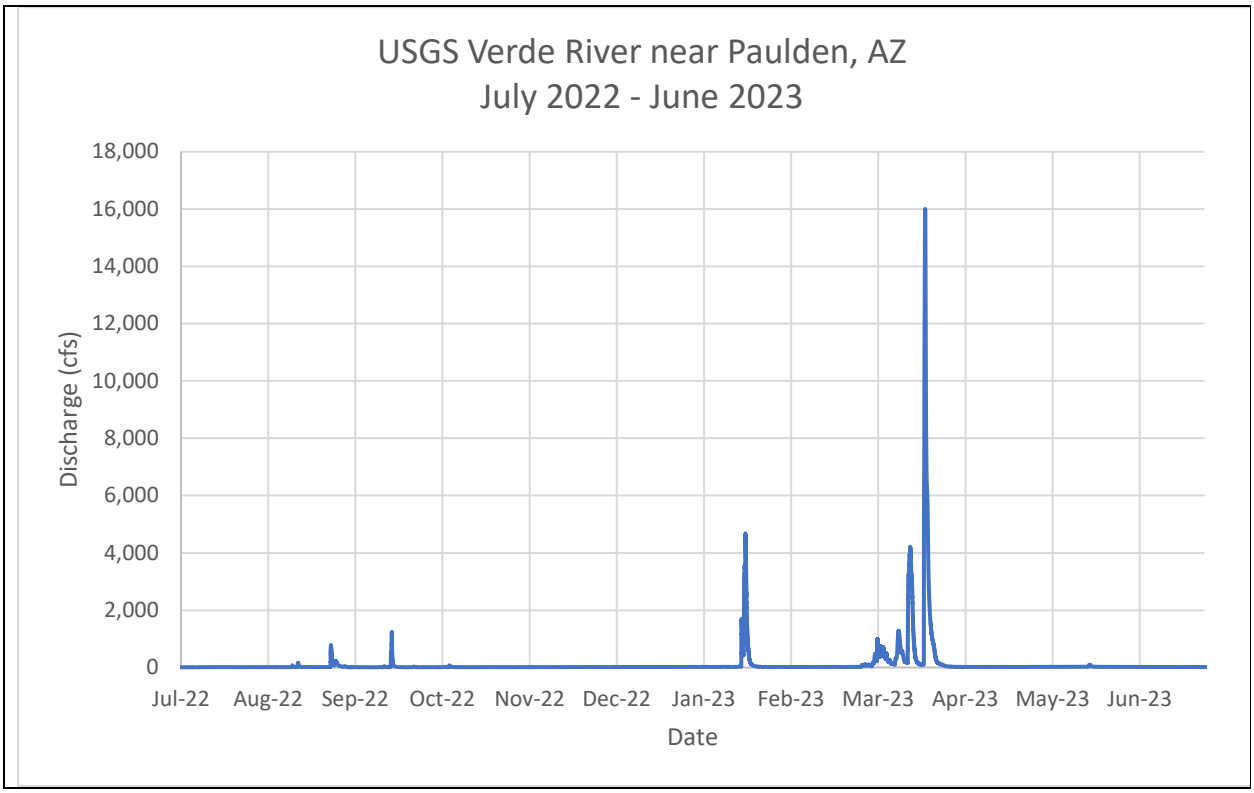
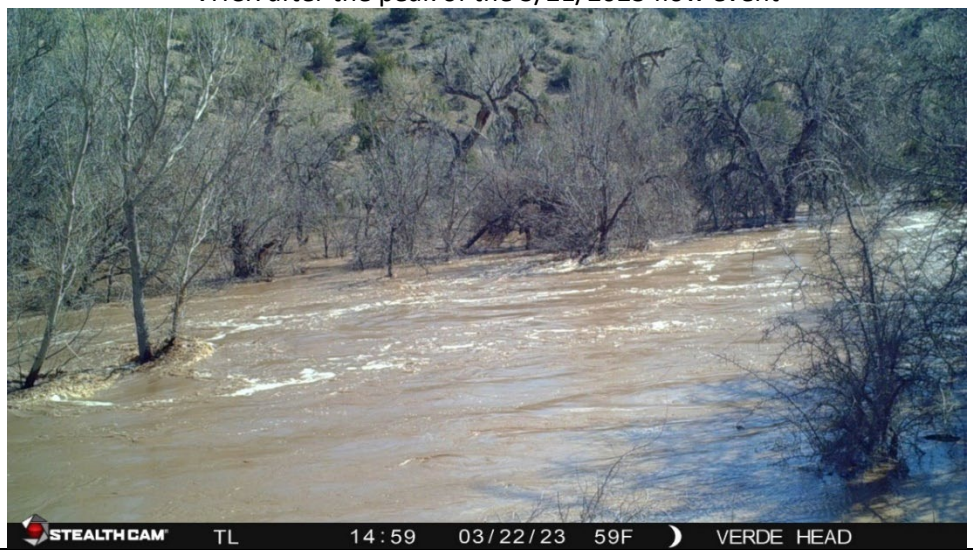


FIGURE 26. USGS VERDE RIVER NEAR PAULDEN, AZ JULY 1, 2022 – JUNE 30, 2023, FLOW EVENTS

VHCR at the start of the 2023 monitoring period

VHCR at the end of the 2023 monitoring period

VHCR after the peak of the 3/21/2023 flow event



VHCR site before the channel and structure were serviced and attempted to bring back into operation.

FIGURE 27. VHCR IMAGE DATA

FIGURE 28. REPAIR AT VHCR AS A RESULT OF MARCH 2023 FLOW EVENTS

SUMMARY

A summary of the flow events observed in the sub-basin during the 2023 monitoring period are outlined below:

- Flow was observed at all Flowtography® sites within the sub-basin.
- Twenty-two (22) flow events were observed across the sub-basin because of monsoon related precipitation events, resulting in a total estimated flow volume of 3,470.6 AF.
- Fifteen (15) flow events were observed across the sub-basin because of winter precipitation and runoff events, resulting in a total estimated flow volume of 14,954.84 AF.
- The largest estimated total flow volume for a single flow event was observed at LWVW with a total estimated flow volume of 6,144.6 AF. Peak discharge measured during this flow event was 2,499 cfs, but the flow exceeded the channel rating for approximately 11 hours.
- Water spilled over Sullivan Dam for approximately 1,219 hours, or 51 days.
- The total estimated flow volume observed in the sub-basin at all sites combined for the reporting period was approximately 25,075.9 AF.

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

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

APPENDIX II

Summaries of Data Collection Equipment

Established Monitoring Efforts

Groundwater Level Monitoring

Well Name	ADWR 55 number	Land Owner	Cadastral	Depth (ft bgs)	Perforated Interval (ft bgs)	Water Level (ft bgs)	Data Repository
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) 26ACC	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)[1]	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)[1]	557247	Southwest Land and Cattle Co.	B(18-03) 26BDB1	320	37 to 320	119.4 to 141.8	GWSI

Well Name	ADWR 55 number	Land Owner	Cadastral	Depth (ft bgs)	Perforated Interval (ft bgs)	Water Level (ft bgs)	Data Repository
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 to 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)	GWSI
BCMW-1	211839	City of Prescott	B(18-04) 25AAA2	737	300-620	261.2 (2008)	GWSI
Paulden South (PZ3)[3]	524078	City of Prescott	B(17-02S) 04DCB3	170	130-170	108 (2019)	GWSI

[1]Southwest Groundwater Consultants, January 4, 2017

[2]Southwest Groundwater Consultant, December 23, 2004

[3]Not shown in Appendix III, Maps and Figures

Stream flow Monitoring

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

Name	Completion Date	Comments
Verde Headwaters at Campbell Ranch	4/2005	https://streamflow.watershedconnection.com/?location=Campbell%20Ranch&project=
Williamson Valley Wash Near Paulden, AZ	1965-1985 2002-Current	USGS Gage 09502800
Big Chino Wash below Partridge Creek	6/26/2014	SRP
Lower Big Chino Wash	5/21/2014	SRP
Lower Walnut Creek at Charney Property	6/10/2014	SRP
Lower Williamson Valley Wash	5/22/2014	SRP
Pine Creek	5/19/2014	SRP
Upper Big Chino Wash	1/16/2014	SRP
Upper Walnut Creek at Forest Service	10/1/2014	SRP - Displaced and removed
Williamson Valley Wash at XU Ranch	6/12/2014	SRP
Upper Walnut Creek at Bridge	6/26/2014	SRP - Camera only
Big Chino Water Ranch	8/26/2015	SRP -Camera only, basin conditions
Sullivan Dam	5/25/2016	SRP -Stage gage/transducer installed 10/12/2017

Climate Monitoring

Publicly Accessible Repositories for Climate Data

Agency Name	Data Portal
YCFCD	https://yavapaiaz.gov/ycflood/
USGS Arizona	http://waterdata.usgs.gov/az/nwis/rt
NWS-HADS - Camp Wood – CPWA3 - Ashfork – ASFA3	https://hads.ncep.noaa.gov/ https://hads.ncep.noaa.gov//cgi-bin/hads/interactiveDisplays/displayMetaData.pl?table=dcp&nesdis_id=CE2280DC https://hads.ncep.noaa.gov//cgi-bin/hads/interactiveDisplays/displayMetaData.pl?table=dcp&nesdis_id=F001D610
Historic Climatic Data	http://www.wrcc.dri.edu/summary/climsmaz.html

Existing Weather Stations in the Big Chino Sub-basin[1]

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	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
Limestone Canyon	YCFCD	Precipitation
Verde River near Paulden, AZ	USGS	Precipitation/Stage/Flow
George Wood Canyon	SRP	Precipitation/Weather

[1] Not all the weather stations are included in Appendix III Figures.

APPENDIX III

Figures

112°40'0"W 112°30'0"W 112°20'0"W

35°0'0"N

WMW-1
WMW-2
WMW-3
BMW-1
BMW-2
BMW-3
BCMW-1
MW-4f.2
MW-4g
MW-4f.1
PZ-3
HR2
MW-4d
MW-4e
MW-4b3
MW-4b2
MW-4b1
Glidden

Pine Creek
Big Chino Wash
Walnut Creek
Williamson Valley Wash
Verde River
Peil Canyon
Rattlesnake Wash
Grindstone Wash
M C Canyon
Bear Canyon

Area Detail

MW-4f.2 (Johnson)
MW-4g
MW-4f.1 (Patton)

112°40'0"W 112°30'0"W Aerial Date: 2021 112°20'0"W

Monitor Well
Creeks & Washes

N
0 1 2 Miles

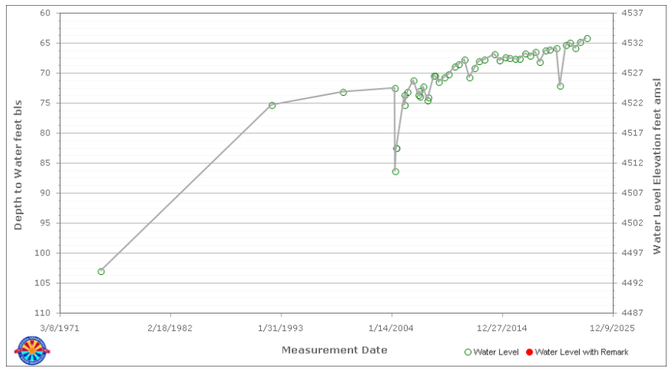
Figure 1
Big Chino Sub-basin Groundwater Monitoring

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

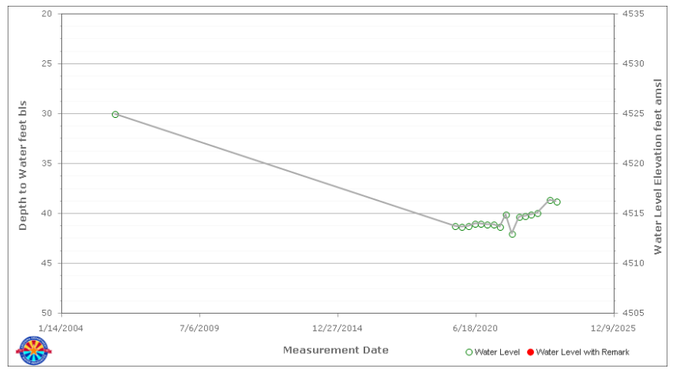
Map Courtesy of SRP®

Big_Chino_Review_2023.aprx
9/26/2023

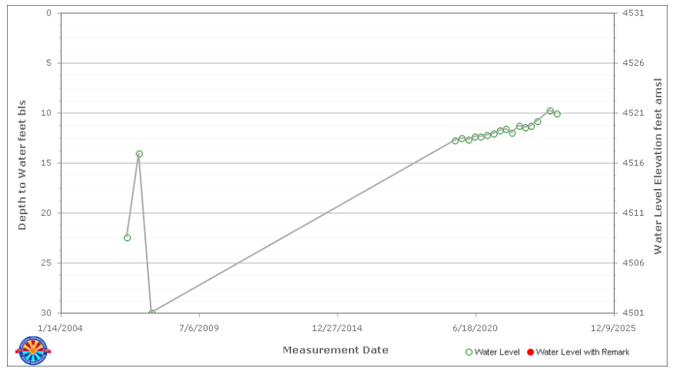
WMW-1



WMW-2

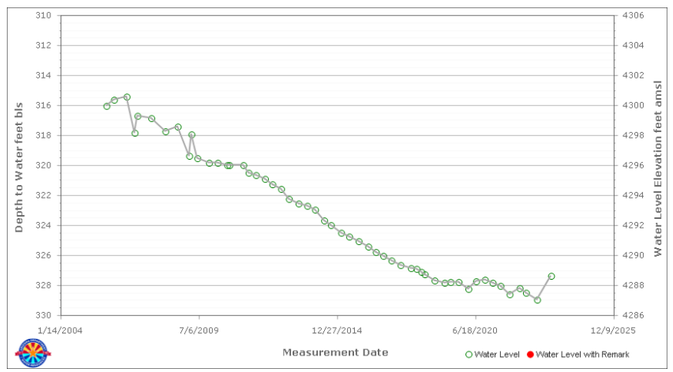


WMW-3



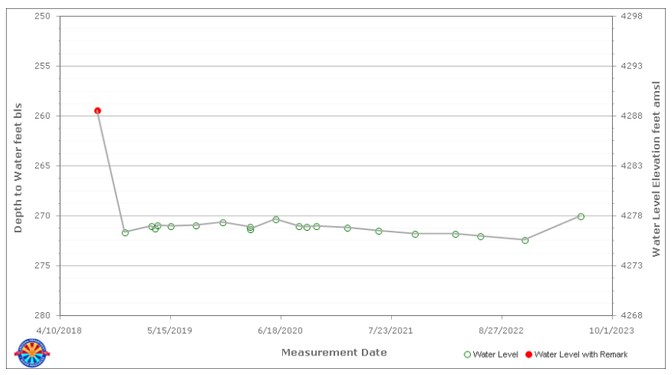
BMW-3

BMW-1

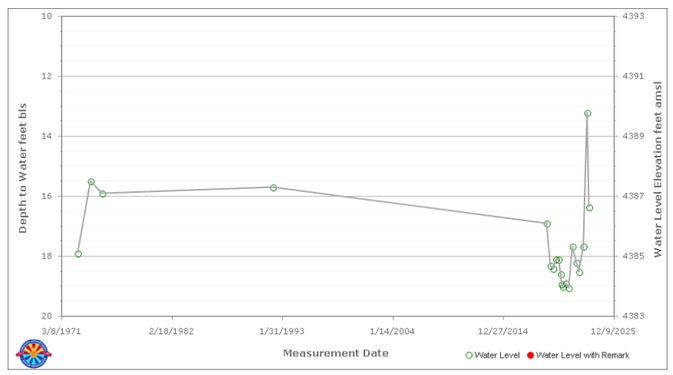


BCMW-1

BMW-2



MW-4f1 (Patton)



MW-4f2 (Johnson)

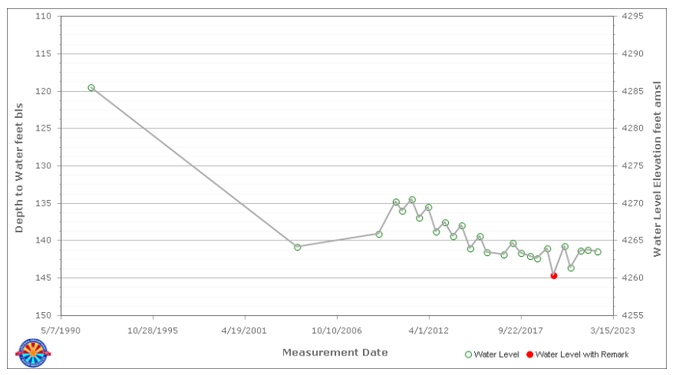


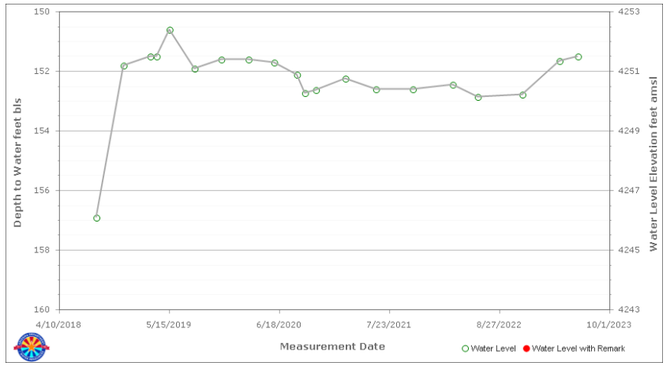
Figure 2
Big Chino Sub-basin Well Hydrographs

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

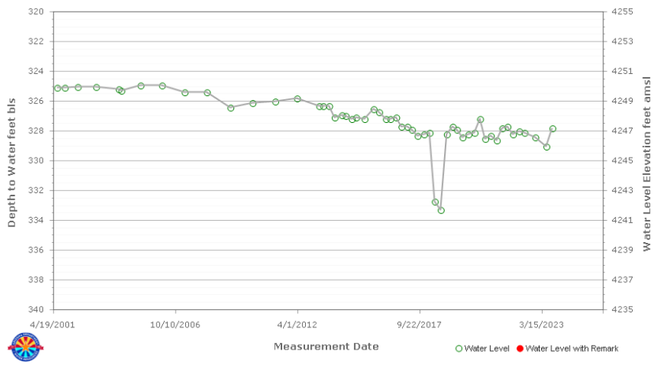
Map Courtesy of SRP®

Big_Chino_Review_2023.aprx
9/26/2023

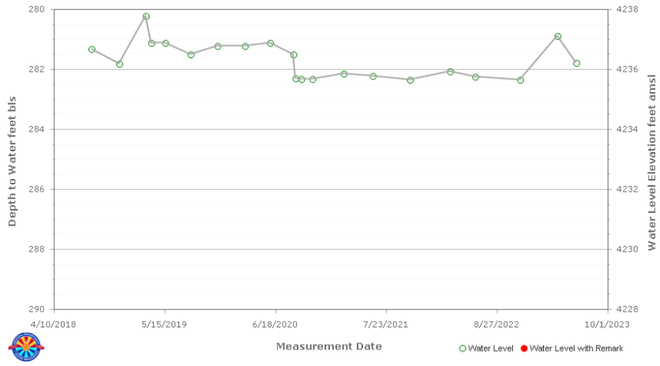
MW-4g



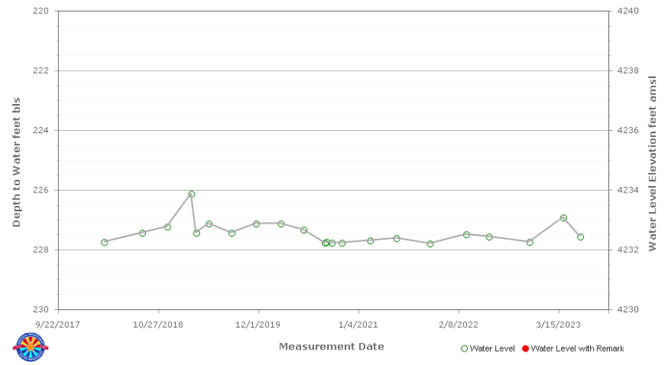
HR2



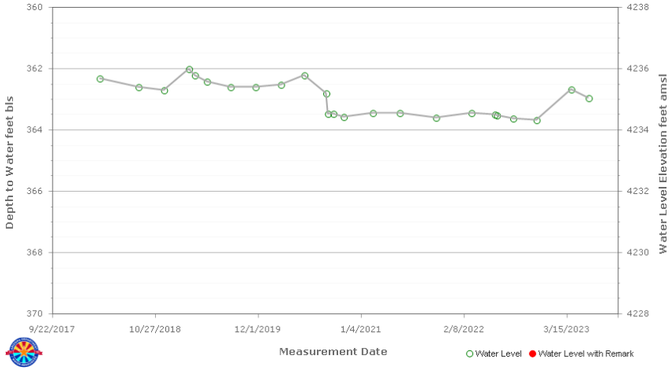
MW-4d



MW-4e

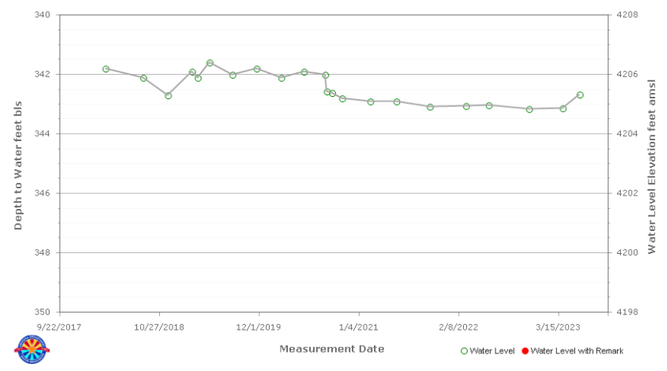


MW-4b3

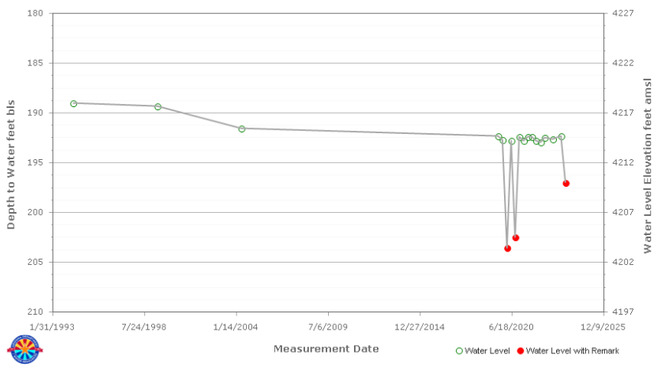


MW-4b2

MW-4b1



Glidden



PZ-3

Figure 3
Big Chino Sub-basin Well Hydrographs

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

Map Courtesy of SRP®

Big_Chino_Review_2023.aprx
9/26/2023

USGS Gauge

SRP Surface Monitoring Location

SRP Verde Headwaters

Creeks & Washes

N

0 3 6 Miles

Figure 4

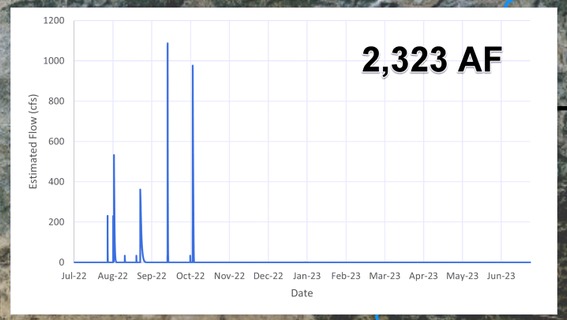
Big Chino Sub-basin - Surface Water Monitoring

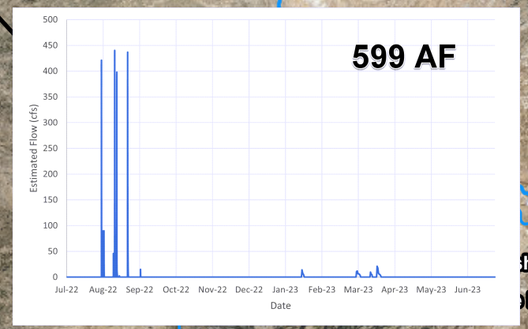
(existing SRP flowtography, camera only sites, existing USGS sites, and Verde Headwaters)

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

Map Courtesy of SRP®

Big_Chino_Review_2023.aprx
9/26/2023





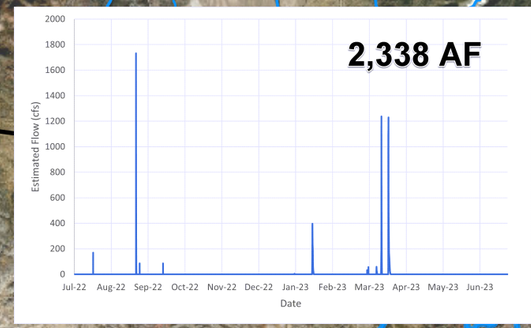


Figure 5
Big Chino Sub-basin - Surface Water Monitoring Northern Hydrographs

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

Map Courtesy of SRP®

Big_Chino_Review_2023.aprx
9/26/2023

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°10'0"N 35°0'0"N 34°50'0"N

Upper Big Chino Wash

Big Chino Wash below Partridge Creek

Big Chino Water Ranch (camera only)

Pine Creek

Pine Creek

Lower Walnut Creek at Charney Property

Walnut Creek

Big Chino Wash

Upper Walnut Creek at Bridge

Upper Walnut Creek at Forest Service

Lower Williamson Valley Wash

Williamson Valley Wash

Lower Big Chino Wash

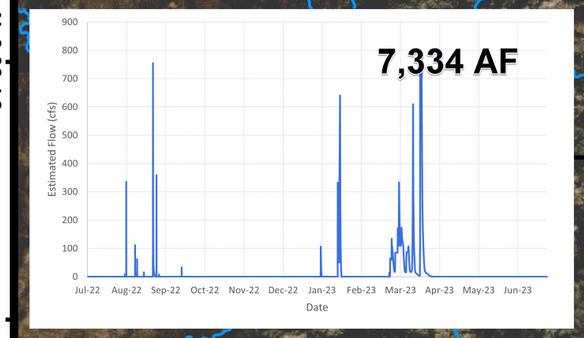
Sullivan Dam

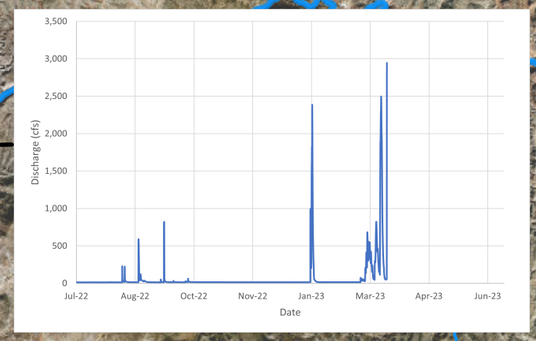
Verde Headwaters at Campbell Ranch (low-flow gage)

Hitt Wash

Williamson Valley Wash at XU Ranch

Horse Wash





Aerial Date: 2021

Creeks & Washes

SRP Surface Water Monitoring Location

SRP Verde Headwaters

N

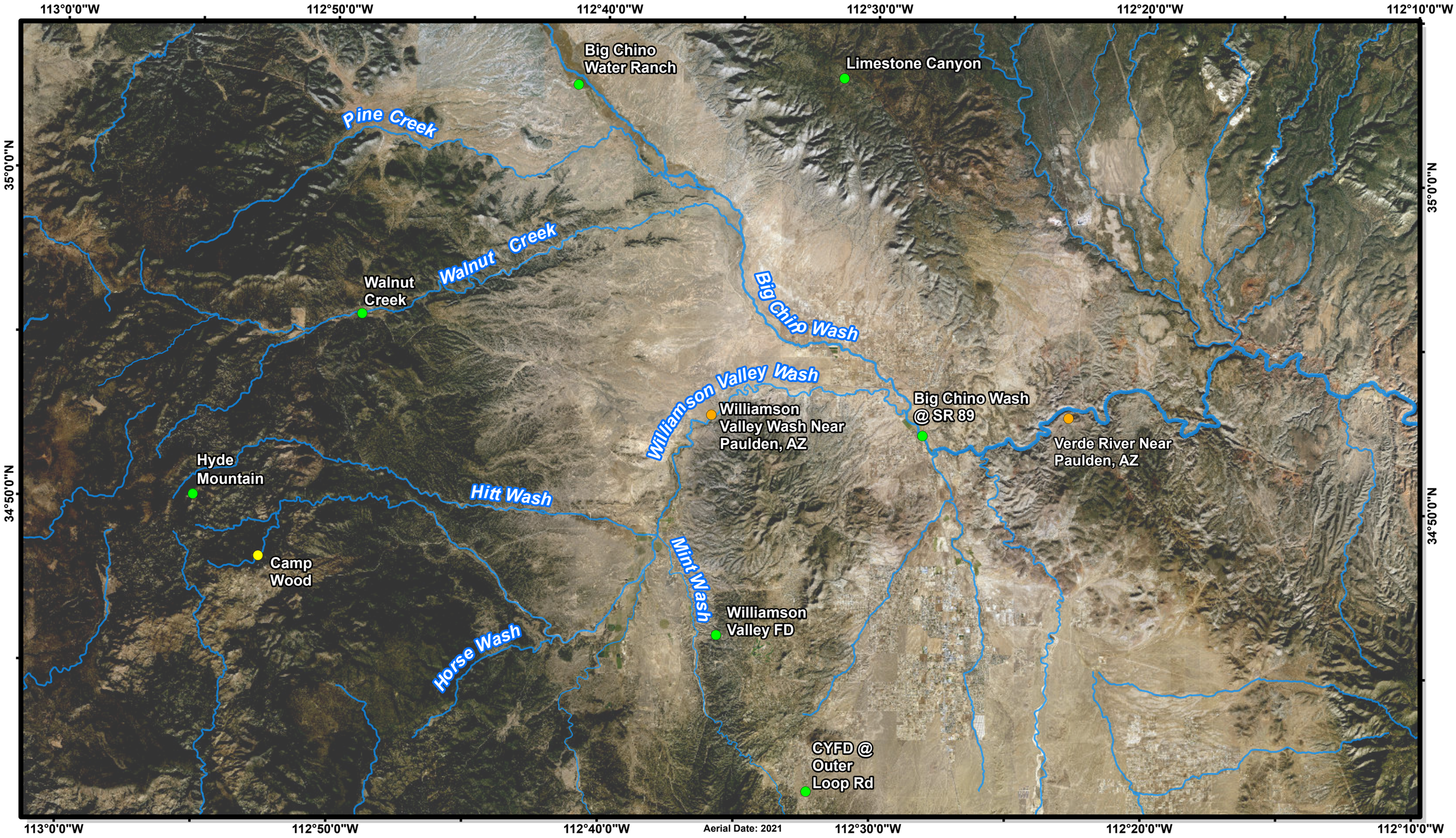
0 3 6 Miles

Figure 6
Big Chino Sub-basin - Surface Water Monitoring Southern Hydrographs

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

Map Courtesy of SRP®

Big_Chino_Review_2023.aprx
9/26/2023



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

Figure 7
Big Chino Sub-basin Area Weather Stations

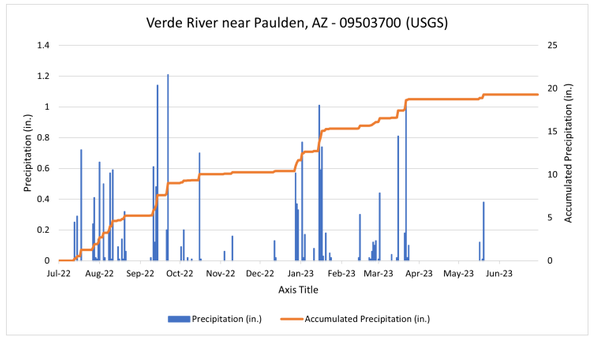
0 3 6 Miles

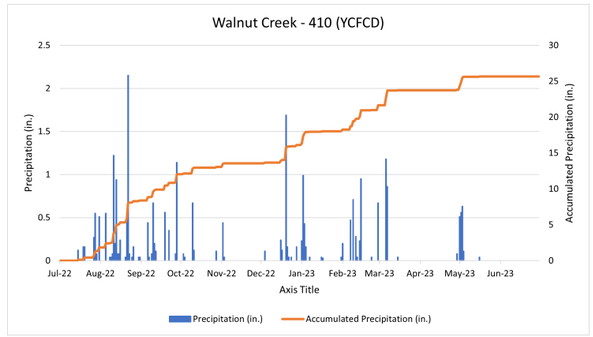
N

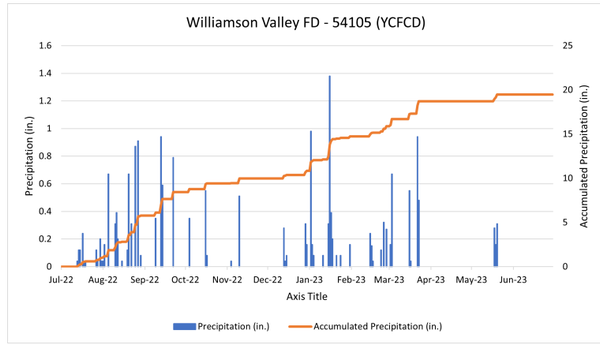
BIG CHINO SUB-BASIN WATER MONITORING PROJECT
PRESCOTT - PRESCOTT VALLEY - SRP

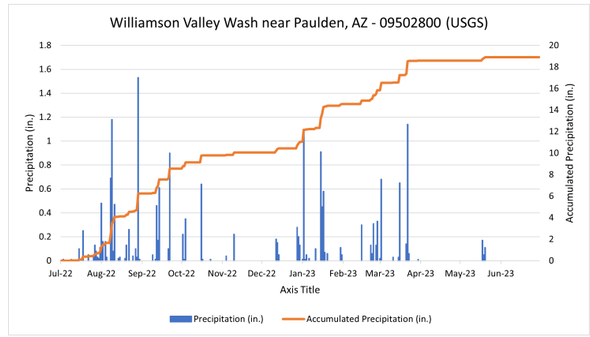
Map Courtesy of SRP®

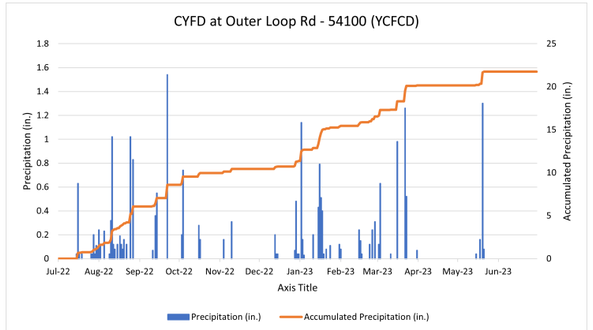
Big_Chino_Review_2023.aprx
10/31/2023

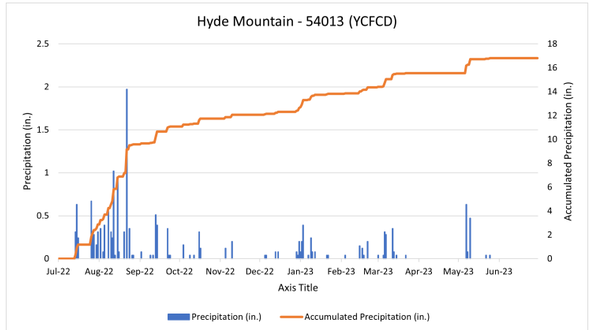


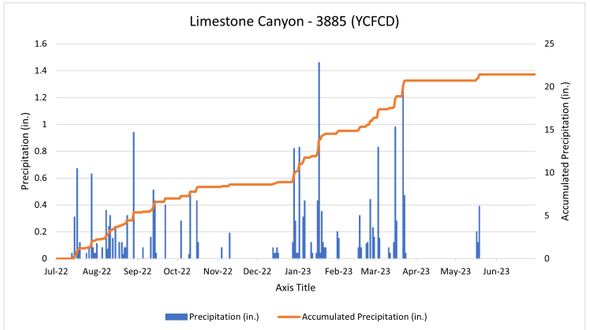


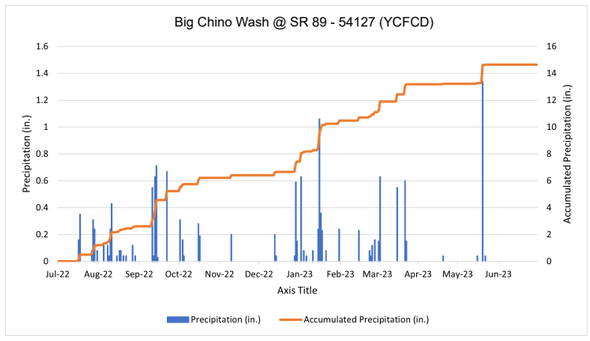


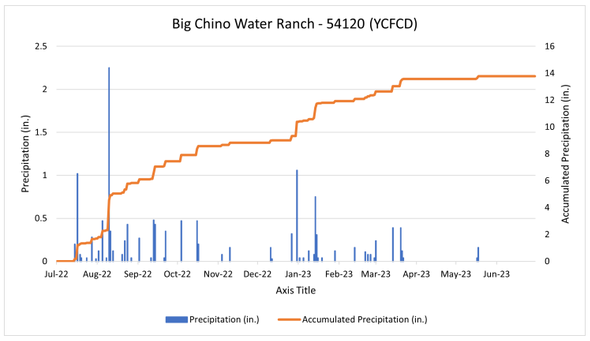












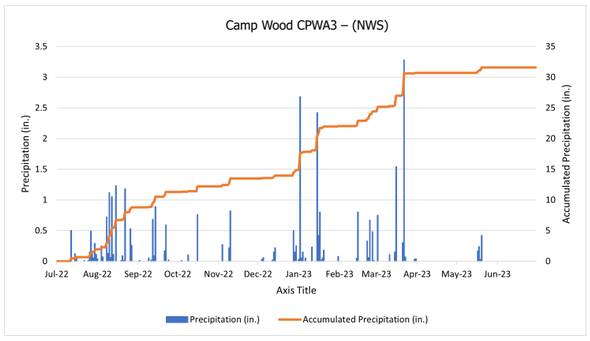


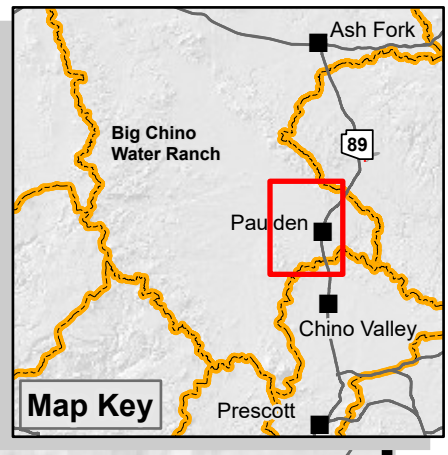
Figure 8
Big Chino Sub-basin Area
Weather Station Data (2022)

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

Map Courtesy of SRP®

Big_Chino_Review_2023.aprx
11/1/2023

Figure 9-1: Big Chino Crop Survey 2022 at Paulden



112°30'0"W

34°50'0"N

Big Chino Wash

Williamson Valley Wash

89

Verde River

BIG CHINO

LITTLE CHINO

0 0.95 1.9 Miles

N

112°30'0"W

34°50'0"N

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

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

Map Courtesy of SRP®

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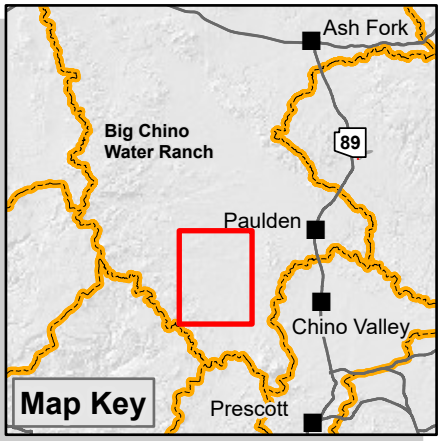
Figure 9-2: Big Chino Crop Survey 2022 at Williamson Valley



112°40'0"W

34°50'0"N

Hitt Wash

Williamson Valley Wash

Mint Wash

Horse Wash

Strickland Wash

0 0.95 1.9 Miles

N

112°40'0"W

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

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

Map Courtesy of SRP®

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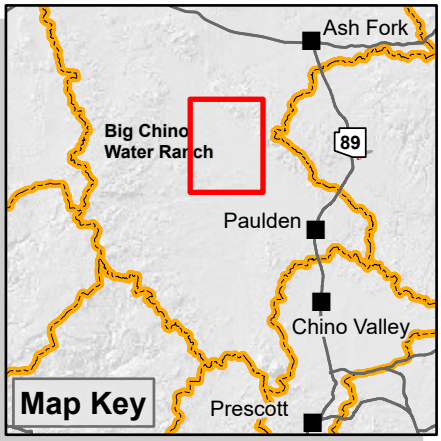
Figure 9-3: Big Chino Crop Survey 2022 at Upper Big Chino



112°40'0"W

35°0'0"N

Big Chino Wash

Pine Creek

Walnut Creek

0 0.95 1.9 Miles

N

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

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

Map Courtesy of SRP®

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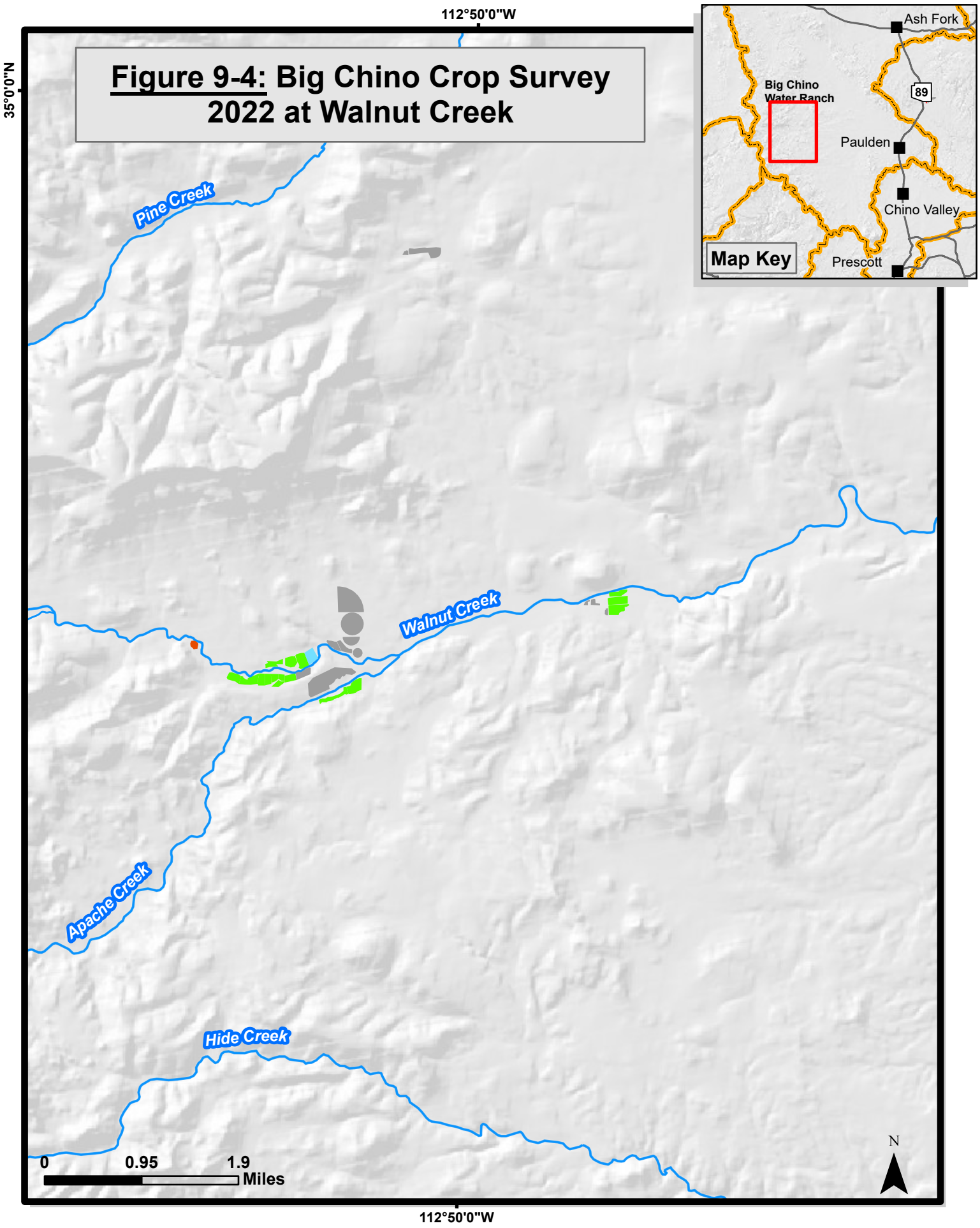
Figure 9-4: Big Chino Crop Survey 2022 at Walnut Creek



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

Map Courtesy of SRP®

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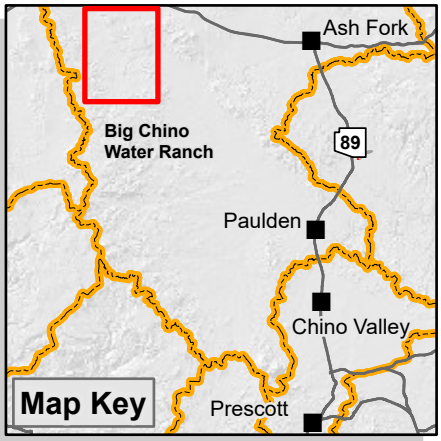
Figure 9-5: Big Chino Crop Survey 2022 at Turkey Canyon



Big Chino Wash

Turkey Canyon

Big Chino Wash

35°10'0"N

35°10'0"N

112°50'0"W

0 0.95 1.9 Miles

N

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

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

Map Courtesy of SRP®

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