Comprehensive Agreement No. 1

Fourth Annual Report

FY17

(July 1, 2016 – June 30, 2017)

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

Prepared by:

October 2017

Comprehensive Agreement #1
Prescott/Prescott Valley/SRP
Monitoring/Modeling Committee
FY17 Annual Report
(July 1, 2016 – June 30, 2017)

Introduction

The fourth annual report documents the progress of the Monitoring and Modeling Committees (Committees) established by Comprehensive Agreement #1 (CA#1). Since late 2012, the Committees have worked to implement the Data Collection and Monitoring Plan (DCMP) for the purposes of developing an improved numerical groundwater flow model of the Big Chino Sub-basin as described in the exhibits attached to CA#1. These efforts include the installation of monitoring equipment required to generate the data sets necessary for an improved groundwater flow model, to establish long-term hydrologic records, and to provide information for future adaptive management approaches in the basin. This report contains: project background, Fiscal Year 2017 (FY17) accomplishments, financial summaries, and the ongoing monitoring and modeling efforts required to fully execute the 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 the Salt River Valley Water Users' Association (SRP) regarding the City's Big Chino Water Ranch Project. The CA#1 agreement was authorized by SRP's Board on September 10, 2012.

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

CA#1 set forth a program for enhanced water monitoring and modeling of groundwater flows in the Big Chino, confirmed rights to water arising from within the Prescott Active Management Area, and achieved a mutual agreement by all Parties not to challenge those rights. CA#1 is a long-term commitment to construct, implement, and maintain the monitoring and modeling program, with the Parties sharing in the long-term cost.

The goals of the DCMP are to:

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

Summary of Annual Accomplishments

Meetings

- Monthly meetings of the Monitoring and Modeling Committees
- Multi-agency meeting (8/25/2016)
- Meeting with USGS re: staffing changes for Geophysics contract (11/9/2016)
- Meeting with Mr. Kieckhefer re: geophysical data collection in Area 3 (11/22/2016)
- Meeting with Specialized Technical Consultants re: Request for Qualifications for the Big Chino Sub-basin Groundwater Flow Model (11/30/2016)
- Meeting among City, USGS, and Mr. Kieckhefer re: geophysical techniques in Area 3 (12/9/2016)
- Meeting of the Parties and Specialized Technical Consultants to review Draft Report – Phase 1 Scope of Work to Assess and Design Long-Term Monitoring Wells for the Big Chino Sub-basin Data Collection and Monitoring Plan and to discuss next steps (1/18/2017)

Executed Documents or Coordinated Activities

- Received Draft Report – Phase 1 Scope of Work to assess and design long-term monitoring wells for the Big Chino Sub-basin Data Collection and Monitoring Plan, Contract No. 2016-296, Southwest Groundwater Consultants, (1/4/2017).
- Collected and analyzed crop survey data in the Big Chino sub-basin – by United States Geological Survey (USGS) through a joint funding agreement with Arizona Department of Water Resources (ADWR) (6/16/ 2016)

- Advertised Request for Statements of Qualification (RSOQ) for Groundwater Modeling (7/20/2016)
- Initiated USGS Joint Funding Agreement to collect and analyze geochemical data from various springs and wells in the Big Chino Sub-basin. Approved by Prescott City Council on 10/11/2016 (Contract No. 2017-143)
- Pre-Application meeting for RSOQ for the groundwater flow model; 11 firms attended (8/10/2016)
- Committee interviewed top 3 RSOQ candidates (11/14/2016), and began contract negotiations with the hydrologic modeling firm Golder Associates, Inc. (11/17/2016)
- Prescott Council approves contract with Golder Associates, Inc. to develop groundwater flow model for the Big Chino Sub-basin, Contract No. 2017-246 (2/28/2017).
- Field reconnaissance with Golder Associates, Inc. (5/3/2017 through 5/5/2017)
- Development of the Phase 2 Scope of Work to construct new long-term monitoring wells for the Big Chino Sub-basin as described in the DCMP. Contract No. 2016-296A1 with Southwest Groundwater Consultants (approved on 7/25/2017)

Funding Contributions

- All parties made monetary contributions for the Monitoring and Modeling Plan for FY17 per CA#1

Public Information

- City of Prescott website – continual updates
- City of Prescott Council Voting and Study Sessions

Status Reports Completed

- Big Chino Sub-basin Water Monitoring Project, July 1, 2016 – June 30, 2017 Annual Report. See Appendix I

Accounting/Budget

In accordance with CA#1, the Parties fund the project with annual contributions into an account managed by the City of Prescott as the fiduciary. The budget for the period of this annual report (FY17) is shown in **Table 1** as Year 4. It is important to note that the Communities and SRP do not have the same fiscal calendars. This project operates on a July 1st to June 30th timeframe. Further, SRP adjusted their contributions to increase their contributions in the early years of the project but their overall project contributions total was unchanged.

A detail of expenditures for FY17 (Year 4) only is shown in **Table 2**. Since the CA#1 commenced, the monitoring project account balance and expenditures as of June 30, 2017 are $2,505,205.96 and $1,190,281.74, respectively. Similarly, the modeling project account balance and expenditure as of June 30, 2017 are $877,013.48 and $70,424.52, respectively. The overall project funds have encumbrances with ongoing contracts, but those encumbrances are not reflected in the values shown in **Table 2**. In February 2017, the Parties entered into a contract (City Contract No. 2017-246) with Golder Associates Inc., for the completion of a groundwater flow model. Toward the end of the FY17, the Parties were completing contract negotiations with Southwest Groundwater Consultants, Inc. (SGC) for monitor well drilling oversight. The SGC contract (City Contract No. 2016-296A1) was approved by City Council on July 25, 2017 (FY18). The accumulations of funds in these accounts anticipate the large project cost for the modeling contract and for drilling several monitoring wells.

Table 1 – Contributions by CA #1 Parties in FY17

Entity	Year 4		Year 3		
	Monitoring	**Modeling**	**Monitoring**	**Modeling**	**WAC equipment**[1]
Prescott	114,649	85,751	483,913	99,578	22,061
Prescott Valley	97,271	72,754	410,566	84,485	21,496
SRP	105,960	79,253	369,636	92,031	0

[1] Prescott and Prescott Valley were members of the former Yavapai County Water Advisory Committee (WAC) which had contracted with USGS for monitoring activities and equipment maintenance in the Big Chino Sub-basin. After verifying its continued importance to the CA#1 monitoring program Prescott and Prescott Valley agreed to continue paying for this program by supplanting WAC membership dues. Prescott and Prescott Valley assumed the full costs in Year 2 and Year 3 of the CA#1 program, after which the "WAC" monitoring became part of the CA#1 monitoring program and the costs will be paid by all parties.

Table 2 – Contract Expenditures in FY17

	Monitoring		
Contractor Name, Number	**Description**	**Amount**	**Payment Date(s)**
SRP, Contract Nos. 2014-001, 001A1, and 001A2	New Stream Gages (Flowtography and weather equipment)	$102,431.86	7/18/16, 11/21/16, 12/21/2016, 2/14/17, 3/30/17, 6/12/17, 6/22/17, 6/30/17
SRP, Contract No. 2014-001	Existing Stream Gages	$5,606.27	7/18/16, 11/21/16, 12/20/2016, 2/14/17, 3/30/17, 6/12/17, 6/12/17, 6/30/17
SRP, Contract No. 2014-001	Existing Well Monitoring	$511.43	7/18/16, 12/21/2016, 2/14/17, 3/30/17
USGS, Contract Nos. 2014-160, and 160A1	Geophysics	$221,611.75	8/31/16, 3/30/17, 6/29/17
USGS, Contract No. 2017-143	Geochemistry	$53,403.75	3/30/17, 6/29/17
Southwest Groundwater Consultants, Contract Nos. 2016-296, and 296A1	Phase 1 Monitoring Well Assessment	$104,569.91	8/8/16, 10/18/16, 10/19/16, 11/22/16, 12/16/16, 1/23/17, 3/21/17,5/8/17, 5/25/17
	Monitoring Total	$488,134.97	

	Modeling		
	Description	**Amount**	**Payment Date(s)**
Golder Associates, Contract No. 2017-246	Modeling Contract	$68,109.08	5/2/2017, 6/7/17, 6/21/2017, 6/30/2017
	Modeling Total	$68,109.08	
	Combined Total	**$556,244.05**	

Monitoring Project - Equipment

The CA#1 Parties and their specialized technical consultants worked with ADWR, USGS, Yavapai County Flood Control District and others to complete an inventory of the existing and historic hydrologic monitoring efforts in the Big Chino Sub-basin. This inventory and the data requirements for developing a detailed groundwater model pointed out data gaps and created a need for new equipment installations at certain locations in the sub-basin. Although not all data collection to date is reflected in this annual report, new equipment installed during the fiscal year will be identified in this section and existing equipment will be shown in table format, by type, in Appendix II.

Groundwater Level Monitoring

- See **Appendix III, Maps 1 and 2**
- During FY17 no new sites were added to the network.
- On 6/7/2016, the Parties executed a scope of work with Southwest Groundwater Consultants to complete a groundwater well assessment (City Contract No. 2016-296). The groundwater well assessment included office and field review of 17 wells. The results of that review identified three potential wells to be added to the monitoring plan. Additional work is scheduled in FY18 for the installation of necessary monitoring equipment. It was determined that two of the identified wells met the monitoring needs in an area that been previously identified as a potential drill site for a new monitor well. The CA#1 Committee will not need to drill a new well at that location and will incorporate the existing wells into the monitoring network. **See Appendix III, Map 3.**

Stream flow Monitoring

- See **Appendix III, Maps 4-6**
- On 10/12/2016 a staff gage was installed on Sullivan Dam following receipt of an access agreement. A camera had been installed previously along the access ROW to monitor flows at Sullivan Dam. The staff gage will allow for a rough estimate of flow events.

Weather Monitoring

- No additional sites were added to the weather monitoring network shown in **Appendix III, Map 7.** The network continued to collect a variety of weather data that will be used to help define the water budget for the Big Chino Sub-basin.
- FY17 precipitation graphs for all weather station sites can be found on **Map 7a**

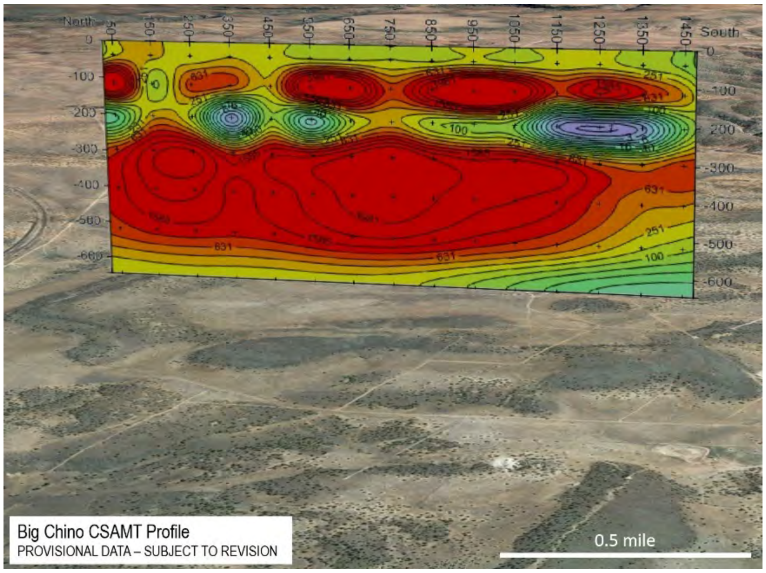
Aquifer Storage Monitoring and Geophysical Surveys

During FY17 the USGS monitored stream flow at the Williamson Valley stream flow gaging station, collected isotope data at stream sampling sites, collected isotope and noble gas data at 2 wells, conducted aquifer-storage monitoring (aka "gravity surveys") at 32 sites, and conducted geophysical surveys in Area 1 (east of Hwy 89) and Areas 2 and 3 (west of Hwy 89 and Paulden).

- USGS geochemical studies in the Big Chino include monitoring of stable isotopes in stream base flow at the stream flow gaging station at the Verde River near Paulden and at Williamson Valley Wash, and sampling of groundwater from wells and springs for stable isotopes and noble gases. The Verde River near Paulden was also sampled in June 2017 for a suite of geochemical analytes. The purpose of the stable isotope stream flow monitoring is to develop a long-term data set that can be used to help determine variations in sources of baseflow to the Verde River. In addition, selected wells are sampled with the long-term goal of developing geochemical signatures of groundwater throughout the Big Chino hydrogeologic system. Six wells and two springs (from the north and south side along the stretch of the Verde River downstream of Granite Creek confluence where there is a rapid increase in discharge) were sampled for the comprehensive geochemical suite during FY17. One blank and one replicate were collected along with the groundwater samples. **See Appendix III, Maps 8 and 8a** showing the Geochemical sampling sites.

- Aquifer-storage monitoring of 32 stations was completed on a seasonal basis including absolute gravity surveys in October 2016, February-March 2016, and June 2016. The final survey under this contract is planned for September-October 2017. Four new stations were added to the storage-change network approximately midway between Big Chino wash and Williamson Valley Road. A total of 86 absolute gravity observations were made. **See Appendix III, Map 9** showing the gravity site locations.
- Depth to water was also observed at gravity stations that are co-located at wells. Depths to water are observed by USGS at 16 wells coincident with gravity observations and entered into the GWSI database. Continuous depth to water is also recorded at 5 of the 12 USGS monitored wells. Depths to water are also available from ADWR at 5 continuously monitored wells, 2 Index wells not measured by USGS, and at 10 other Index wells that are also monitored by USGS. No depth to water data are collected at 6 gravity stations because there is no co-located well or the well is inaccessible for measurements. One well, B-18-02 28ABA (North Paulden), has been identified as suitable for monitoring as part of the USGS Climate Response Network.
  (https://groundwaterwatch.usgs.gov/Net/OGWNetwork.asp?ncd=crn).
- Preliminary data indicate trends in aquifer storage are largely similar to previous years. Increases in storage during 2012-2017 are evident at one station. Persistent decreasing storage trends during 2009-2016 are evident at 3 stations. Other stations display variable storage trend records or no significant variations during the period of record.
- Geophysical surveys using the Controlled-Source Audio-Magnetotelluric method (CSAMT) and Transient Electromagnetics (TEM) were carried out in areas 1, 2, and 3. A total of about 50 miles (80 kilometers) of survey lines were completed for the year; about 69.6 miles (112 kilometers) of survey lines have been completed for the project. Completed surveys include a longitudinal profile parallel to Big Chino Wash, several perpendicular profiles including profiles across the Big Chino fault, individual soundings at potential drilling locations, and soundings near the Verde River headwater springs. Preliminary subsurface electrical models of the CSAMT data have also been completed. Preliminary models illustrate the change in subsurface geology between areas west of Highway 89 and those east of Highway 89. **See Appendix III, Map 10** showing the Geophysical profiles.

Below is an example Controlled-Source Audio-Magnetotelluric (CSAMT) profile in the Big Chino area. Reddish colors indicate more resistive material and bluish colors more conductive material. Variations in resistivity are typically correlated with different rock and/or sediment type.



- Preliminary subsurface geophysical models were discussed with technical consultants to the CA#1 Parties as they pertain to potential drilling targets in areas 1 and 2.
- Online data releases are planned for gravity and CSAMT data by the end of 2017. Two Scientific Investigations Reports are planned in 2018 to provide interpretation of the gravity and CSAMT data. In 2019, a USGS report or journal article will be published to document final interpretations from the geochemical studies.

Crop Surveys and Estimated Crop Water Use

The USGS, in contract with ADWR, conducted crop surveys in the Big Chino Sub-basin in June 2016. The results are shown in **Table 3**, and depicted in **Appendix III, Maps 11-1 to 11-4**.

Approximately 45% of the irrigable lands that were surveyed were being irrigated in 2016 (1718.9 acres in June). The USGS estimated that the total water withdrawal for crops on these lands was 4015 acre-feet during summer 2016. This represents a total withdrawal of 2.3 acre-feet per acre. The USGS methodology for calculating crop consumptive use and irrigation efficiency should be examined and local climatic data collected at the station on the Big Chino

Water Ranch should be incorporated in consumptive use estimates before these values are used in a groundwater model.

Table 3– 2016 Crop Survey – Acres Irrigated June 2016

	Map Area				
Crop	**Upper Big Chino**	**Paulden**	**Williamson Valley**	**Walnut Creek**	**Total**
ALFALFA	315.5	0	3.1	0	318.5
GRASS	91.5	25.5	673.0	56.7	846.7
OATS	172.5	4.1	15.6	0	15.51
PASTURE	173.9	3.8	55.8	0	233.5
SOD	0	110.2	0	0	110.2
VEGETABLE	0	17.7	0	0	17.7
Total Crop Acres	**753.4**	**161.4**	**747.5**	**56.7**	**1718.9**
No Crop Evident	**1224.1**	**307.8**	**351.3**	**190.7**	**2073.3**

Monitoring Project - Analytical Results and Data Collected

The results of the data collection and data interpretation efforts are provided in separate reports or 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. An explanation of how these efforts are reported or recorded is provided below.

Groundwater Monitoring

Groundwater level monitoring efforts are being completed both under contract with the CA#1 program (e.g. aquifer storage monitoring and continuous water level monitoring under the USGS contract) and through traditional water level monitoring efforts conducted by the Arizona Department of Water Resources.

- Efforts by the USGS

The USGS will produce a data report for the CA#1 program on the aquifer storage monitoring results (gravity data combined with water level data) around January 2018, near the end of the contract period. Data that is collected in the interim is provided to the CA#1 Committee in regular presentations by the USGS and housed in electronic format by the USGS.

- Efforts by ADWR

ADWR collects annual water level data at over 80 index wells in the Big Chino Sub-basin (including 9 automated telemetry sites) and attempts to conduct water level “sweeps” of a larger number of wells approximately every five (5) years. ADWR conducted a water level sweep of the Big Chino Sub-basin in the spring of 2017. Information from that sweep is currently being processed by ADWR and should be available in fall 2017; the last sweep occurred in 2009. ADWR maintains this information in the Groundwater Site Index (GWSI) data base that is hosted on-line at www.azwater.gov.

Stream flow Monitoring

Stream flow monitoring efforts in the Big Chino Sub-basin are conducted by SRP Field Services Division and by the USGS under contracts with the CA#1 program. The USGS also maintains another stream gage outside of the CA#1 Contract. Additional flow stage data is collected by YCFCD for flood control purposes.

- Efforts by SRP

SRP Field Services Division collects stream flow data and other information at thirteen (13) locations in the Big Chino Sub-basin under contract with the CA#1 program. There was a distinct seasonal difference in surface water flow observed during the 2017 annual monitoring period. The Big Chino Wash locations and Pine Creek saw frequent smaller events during the summer monsoon and generally minor, if any, flow during the remaining months. Just the opposite occurred in the Williamson Valley Wash and Walnut Creek basins. The two basins produced very little during the monsoon, but had a very productive winter season. Every location in the Big Chino Sub-basin had some observable flow. Lower Walnut Creek at Charney Property had the fewest observable flow events with three (3) while nine (9) separate events were observed at the Williamson Valley Wash at XU Ranch location. The full report for FY17 documenting the results of the flow monitoring program is attached as **Appendix I**. The annual hydrographs are located in **Appendix III, Maps 5 and 6**.

- Efforts by USGS

The USGS operates two stream gages in the Big Chino Sub-basin. The Williamson Valley Wash near Paulden gage is funded through the CA#1 program and the Verde River near Paulden gage is funded through a separate program with SRP, the U.S. Forest Service and the USGS. Stream flow records for these sites are maintained by the USGS in their on-line database: http://waterdata.usgs.gov/az/nwis/rt

- Efforts by Yavapai County Flood Control District

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 stream flow records. Of the listed sites only the Walnut Creek Bridge stage data will be used for calculating stream flow.

Modeling Project

FY17 focused on hiring a third-party contractor to construct a groundwater flow model for the Big Chino Sub-basin. The process included issuing a Request for Statement of Qualifications (eleven firms responded), selecting and interviewing the top three firms, and negotiating a scope and fee agreement with Golder Associates Inc., (Golder) within the allowable budget ($1.1M). The members of the Committees and the specialized technical consultants were involved in the selection process and unanimous in the selection of Golder as the most qualified firm to provide a credible, defensible, groundwater flow model that will meet the needs and intent of CA#1. In the February 27, 2017, City of Prescott Council voting session, the contract was approved by a unanimous vote. The contracted work commenced on March 13, 2017, and will continue for approximately 3 years. A project kick-off meeting was held on March 21, 2017, with additional meetings in April, leading to a 3-day field trip in May to provide the Golder modeling team an overview of the Big Chino Sub-basin. To view a copy of the approved Scope of Work, see the City's website at http://www.prescott-az.gov/services/water/chino.php.

Conclusions

The FY17 project year reached significant milestones 1) execution of the contract with Golder Associates Inc., for development of the groundwater flow model; 2) completion of significant field work by the USGS; and 3) completion of a monitoring well assessment that identified three existing monitoring wells, replacing the need to drill one new monitor well.

The surface water, gravity and weather station networks are deemed complete and data collection is on-going; however, if an opportunity arises to fill a data gap or improve the network in a certain area, then the Parties will discuss that effort and the associated expenditure(s). The crop survey work in the sub-basin will continue per the joint funding agreement between the USGS and ADWR.

Expectations for FY18 include 1) analysis from the USGS based on their geophysics field work to assist the modeling effort; 2) the drilling of 7 new monitor wells; 3) initial results of the USGS geochemistry work; and 4) development of the geologic framework and conceptual models in moving forward with Golder's work plan.

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 specialized technical representative, and with the agencies will continue to rise as we enter into the most intensive year yet with well drilling and model development.

APPENDIX I

Big Chino Sub-basin Water Monitoring Project, July 1, 2016 – June 30, 2017 Annual Report

Big Chino Sub-basin Water Monitoring Project

July 1, 2016 – June 30, 2017 Annual Report

Prepared for CA1 Monitoring Committee

(Prescott, Prescott Valley, SRP)

Prepared by SRP Water Measurement Staff

9/1/2017

Table of Contents

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 recorded during the 2017 monitoring period (July 1, 2016 to June 30, 2017) is contained within this report.

Seasonal Flow Events Summary

Surface water flow was observed at each SRP Flowtography® location during the 2017 annual monitoring period. The date a flow event started, the magnitude of the flow event, and the locations where surface water flow was observed are shown in (Table 1 and Figure 1).

Facts about the flow observed in the sub-basin during the reporting period:

- There were 23 days during the year that marked the start of a surface water flow event at a monitoring location in the Big Chino Sub-basin
- Fourteen of the 23 day were during the monsoon, July 1, 2016 – September 30, 2016
- Williamson Valley Wash at XU Ranch had nine (9) separate flow events, the most of any location (not considering the Walnut Creek locations)
- The Big Chino Wash locations recorded more flow volume during the monsoon season than the winter season
- Surface water flow was often isolated to a single location during the monsoon.
- Flow volumes are generally low during the monsoon, exception would be 9/1/2016
- On 9/1/2016, just over 900 AF of flow was observed at three different locations
- The Williamson Valley Wash and Walnut Creek locations saw very little surface water flow during the monsoon
- Lower Williamson Valley Wash recorded over 6,500 AF of flow during the winter, a total volume greater than all the other locations combined.

Table 1. Big Chino Sub-basin July 1, 2016 – June 30, 2017 Flow Event Totals in acre-feet (AF)

Start Date*	Upper Big Chino Wash (UBCW)	Big Chino Wash below Partridge Creek (BCWPC) **	Partridge Creek***	Pine Creek (PC)	Upper Walnut Creek at Forest Service (UWCFS)****	Upper Walnut Creek at Bridge (UWCB) (yes/no to flow)	Lower Walnut Creek at Charney Property (LWCCP)	Williamson Valley Wash at XU Ranch (WVWXU)	Lower Williamson Valley Wash (LWVW)	Lower Big Chino Wash (LBCW)
7/19/2016					No flow	No visible flow		0.6		
7/22/2016					No flow	No visible flow		0.05		
7/25/2016				0.2	No flow	No visible flow				
7/30/2016					No flow	No visible flow				52
7/31/2016	96	52			No flow	No visible flow			19	
8/4/2016		6	6		No flow	No visible flow				
8/5/2016	56				No flow	No visible flow	0.5	0.02		
8/19/2016				0.04	No flow	No visible flow				
8/20/2016	14				No flow	No visible flow				
8/22/2016				6	No flow	No visible flow				
8/24/2016					No flow	No visible flow		0.01		
8/27/2016	25	3		0.1	No flow	No visible flow	1	0.3		
9/1/2016	**529**	**373**		14	No flow	No visible flow				
9/2/2016				**23**	No flow	No visible flow				
11/21/2016	0.06				No flow	No visible flow				
12/21/2016	0.08				High	Visible flow				
12/22/2016					High	Visible flow		10		
1/21/2017					High	Visible flow		385	1,029	198
1/23/2017				1	High	Visible flow			1,753	403
2/18/2017					High	Visible flow		7		
2/27/2017					High	Visible flow		**976**		
2/28/2017					High	Visible flow	**79**		**3,733**	**781**
3/5/2017		78	78		High	Visible flow				
Totals	720	512	84	44			80	1,379	6,534	1,434

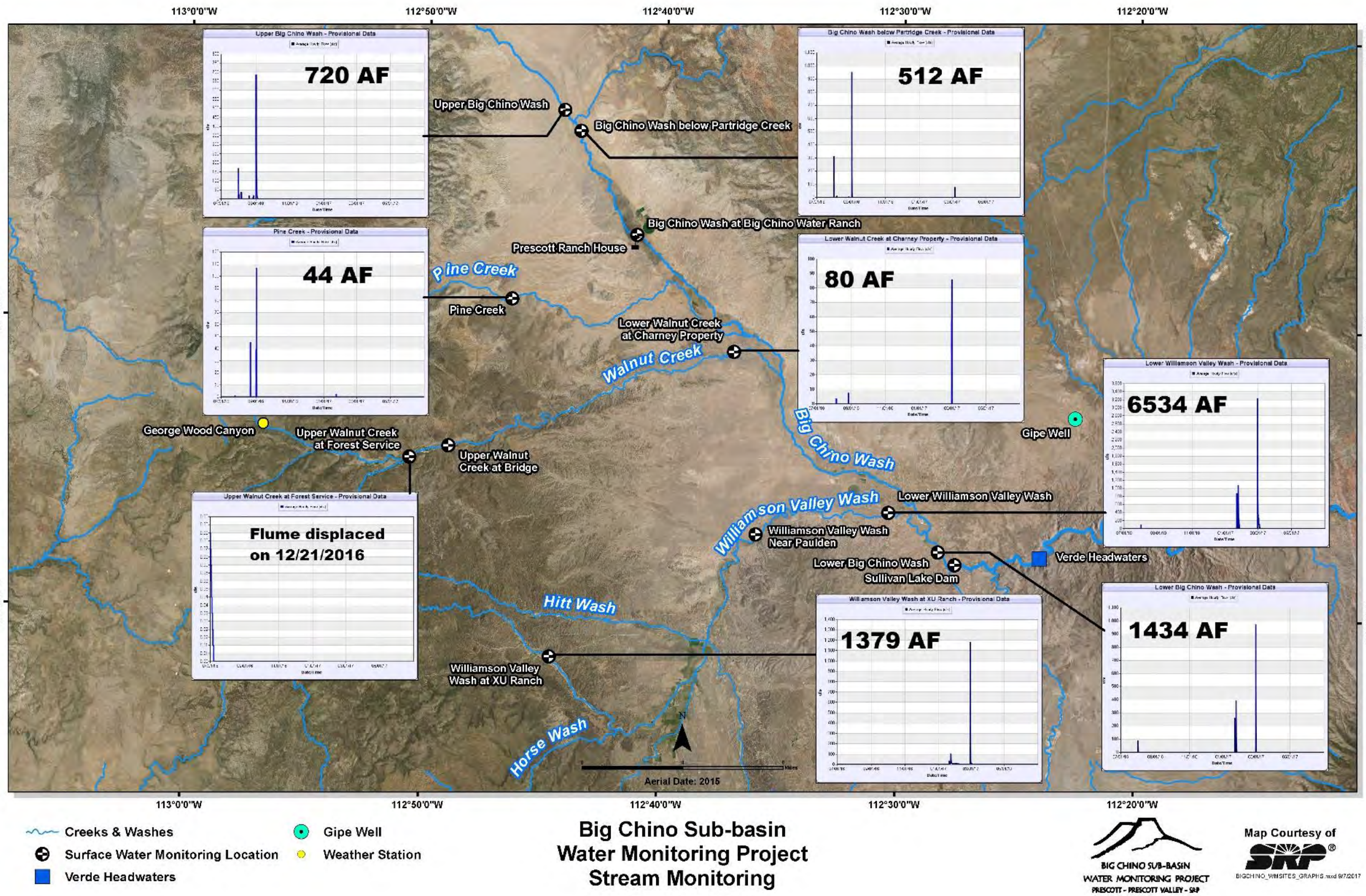
**Note: Flow events may start just prior to date indicated or continue into following day.*

*** Upper Big Chino Wash flows may be included in these numbers.*

****These flows were derived by subtracting the Upper Big Chino Wash contribution from the flows at Big Chino Wash below Partridge Creek. These are estimated flows, as there is no monitoring equipment on Partridge Creek.*

*****Surface water flow is observed throughout the year at the Upper Walnut Creek at Forest Service flume. During low and high flow events, the water was running through and around the flume. Low and high were used as subjective indications of the flow based on visual observations. See Figure 13 on page 19 for low and high flow event images. Flows marked as '0' are when there was no flow observed at the site.*

Figure 1. Big Chino Sub-basin July 1, 2016 – June 30, 2017 SRP Flowtography® Stream-flow Monitoring Location Hydrographs with Total Estimated Water Volume (AF)



Location Summaries

Upper Big Chino Wash (UBCW)

Seven (7) flow events were recorded at Upper Big Chino Wash (UBCW) during 2017 annual monitoring period. UBCW responded well to summer monsoon related precipitation events, but had little to no flow during the winter months. Peak discharge for the year was observed on 9/1/2016, reaching a high of 878 cfs. The event lasted several days resulting in a flow volume of 529 AF or 73% of the annual volume. The flow events, durations and volume totals are given in (Table 2 and Figure 2). The annual total volume recorded was 720 AF, most of which occurred during two separate monsoon events.

Table 2: Upper Big Chino Wash October 2016 – March 2017 Winter Flow Events

Start Date	**Start Time***	**Duration (hours)**	**Peak Stage (feet)**	**Peak Discharge (CFS)**	**Total Volume (AF)**
7/31/2016	19:00	40	3.67	274	96
8/5/2016	18:00	27	1.70	52	56
8/20/2016	03:00	18	1.07	19	14
8/27/2016	04:00	36	1.07	19	25
9/1/2016	16:00	86	5.85	878	529
11/21/2016	08:30	1	0.08	1.1	0.06
12/21/2016	03:30	6	0.25	0.5	0.08
Totals		**214**	**5.85**	**878**	**720**

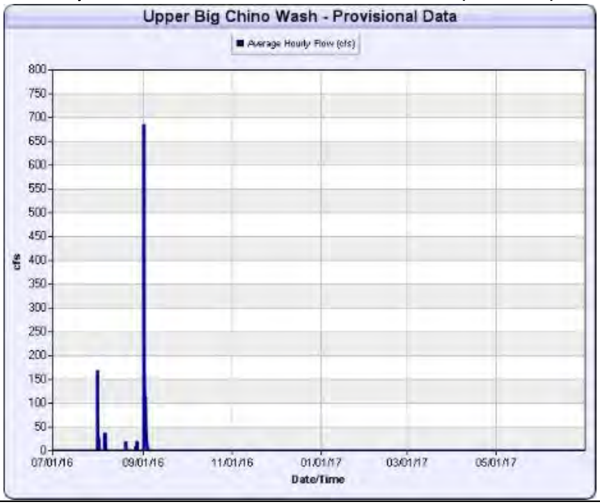
**Start times are approximate within 15 minutes and events may continue into the following days.*

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

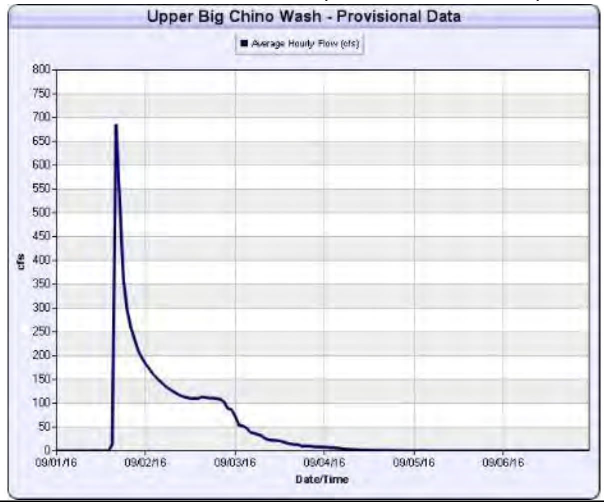
- Cleared the event gages of debris.
- Replaced damaged event gages.
- Replaced batteries.

Figure 2: Upper Big Chino Wash Hydrographs and SRP Flowtography® Flow Event Images

July 2016 – June 2017 Flow Events (7 Total)



9/1/2016 Flow Event (Peak Q ≈ 878 CFS)



Flow conditions during peak event

Big Chino Wash below Partridge Creek (BCWPC)

Five (5) flow events were recorded at Big Chino Wash below Partridge Creek (BCWPC) during the 2017 annual monitoring period. Four of the events occurred during the monsoon season, with a peak flow of 1,128 cfs and total flow volume of 373 AF observed on 9/1/2016 (see Table 3 and Figure 3). There was one event during the winter season recorded on 3/5/2017. The event lasted a couple of days and produced 78 AF. The annual volume total for BCWPC was 512 AF.

Table 3: Big Chino Wash below Partridge Creek July 2015 - June 2016 Annual Flow Events

Start Date	Start Time*	Duration (hours)	Peak Stage (feet)	Peak Discharge (CFS)	Total Volume (AF)
7/31/2016	19:00	30	4.33	332	52
8/4/2016	16:30	48	1.50	20	6
8/27/2016	10:00	48	1.28	13	3
9/1/2016	16:00	72	7.08	1,128	373
3/5/2017	11:30	48	2.60	82	78
Totals		**246**	**7.08**	**1,128**	**512**

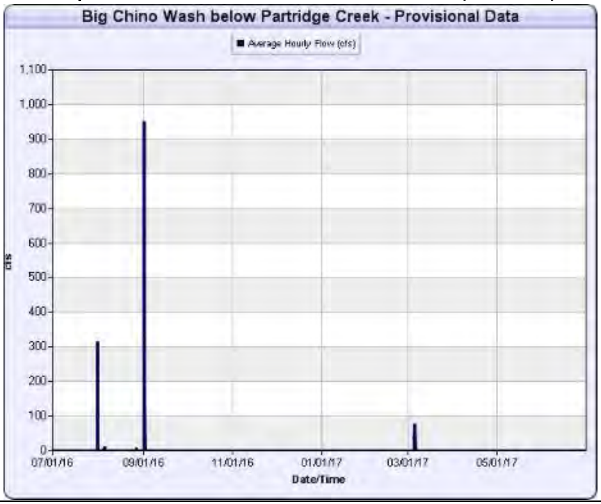
**Start times are approximate within 15 minutes and events may continue into the following days.*

The BCWPC location was visited a total of six (6) times during the 2017 annual monitoring period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

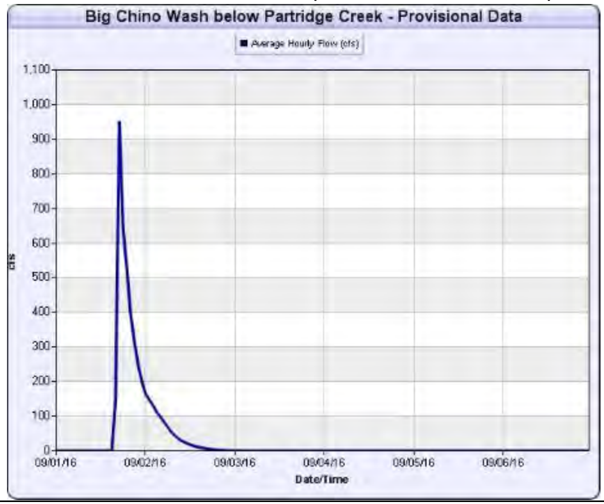
- Cleared the event gages of debris.
- Replaced damaged event gages.
- Replaced batteries.
- Installed new whip gauge.

Figure 3: Big Chino Wash below Partridge Creek Hydrographs and SRP Flowtography® Flow Event Images

July 2016 – June 2017 Flow Events (5 Total)



9/1/2016 Flow Event (Peak Q ≈ 1,128 CFS)



Flow conditions during peak of event

Big Chino Wash at Big Chino Water Ranch (BCWR)

For this report, the site name was corrected from Big Chino Wash at Prescott Ranch to Big Chino Wash at Big Chino Water Ranch (BCWR). There were several precipitation events observed in the field of view of the SRP Flowtography® camera only assembly during the 2017 annual monitoring period. None of the events resulted in water pooling at the surface. Snow was observed in the Big Chino Sub-basin as seen in the below image taken on 1/21/2017 (See Figure 4).

Figure 4: Big Chino Wash at Big Chino Water Ranch SRP Flowtography® Image

The BCWR location was visited a total of three (3) times during the 2017 annual monitoring period. All site visits were to complete routine site maintenance.

Pine Creek (PC)

Seven (7) flow events were recorded at Pine Creek (PC) during the 2017 annual monitoring period. Most of the flow events for the year were small and of short duration. Of the 7 events, all but one occurred during the monsoon season. The largest event occurred on 9/2/2016 with a peak discharge of 145 cfs and a total volume of 23 AF (see Table 4 and Figure 5). The total volume observed at PC for the year was 44 AF.

Table 4: Pine Creek July 2015 - June 2016 Annual Flow Events

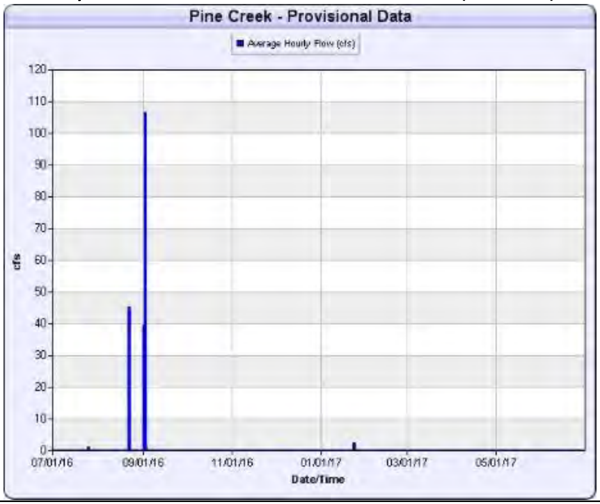
Start Date	**Start Time***	**Duration (hours)**	**Peak Stage (feet)**	**Peak Discharge (CFS)**	**Total Volume (AF)**
7/25/2016	14:30	4	0.18	2	0.2
8/19/2016	15:00	2	0.10	1	0.04
8/22/2016	13:00	4	1.06	64	6
8/27/2016	05:00	8	0.09	1	0.1
9/1/2016	18:30	12	1.22	84	14
9/2/2016	14:00	16	1.60	145	23
1/23/2017	13:00	16	0.20	2	1
Totals		**62**	**1.60**	**145**	**44**

** Start times are approximate within 15 minutes and events may continue into the following days.*

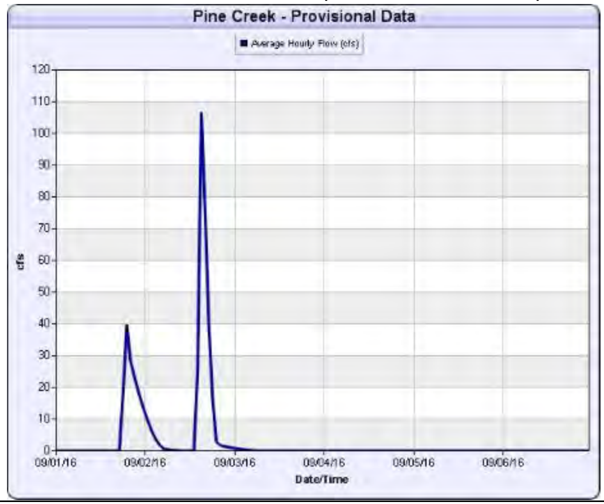
The PC location was visited a total of four (4) times during the 2017 annual monitoring period. All site visits were to complete routine site maintenance.

Figure 5: Pine Creek Hydrographs and SRP Flowtography® Flow Event Images

July 2016 – June 2017 Flow Events (7 Total)



9/2/2017 Flow Event (Peak Q ≈ 145 CFS)



Flow conditions during peak of event

George Wood Canyon (GWC)

The George Wood Canyon (GWC) weather station collected data including: precipitation, barometric pressure, air temperature, wind direction, peak gust, relative humidity, wind speed, and SRP Flowtography® images of snow depth during the 2017 annual monitoring period.

At the GWC weather station, three (3) snow accumulation events were recorded during the 2017 annual monitoring period. The peak snow depth was approximately 0.75 feet observed on 1/21/2017 (See Table 5).

Some items of interest recorded at the weather stations are (See Figure 6 and Figure 7):

- Air temperature ranged from a summer peak near 100 °F and winter minimum in the low teens.
- Average wind speeds are highest in the late winter and early spring
- Dew point temperatures are highest during the monsoon season and relative humidity peaks in the winter season due to the colder air temperatures
- GWC observed 19.67” of precipitation over the monitoring period
- The greatest variability in atmospheric pressure occurs in the winter season
- Based on the windrose for GWC (see Figure 7) the predominant wind direction is WNW with the majority of the winds below 10 mph

Table 5 George Wood Canyon Snow Accumulation Event Data

Start Date	End Date*	Snow Visible	Peak Snow Depth
11/27/2016	11/28/2016	2 days	< 0.1 feet
12/24/2016	12/27/2016	4 days	< 0.25 feet
1/19/2017	2/2/2017	15 days	< 0.75 feet
Totals		**21 days**	**< 0.75 feet**

**Some small patches of snow in shaded areas could still be present after this date.*

The GWC location was visited a total of three (3) times during the 2017 annual monitoring period. All site visits were to complete routine site maintenance.

Figure 6: George Wood Canyon – Weather Station Summary Data

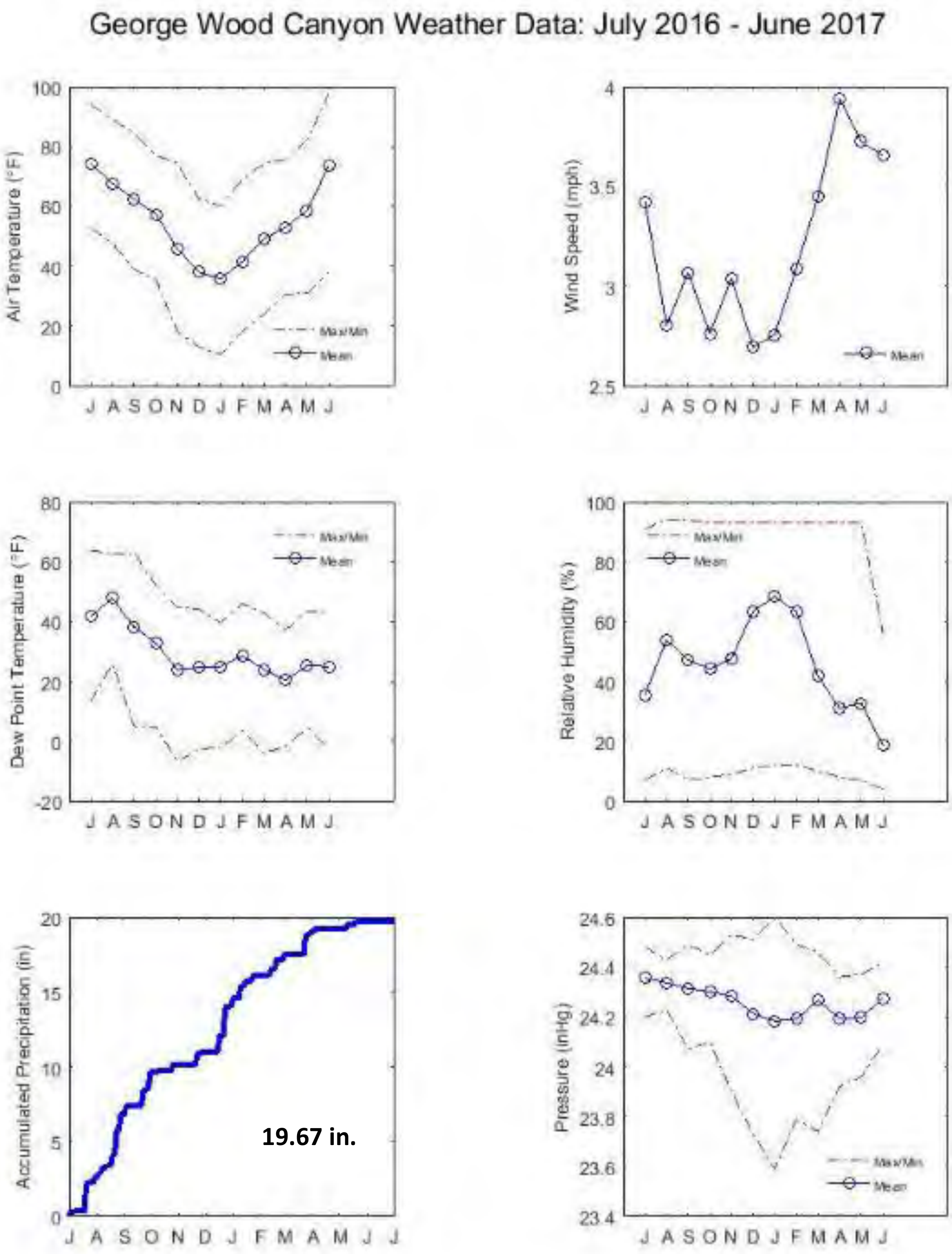
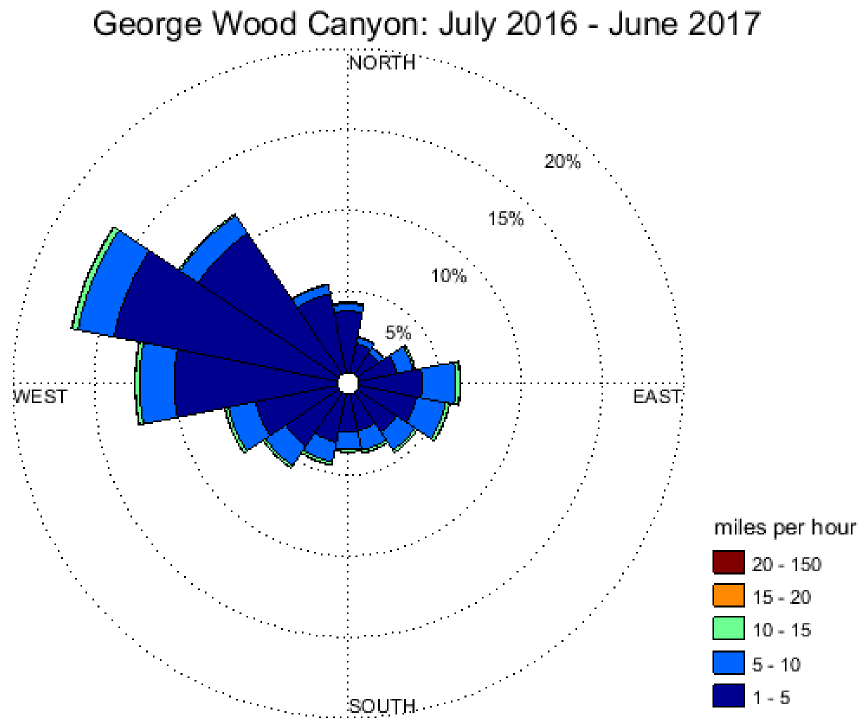


Figure 7: George Wood Canyon Weather Station Data Graphs and SRP Snowtography™ Site Images and windrose



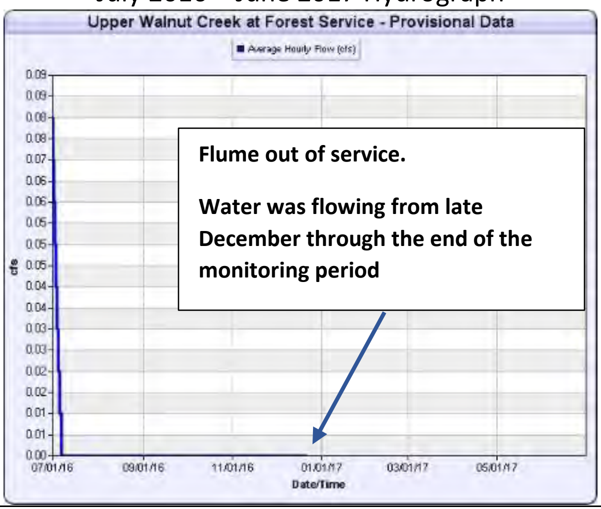
Peak Snow Accumulation on 1/21/2017

Upper Walnut Creek at Forest Service (UWCFS)

A high flow event occurred on December 22, 2016. This and subsequent events compromised the flume, ultimately displacing the flume altogether (see Figure 8). Due to the damage done to the flume and the continual flow in the channel, there are not any reliable flow estimates for this site. Due to the frequent damage to the flume, the flume has been permanently removed and the site cleaned up.

Figure 8: Upper Walnut Creek at Forest Service Hydrographs and SRP Flowtography® Event Images

July 2016 – June 2017 Hydrograph



Example of high flow

Aftermath of one event

The UWCFS location was visited a total of three (3) times during the 2017 annual monitoring period. In addition to routine maintenance and data collection, flume adjustment were made. However the adjustment did not result in a longer term fix for this season.

Upper Walnut Creek at Bridge (UWCB)

Surface water flow first occurred at Upper Walnut Creek at the Bridge (UWCB) on 12/22/2016 (see Figure 9). Some level of surface water was visible throughout the remainder of the monitoring period (June 30, 2017). UWCB experienced three (3) distinct surges in flow, each lasting between 1-2 days. The first was observed on 12/22/2016, on that day, GWC recorded a 24-hour total of 1.60" of rainfall. The second surge occurred on 1/23/2017, with GWC recording 0.29" for a 24-hour rainfall total. The last and largest surge was observed on 2/28/2017 where GWC totaled 0.36" of rainfall over a 24-hour span.

The UWCB location was visited a total of three (3) times during the 2017 annual monitoring period. All visits were to perform general site maintenance and data collection.

Figure 9. Upper Walnut Creek at Bridge - Flow Event Images

First flow of the monitoring season

Peak of flow event

Lower Walnut Creek at Charney Property (LWCCP)

The Lower Walnut Creek at Charney Property (LWCCP) site experienced three (3) flow events during the 2017 annual monitoring period. The most significant event occurred on 2/28/2017, with a peak flow of 94 cfs and a total volume of 79 AF (see Table 6 and Figure 10). Two relatively small event were observed during the monsoon season resulting in an additional 1 AF of volume

Table 6: Pine Creek July 2015 - June 2016 Annual Flow Events

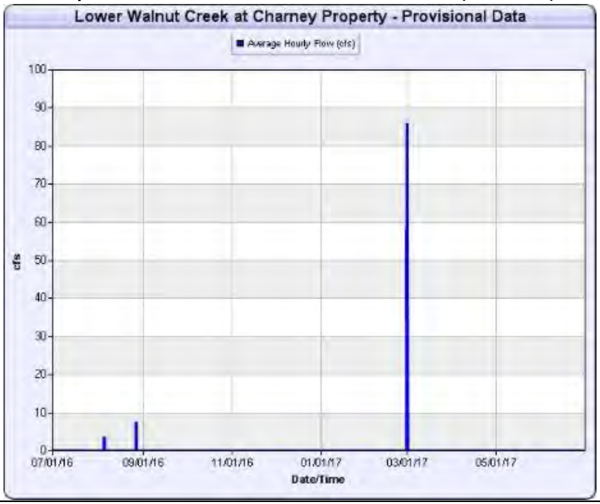
Start Date	Start Time*	Duration (hours)	Peak Stage (feet)	Peak Discharge (CFS)	Total Volume (AF)
8/5/2016	15:00	1	0.20	15	0.5
8/27/2016	10:30	1.5	0.18	13	1
2/28/2017	11:30	19	0.80	94	79
Totals		**21**	**0.80**	**94**	**80**

** Start times are approximate within 15 minutes and events may continue into the following days.*

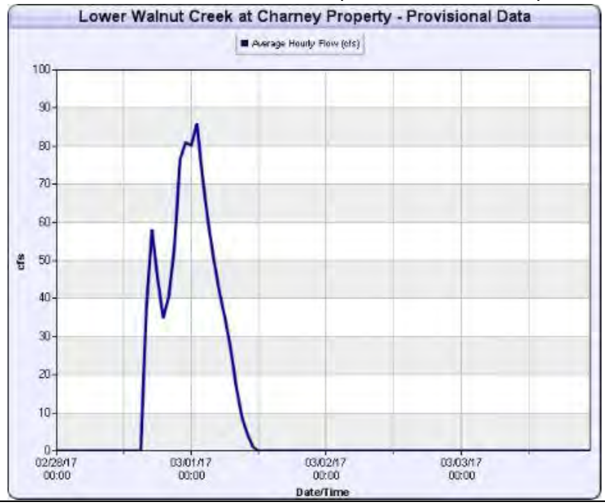
The LWCCP location was visited a total of three (3) times during the 2017 annual monitoring period. All visits were to perform general site maintenance and data collection.

Figure 10. Lower Walnut Creek at Charney Property Hydrographs and SRP Flowtography® Images

July 2016 – June 2017 Flow Events (3 Total)



2/28/2017 Flow Event (Peak Q ≈ 94 CFS)



Near peak of flow event)

Williamson Valley Wash at XU Ranch (WVWXU)

There were nine (9) distinct flow periods at the Williamson Valley Wash at XU Ranch (WVWXU) site during the 2017 annual monitoring period. Unlike many of the other locations in this report, WVWXU responded greater to winter precipitation rather than the monsoon (see Table 7 and Figure 11). Most of the flow volume occurred in discrete intervals lasting a week or more at a time. The peak flow observed was 1,304 cfs and a 27 day flow volume of 976 AF. Total flow volume over the 2017 annual monitoring period was 1,379 AF.

Table 7: Williamson Valley Wash at XU Ranch July 2015 - June 2016 Annual Flow Events

Start Date	**Start Time***	**Duration (hours)**	**Peak Stage (feet)**	**Peak Discharge (CFS)**	**Total Volume (AF)**
7/19/2016	17:00	3	0.74	14	0.6
7/22/2016	17:30	2	0.24	1	0.05
8/5/2016	18:00	1	0.19	0.5	0.02
8/24/2016	04:30	1	0.17	0.3	0.01
8/27/2016	19:30	6	0.42	3	0.3
12/22/2016	03:30	168	0.46	4	10
1/21/2017	00:00	624	1.34	108	385
2/18/2017	02:00	168	0.43	4	7
2/27/2017	19:30	648	3.76	1,304	976
Totals		**1,621**	**3.76**	**1,304**	**1,379**

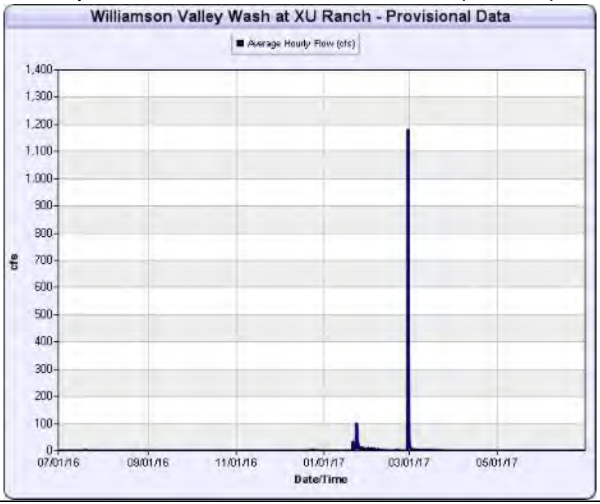
**Start times are approximate within 15 minutes and events may continue into the following days.*

The WVWXU location was visited a total of six (6) times during the 2017 annual monitoring period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

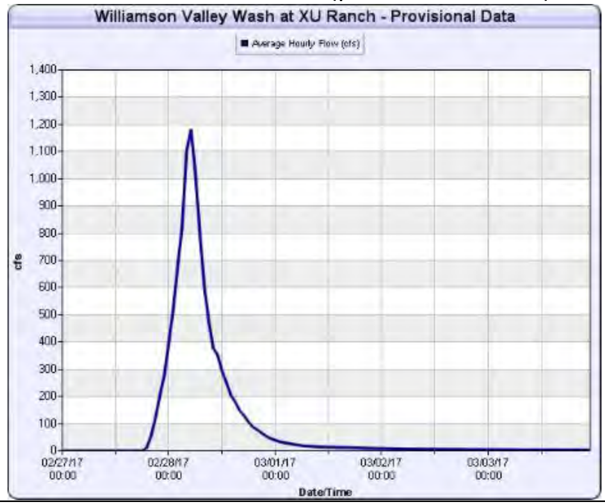
- Cleared the event gages of debris.
- Collect images for the local authorities
- On 3/14/2017, SRP Water Measurement staff collected a current meter measurement during the recession of the 2/27/2017, peak hydrograph. The flow at the time was on the lower end of the rating. The measured discharge was 2.14 cfs with the corresponding rating at 2.46 cfs. Making the difference 15.0 %, or an over prediction of the flow. However, given the size and complexities of the channel and the relatively low flow condition for measurement, the agreement between the rating and observation is excellent.

Figure 11. Williamson Valley Wash at XU Ranch Hydrographs and SRP Flowtography® Flow Event Images

July 2016 – June 2017 Flow Events (9 Total)



2/27/2017 Flow Event (peak Q ≈ 971 CFS)



First clear daylight picture after peak of the event

Lower Williamson Valley Wash (LWVW)

Four (4) flow events were recorded at the Lower Williamson Valley Wash (LWVW) site during the 2017 annual monitoring period. Similar to the WVWXU site, the majority of the flow volume observed at LWVW occurred over long intervals during the winter months (see Table 8 and Figure 12). The peak flow observed was 3,409 cfs with a resulting flow volume of 3,733 AF. The total flow volume for the year was 6,534 AF, representing 61% of total volume observed at all sites for the entire reporting period.

Table 8: Lower Williamson Valley Wash July 2015 through June 2016 Annual Flow Events

Start Date	Start Time*	Duration (hours)	Peak Stage (feet)	Peak Discharge (CFS)	Total Volume (AF)
7/31/2016	18:00	7	0.48	116	19
1/21/2017	02:00	63	1.71	868	1,029
1/23/2017	17:00	62	2.91	1,098	1,753
2/28/2017	07:00	112	3.60	3,409	3,733
Total		**244**	**3.60**	**3,409**	**6,534**

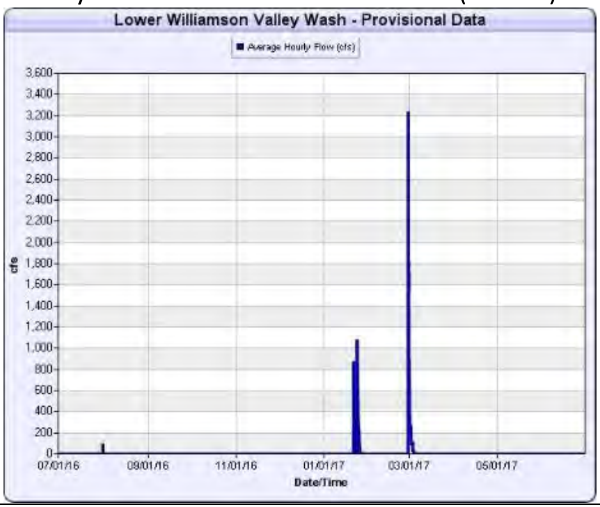
**Start Times are approximate within 15 minutes and events may continue into the next day.*

The LWVW location was visited a total of four (4) times during the 2017 annual monitoring period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

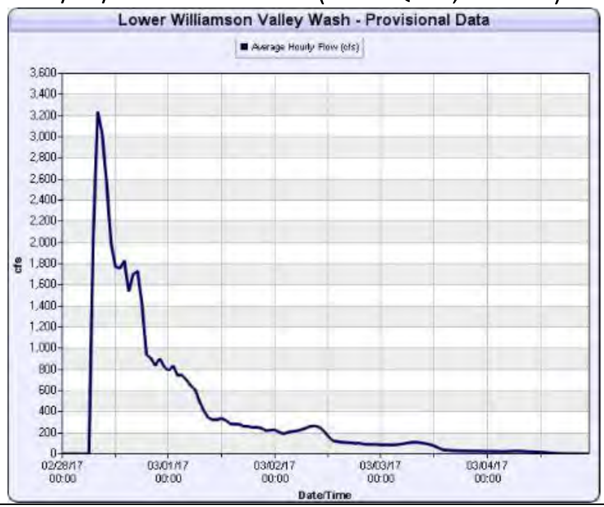
- Cleared the event gages of debris
- Replaced batteries

Figure 12: Lower Williamson Valley Wash Hydrographs and SRP Flowtography® Flow Event Images

July 2016 – June 2017 Flow Events (4 Total)



2/28/2017 Flow Event (Peak Q ≈ 3,409 CFS)



Peak of Flow Event on 2/28/2017

Lower Big Chino Wash (LBCW)

Four (4) flow events were recorded at the Lower Big Chino Wash (LBCW) site during the 2017 annual monitoring period. Peak discharge during the flow events ranged from 96 CFS on July 30, 2016 to 1,007 CFS on February 28, 2017. Total volume of the four events ranged from 52 AF to 781 AF (Table 9 and Figure 13). A total volume of 1,434 AF was estimated for the year.

Table 9: Lower Big Chino Wash July 2016 through June 2017 Annual Flow Events

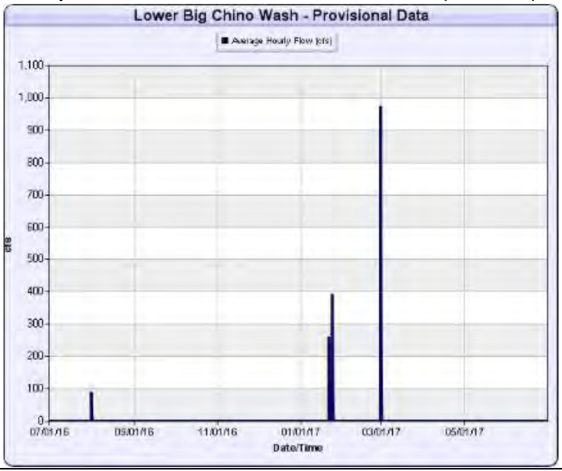
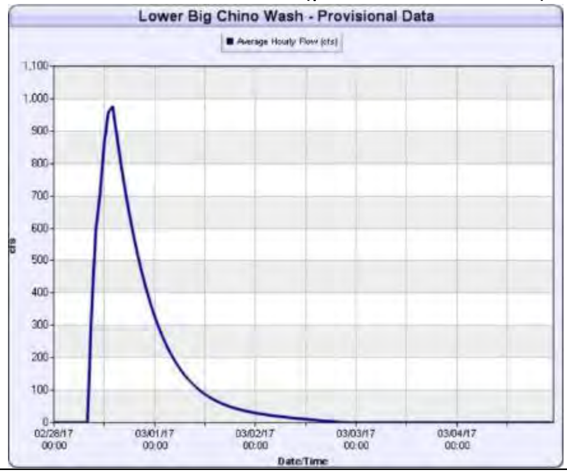
Start Date	Start Time*	Duration (hours)	Peak Stage (feet)	Peak Discharge (CFS)	Total Volume (AF)
7/30/2016	19:30	24	2.50	96	52
1/21/2017	16:00	40	3.74	265	198
1/23/2017	23:15	72	4.43	394	403
2/28/2017	09:00	36	6.75	1,007	781
Total		**172**	**6.75**	**1,007**	**1,434**

**Start Times are approximate within 15 minutes and events may continue into the next day.*

The LBCW location was visited a total of three (3) times during the 2017 annual monitoring period. In addition to routine maintenance and data collection, the following adjustments were made at the site:

- Cleared the event gauges of debris.
- Installed new whip event gauges.
- Replaced damaged pressure transducers.
- Straightened damaged event gages.
- Replaced batteries.

Figure 13. Lower Big Chino Wash Hydrographs and SRP Flowtography® Flow Event Images

July 2016 – June 2017 Flow Events (4 Total)	2/28/2017 Flow Event (peak Q ≈ 1,007 CFS)
	

Gauge before an event

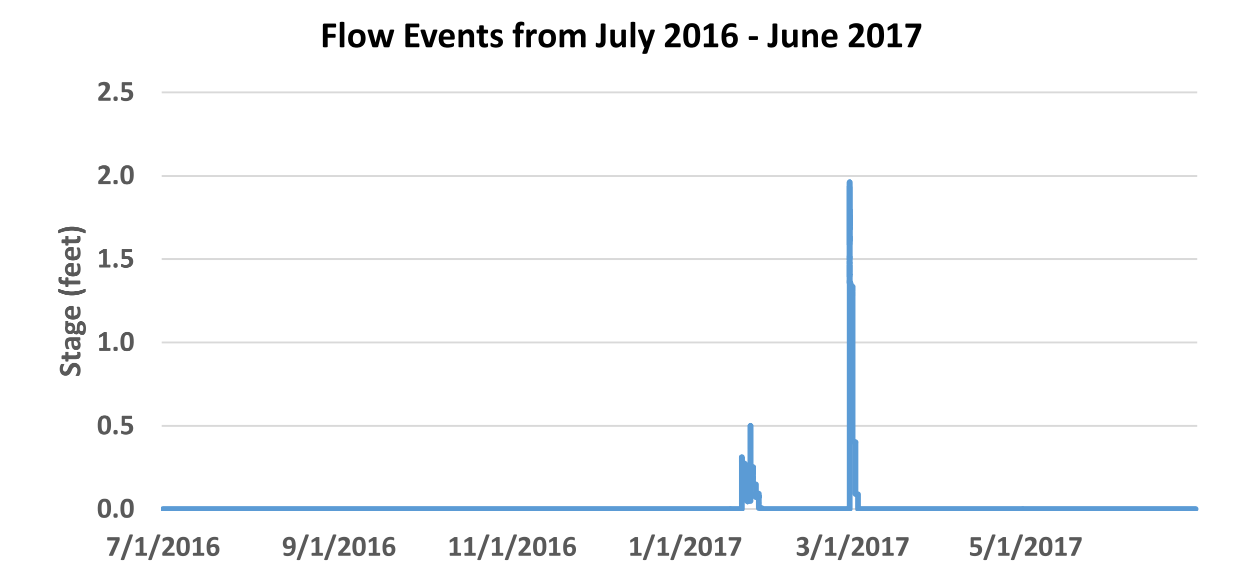
Peak of Flow Event on 2/28/2017

Sullivan Dam (SD)

Two (2) flow events were recorded at the Sullivan Dam (SD) site during the 2017 annual monitoring period (see Figure 14). Standing surface water started accumulating behind the dam in late July 2016 and remained through the rest of the monitoring period (June 30, 2017).

SD location was visited a total of four (4) times during the 2017 annual monitoring period. In addition to routine maintenance and data collection, batteries were replaced.

Figure 14: Sullivan Lake Dam SRP Flowtography® Camera Only Assembly Installation and Site Images



Peak of Flow Event on 2/28/2017

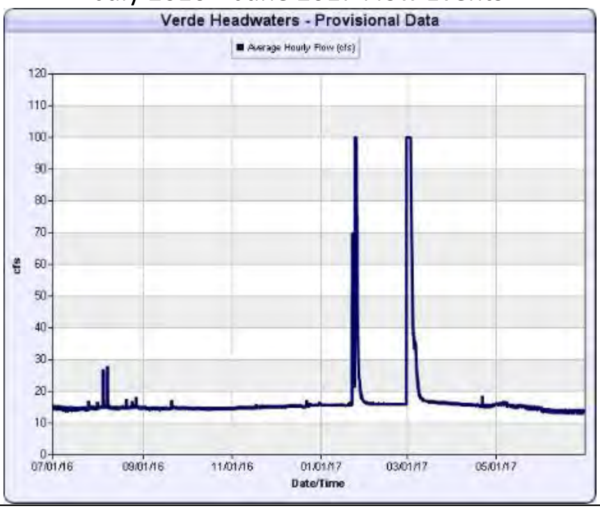
Verde Headwaters at Campbell Ranch (VHCR)

The Verde Headwaters at Campbell Ranch (VHCR) site experienced two (2) flow events during the 2017 annual monitoring period that exceeded the 100 cfs flow design limit of the flume (see Figure 15). The first event started on 1/22/2017 and the second began on 2/28/2017. The USGS stream gauge, Verde River near Paulden, AZ, peaked at 382 cfs in January and 2,330 cfs with the February event.

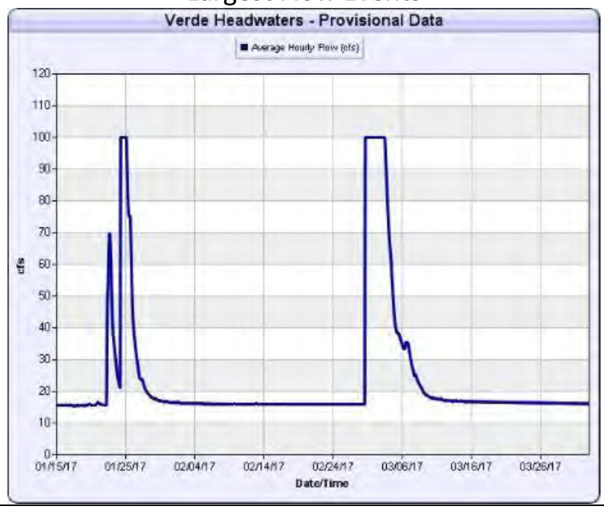
VHCR location was visited a total of five (5) times during the 2017 annual monitoring period. In addition to routine maintenance and data collection, current meter measurements were made at the site.

Figure 15. Verde Headwaters near Campbell Ranch Hydrographs and Site Images

July 2016 – June 2017 Flow Events



Largest Flow Events



Flow Event on 2/28/2017

Gipe Well (GW)

The Gipe Well (GW) location records the depth to water (stage in feet below land surface). During the 2017 annual monitoring period the overall depth to water decreased around 2 feet, most likely due to increased winter precipitation in the area relative to recent years (See Figure 16).

The GW location was visited a total of three (3) times during the 2017 annual monitoring period. All visits were to perform general site maintenance and data collection. An obstruction in the well limits the ability to sound the well during site visits.

Figure 16: Gipe Well Hydrograph (depth to water in feet) and Site Images

July 2016 – June 2017 Depth to Groundwater

Gipe Well Site Image

Conclusions

There was a distinct seasonal difference in surface water flow observed during the 2017 annual monitoring period. The Big Chino Wash locations and Pine Creek saw frequent smaller events during the summer monsoon and generally minor, if any, flow during the remaining months. Just the opposite in the Williamson Valley Wash and Walnut Creek basins. The two basins produced very little during the monsoon, but had a very productive winter season.

Every location in the Big Chino Sub-basin had some observable flow. Lower Walnut Creek at Charney Property had the fewest observable flow events with three (3) while nine (9) separate events were observed at the Williamson Valley Wash at XU Ranch location.

The greatest event flow volume was 3,733 AF, recorded at Lower Williamson Valley Wash starting on 2/28/2017. Pine Creek had the lowest maximum flow event of 23 AF, recorded on 9/2/2017. Lower Williamson Valley Wash had three (3) separate events that exceeded 1,000 AF. All occurred during the winter season. No other site exceeded 1,000 AF during the year.

Almost 20 inches of precipitation fell at George Wood Canyon over the monitoring period. The precipitation was spread fairly evenly between the summer monsoon and winter season. Wind speeds tended to be higher in the winter and early spring. However, the winds are generally light, less than 10 mph, and predominately out of the WNW.

Due to a productive monsoon, Sullivan Dam pooled standing water in late July 2016. By August the dam was full and water would occasionally lap over the structure. This is most likely due to wind conditions at the time. On 1/21/2017, winter runoff created the first spill event at the dam. The spill event lasted just over one week. The second and last spill event of the monitoring period was also the largest. Due to a significant storm in the area, on 2/28/2017, the dam started to spill again with the water level approaching 2 feet. The event lasted 4 days. Due to the productive monsoon and winter season, pooled water remained behind the dam through the end of the monitoring period 6/30/2017.

The productive winter also appears to have benefitted groundwater levels. Starting around late February, the depth to water at Gipe Well decreased by approximately 2 feet. Around 5/1/2017, the water levels leveled off and slightly increased.

SRP WM continues to maintain the sites and process pressure transducer data and SRP Flowtography® images collected at the monitoring locations. While stage values are typically more accurate during flow events, discharge values are based on estimated ratings derived from cross sectional profiles and impacted by changes in the channel cross sections. Additional direct current meter measurements would be needed to improve estimates of discharge values in the future. The data presented within this report are provisional in nature, and is reflective of the best available data at the time this report was written.

APPENDIX II

Summary of Existing Data Collection Equipment

Established Monitoring Efforts

Groundwater Level Monitoring

Monitoring Wells Established Under CA#1

Name	Cadastral Location	Completion Date	Comments
WMW-1	B-20-04 19CBA	1956	Data collection by either ADWR or USGS
WMW-2	B-20-04 33CBD2	2006	Data collection by either ADWR or USGS
WMW-3	B-19-04 10CCB2	2006	Data collection by either ADWR or USGS
BMW-3	B-18-04 01ACA2	2007	Data collection by ADWR
BMW-1	B-18-04 11ACC	2003	Data collection by ADWR
BCMW-1	B-18-04 25AAA2	2006	Data collection by ADWR
Gipe Well	B-18-01 17AAA	2008	Installed by SRP with cooperative funding from the Drake Mine
PZ3	B-17-02S 04DBC3	1989	Data collection by either ADWR or USGS

Stream flow Monitoring

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

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

Climate Monitoring

Publicly Accessible Repositories for Climate Data

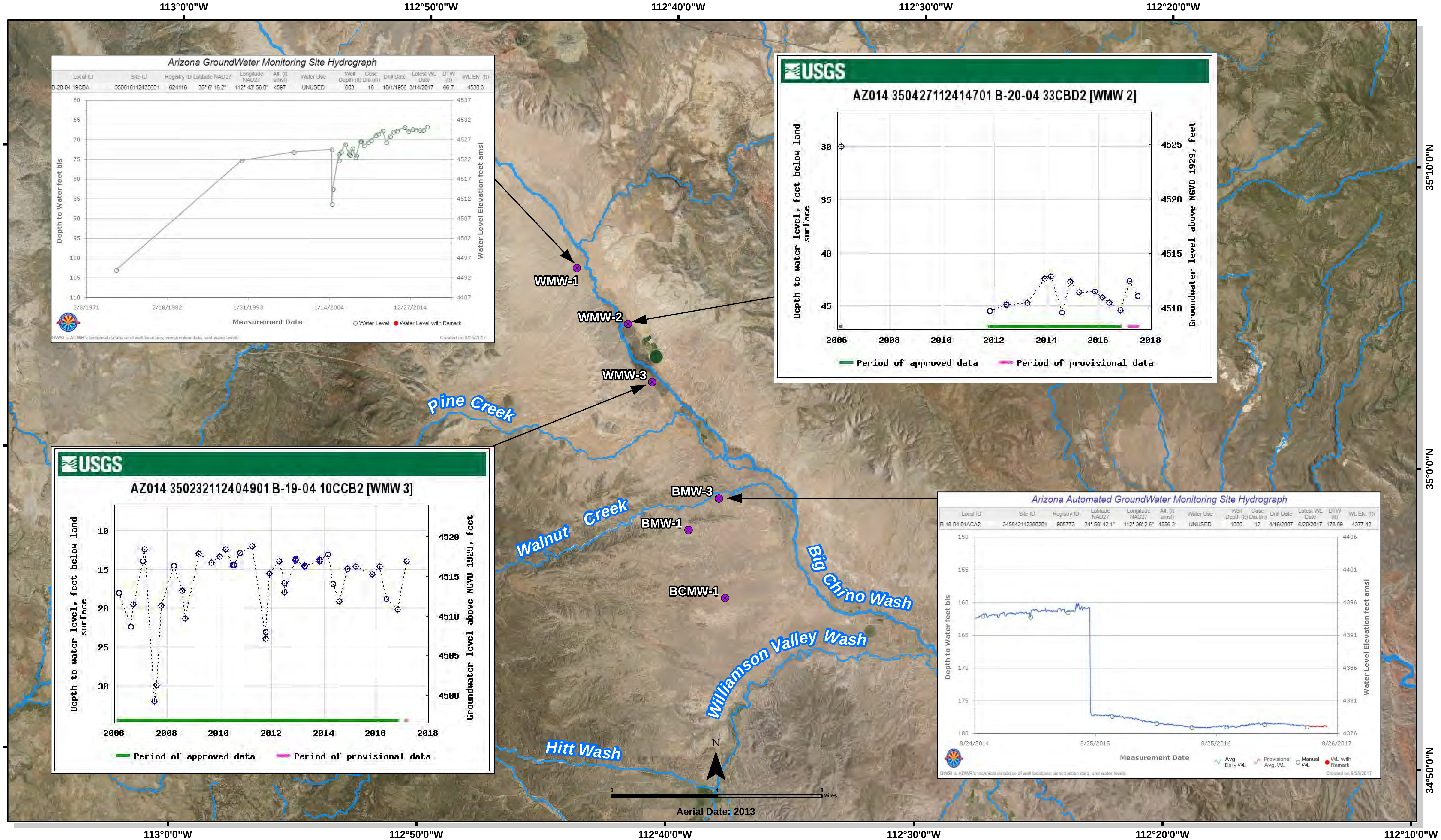
Agency Name	Data Portal
YCFCD	http://weather.ycflood.com/
USGS	http://waterdata.usgs.gov/az/nwis/rt
NWS-HADS (Camp Wood – CPWA3, Ashfork – ASFA3)	http://www.nws.noaa.gov/oh/hads/
Historic Climatic Data	http://www.wrcc.dri.edu/summary/climsmaz.html

Existing Weather Stations in the Big Chino Sub-basin

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

APPENDIX III

Maps



Existing Monitor Well

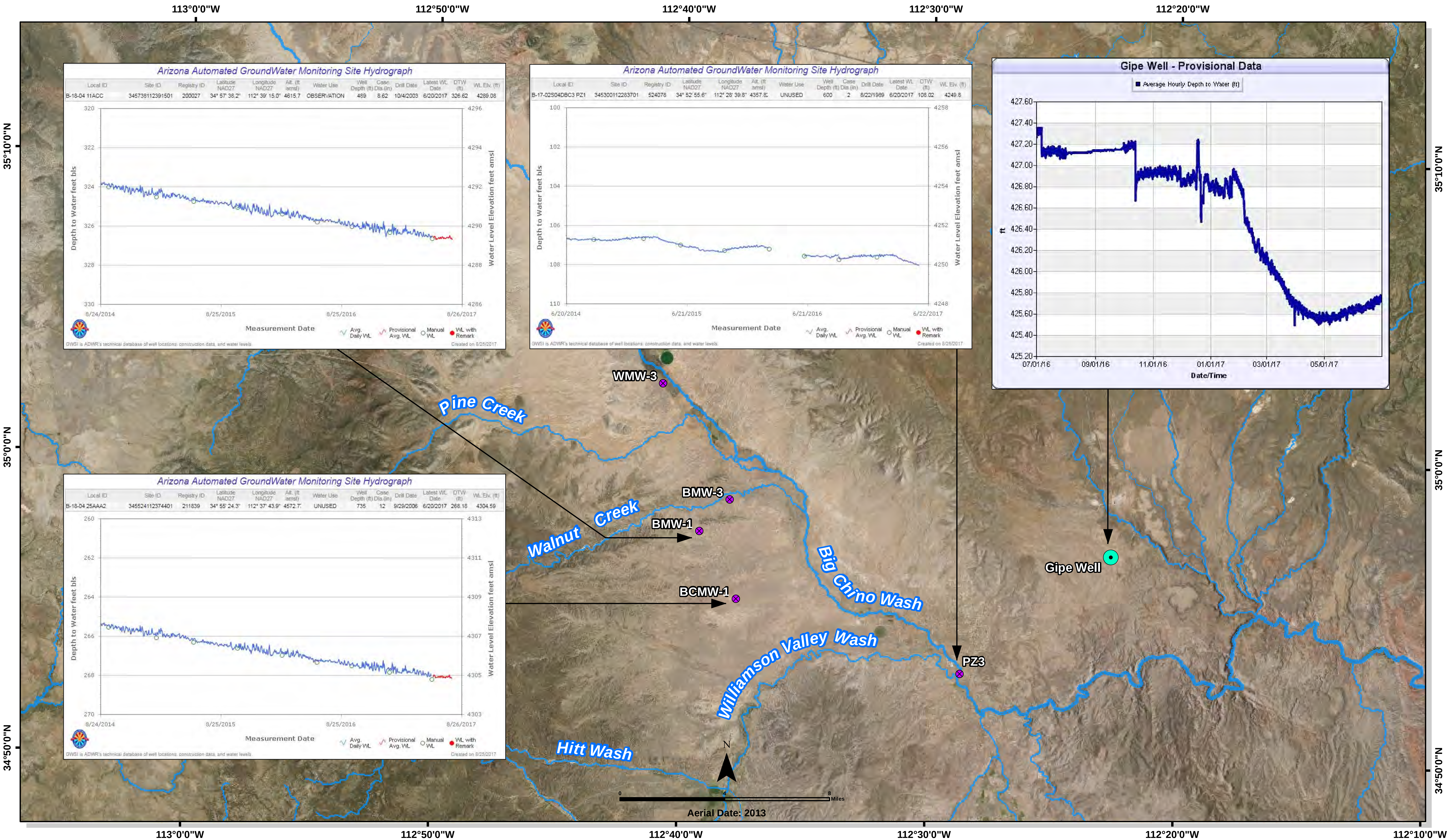
Gipe Well

Map 1
Big Chino Water Ranch/Gipe Well
Northern Existing Monitor Wells

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

Map Courtesy of SRP®

BIG_CHINO_MONWELL_17NORTH.mxd
9/25/2017



● Existing Monitor Well

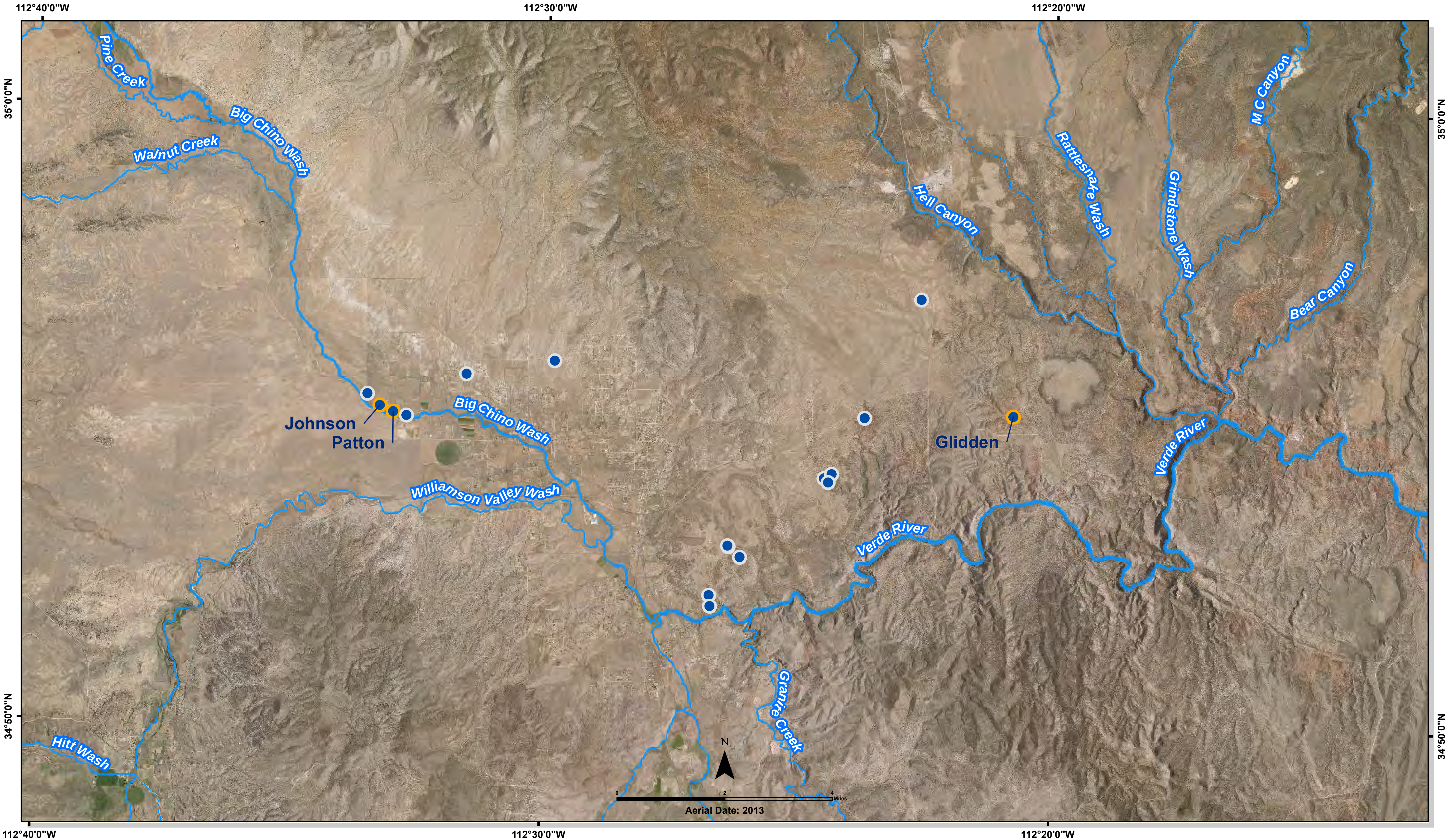
● Gipe Well

Map 2
Big Chino Water Ranch/Gipe Well
Southern Existing Monitor Wells

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

Map Courtesy of SRP®

BIG_CHINO_MONWELL_17SOUTH.mxd 9/25/2017



Did Not Meet Monitoring Needs

Existing Wells to be added to Monitor Plan

Map 3
Big Chino Sub-basin Water Monitoring Project
Assessment of Potential Monitor Wells – Phase 1 Scope of Work

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

Map Courtesy of SRP

BIGCHINO_POTENTIALMONWELL_17.mxd
9/25/2017

Surface Monitoring Location

USGS Gauge

Verde Headwaters

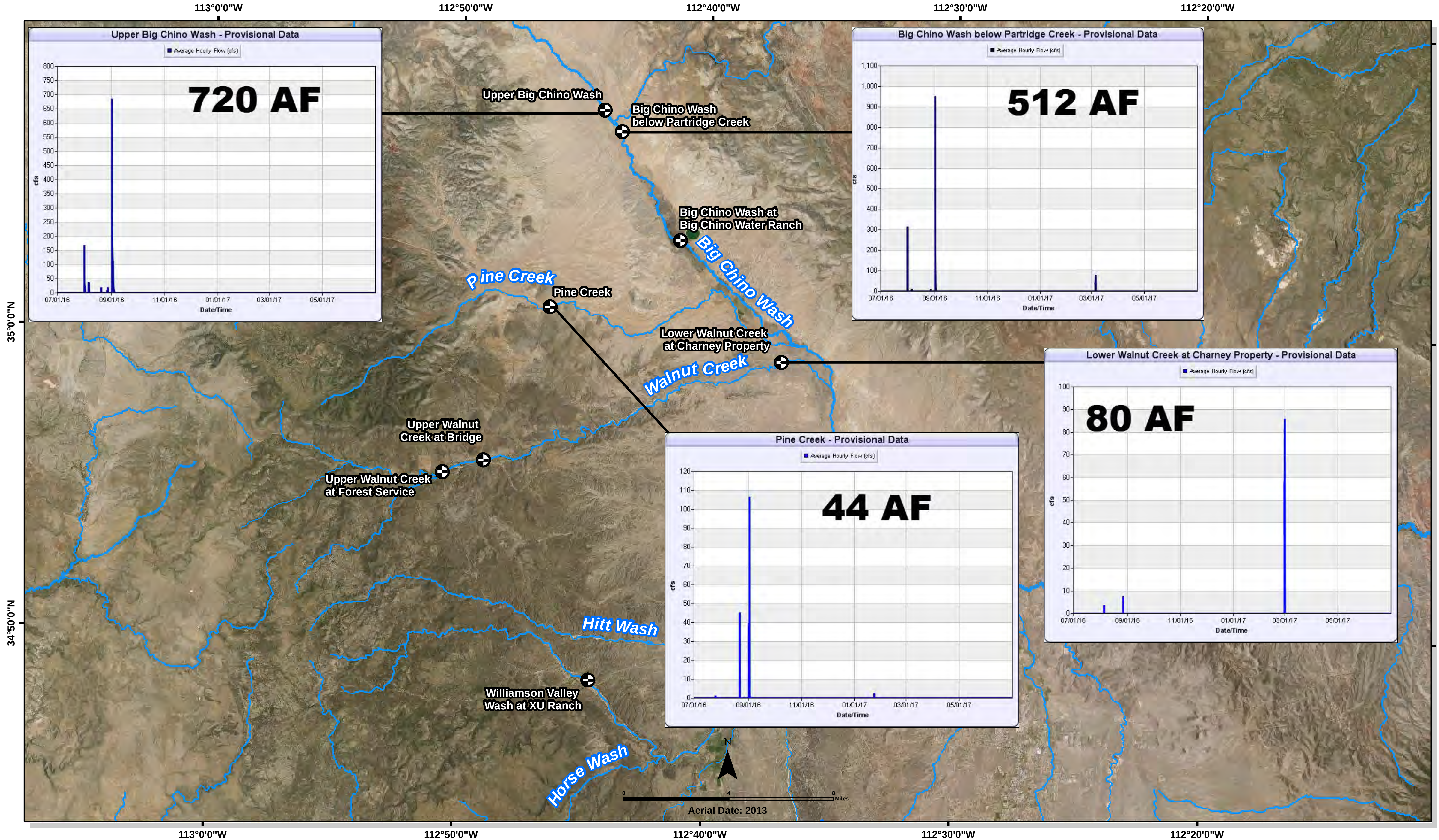
Creeks & Washes

Map 4
Big Chino Sub-basin - Surface Water Monitoring
(existing flowtography, camera only sites and Verde Headwaters)

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

Map Courtesy of SRP®

BIGCHINO_EPHEMERAL_17.mxd 9/25/2017



Creeks & Washes

Surface Water Monitoring Location

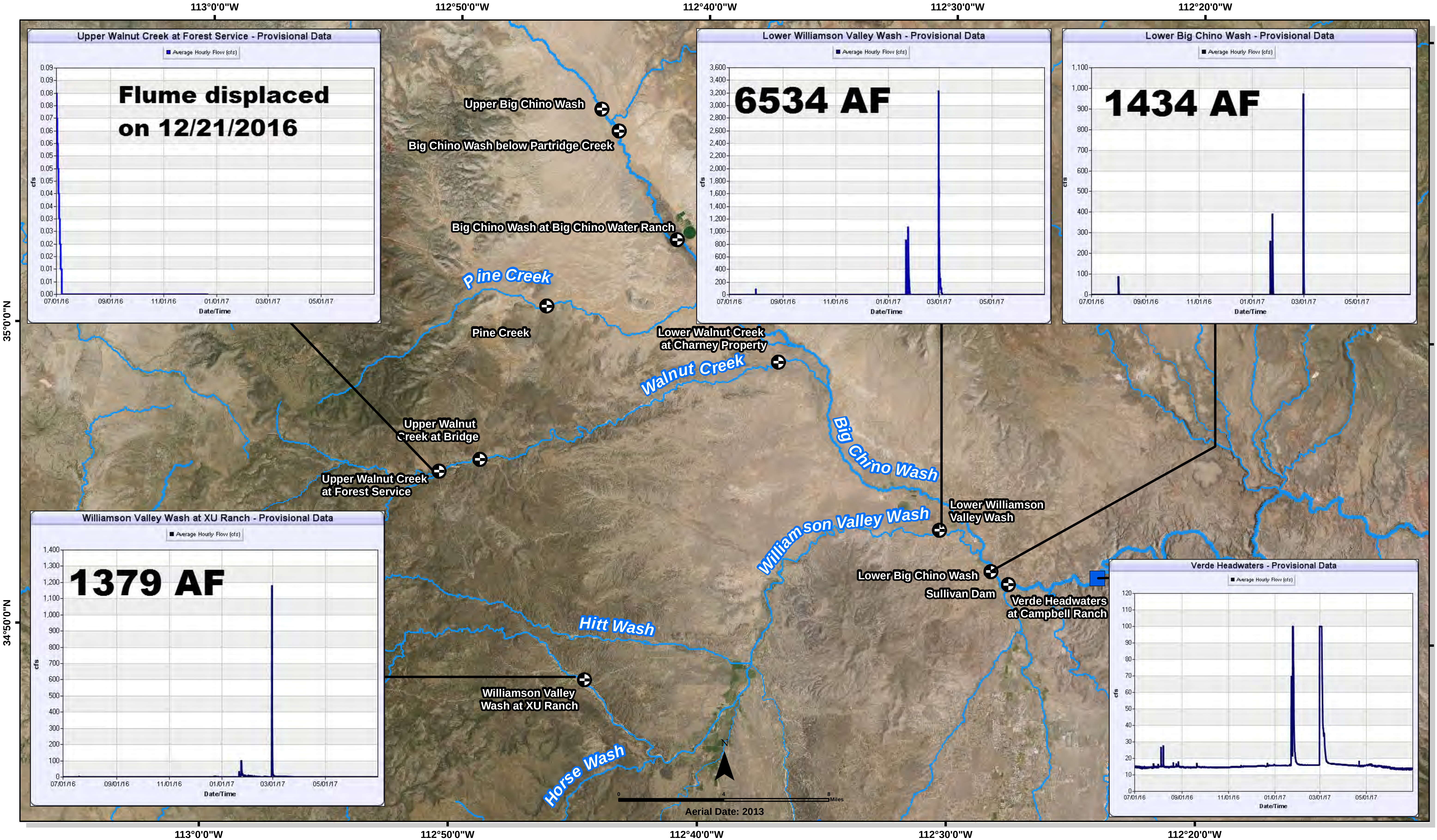
Verde Headwaters

Map 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®

BIGCHINO_WMSITES_17NORTH.mxd
9/25/2017



Creeks & Washes

Surface Water Monitoring Location

Verde Headwaters

Map 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

BIGCHINO_WMSITES_17SOUTH.mxd
9/25/2017

Yavapai County Flood Control District Weather Station

National Weather Service Hydrometeorological Automated Data System Station

USGS Weather Station

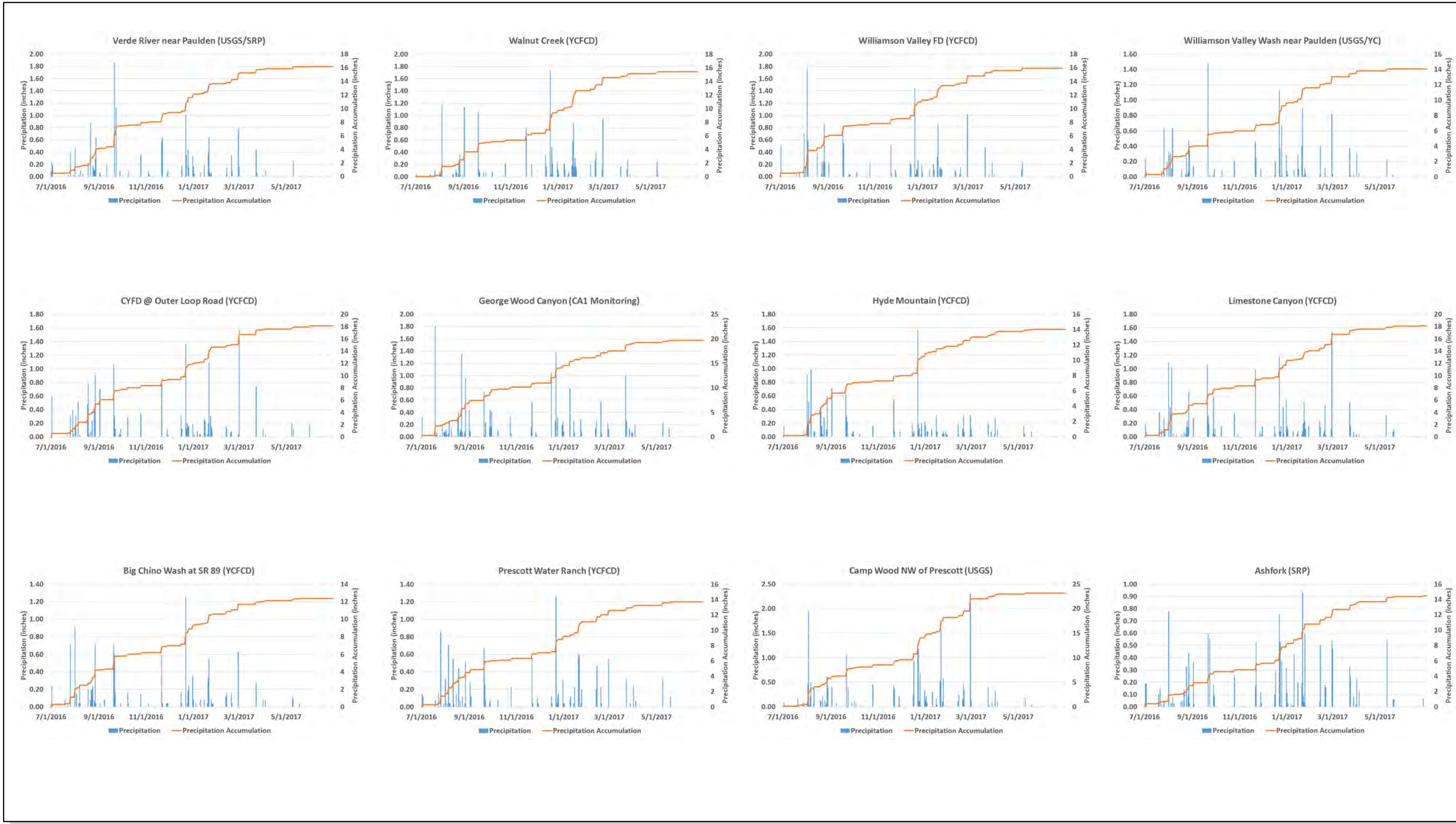
SRP Weather Station

Map 7
Big Chino Area Weather Stations

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

Map Courtesy of SRP®

BIG_CHINO_WEATHER_STATIONS_17.mxd
9/25/2017

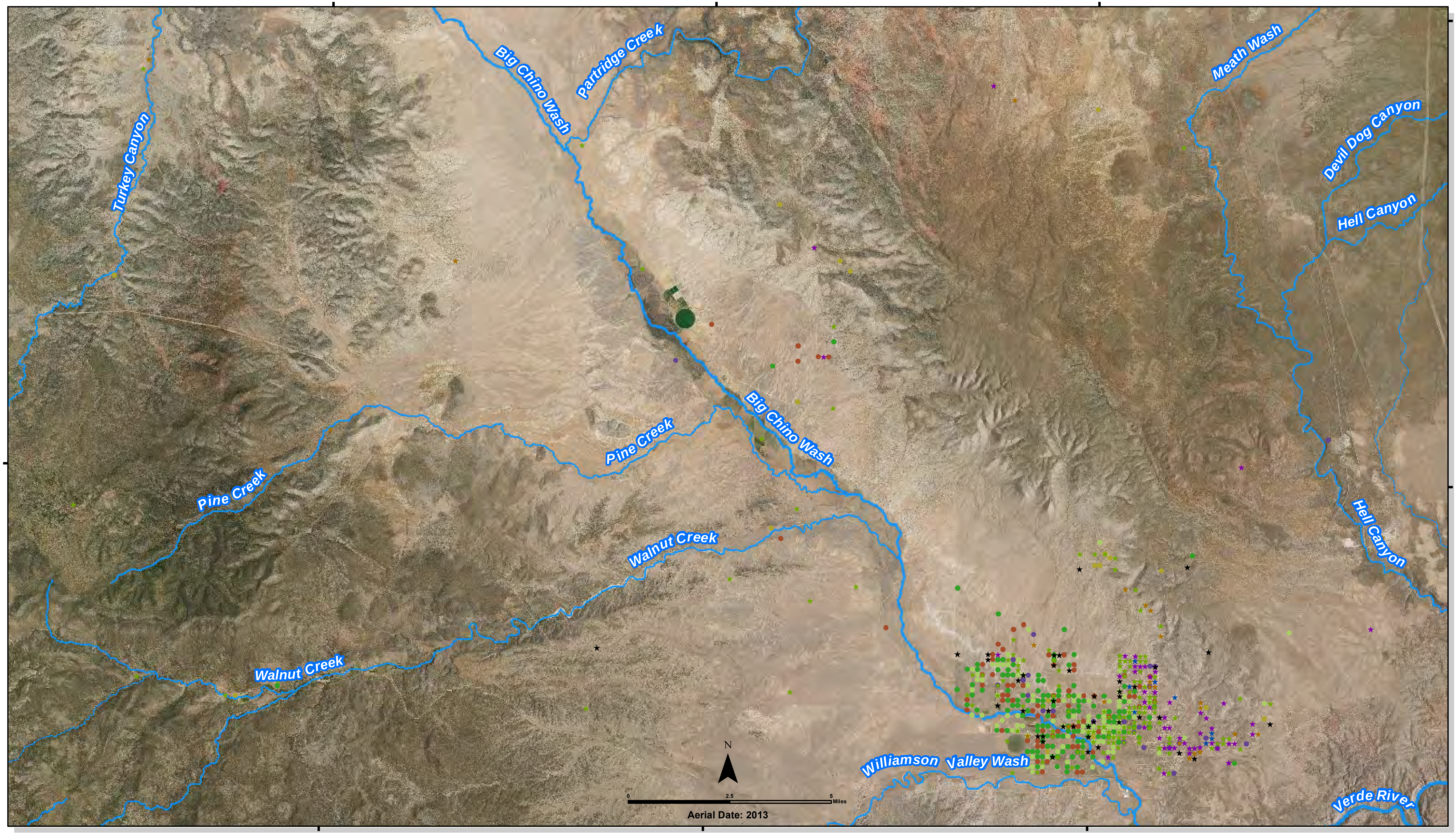


Map 7a
Big Chino Area
Weather Station Data

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

Map Courtesy of

BIG_CHINO_WEATHER_DATA17.mxd 9/25/2017



Well Completion Lithology

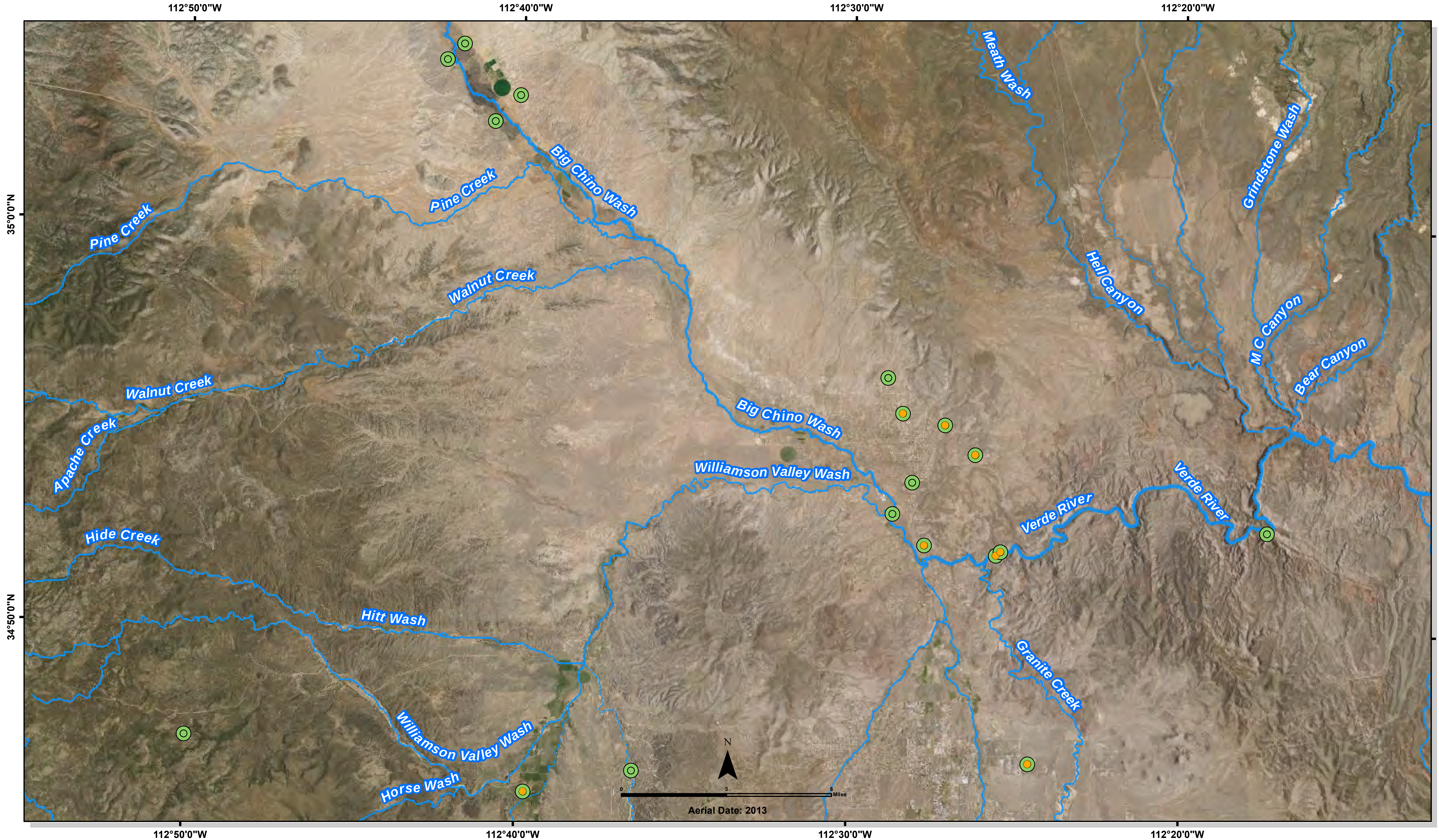
- Basalt
- Basin Fill
- Clay
- Conglomerate
- Granite Igneous
- Limestone
- Metamorphic
- Multiple Aquifers
- Sedimentary Rock
- Uncharacterized

Map 8
Big Chino Sub-basin Water Monitoring Project
Geochemical Data Collection – Sites screened for Potential Sampling

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

Map Courtesy of SRP®

BIGCHINO_GEOCHEM_P_17.mxd 9/25/2017



Active Sample Sites

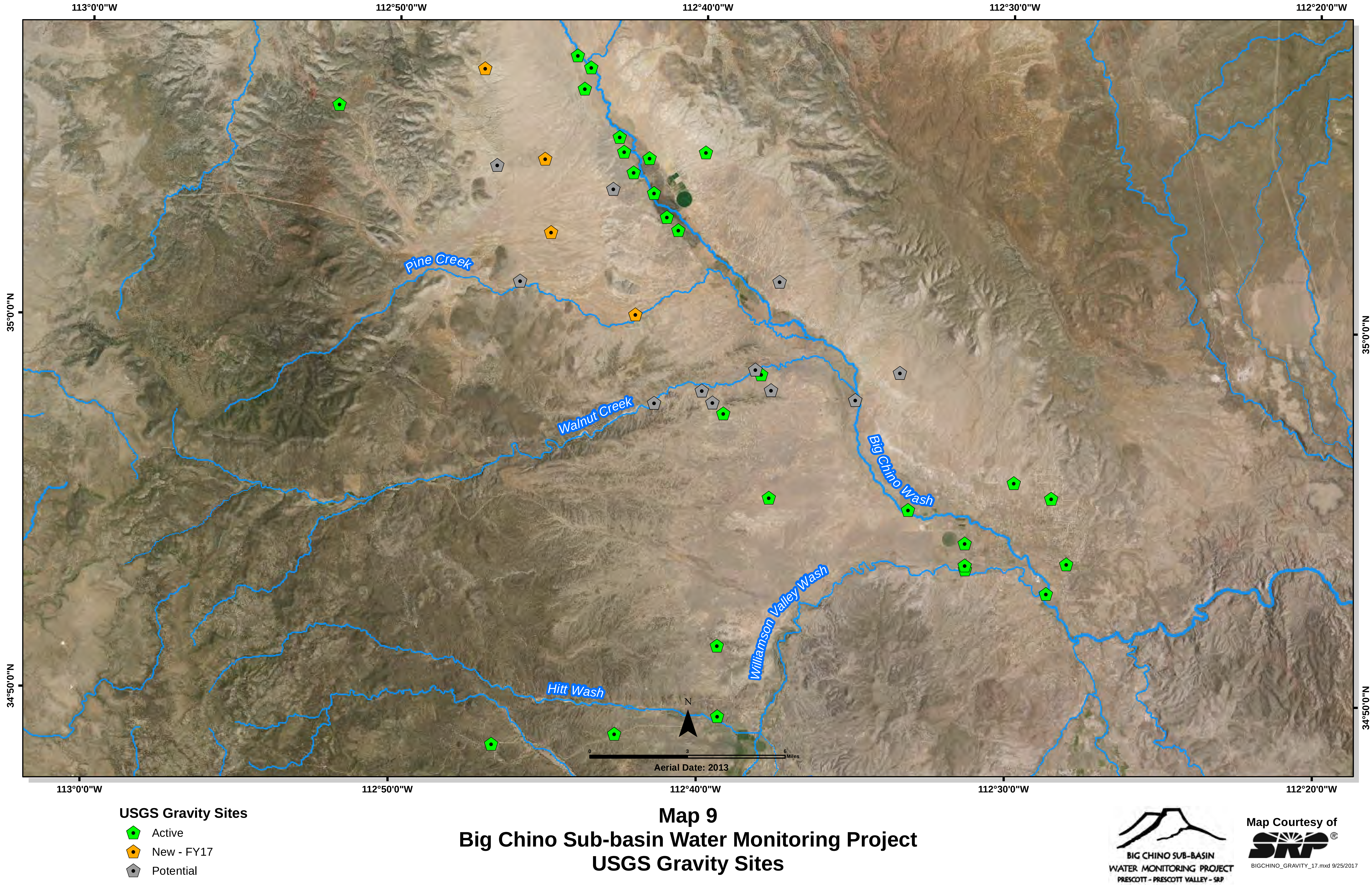
Samples Collected in FY17

Map 8a
Big Chino Sub-basin Water Monitoring Project
Geochemical Data Collection – Active Sites

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

Map Courtesy of SRP®

BIGCHINO_GEOCHEM_A_17.mxd 9/25/2017

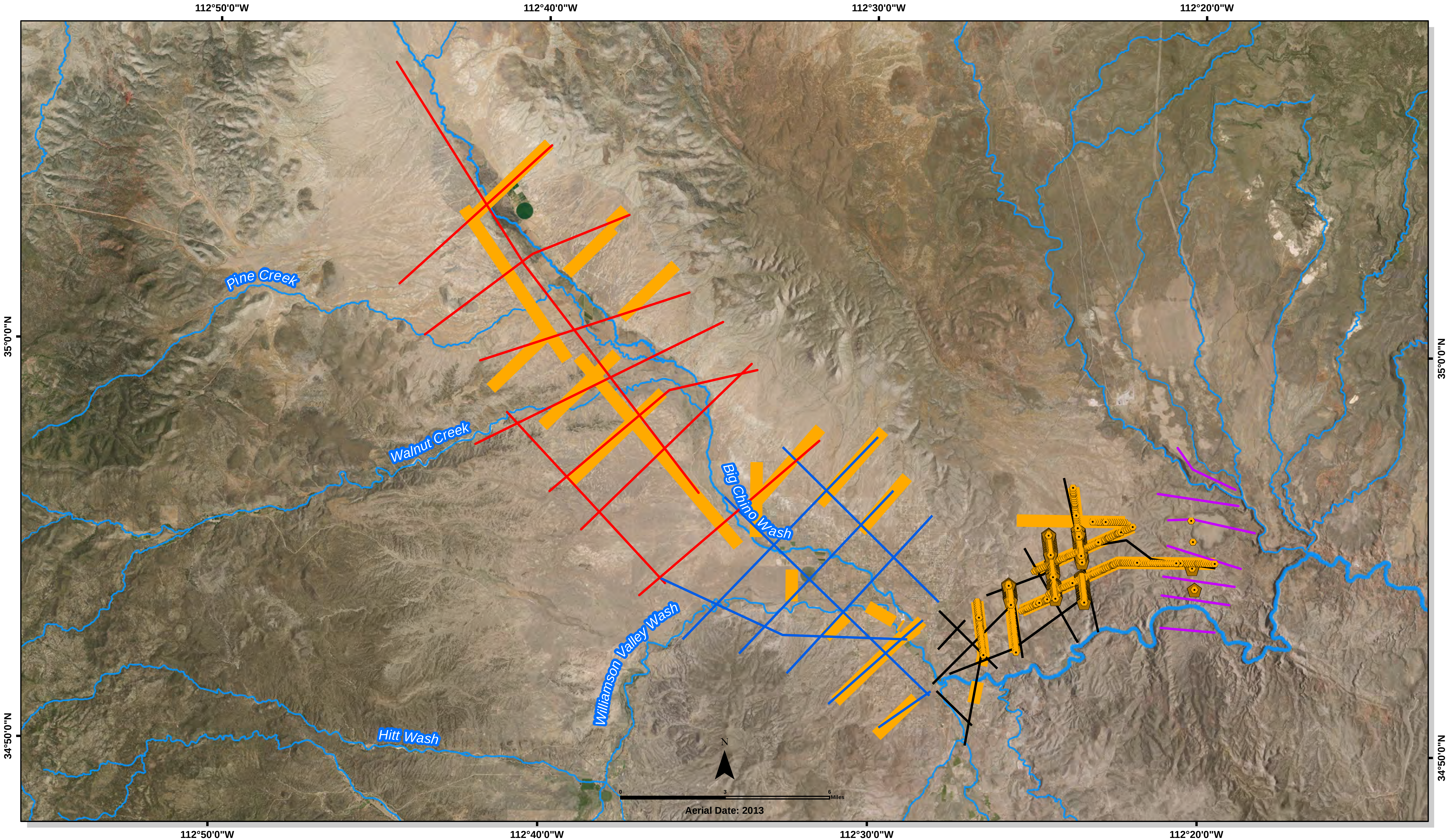


Map 9
Big Chino Sub-basin Water Monitoring Project
USGS Gravity Sites

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

Map Courtesy of SRP®

BIGCHINO_GRAVITY_17.mxd 9/25/2017



USGS Gravity Sites

- FY15 Profiles - Field Work Completed
- FY16 Profiles - Field Work Completed
- FY17 Profiles - Field Work Completed

Geophysical Profiles

- Phase 1
- Phase 2
- Phase 3
- King Spring

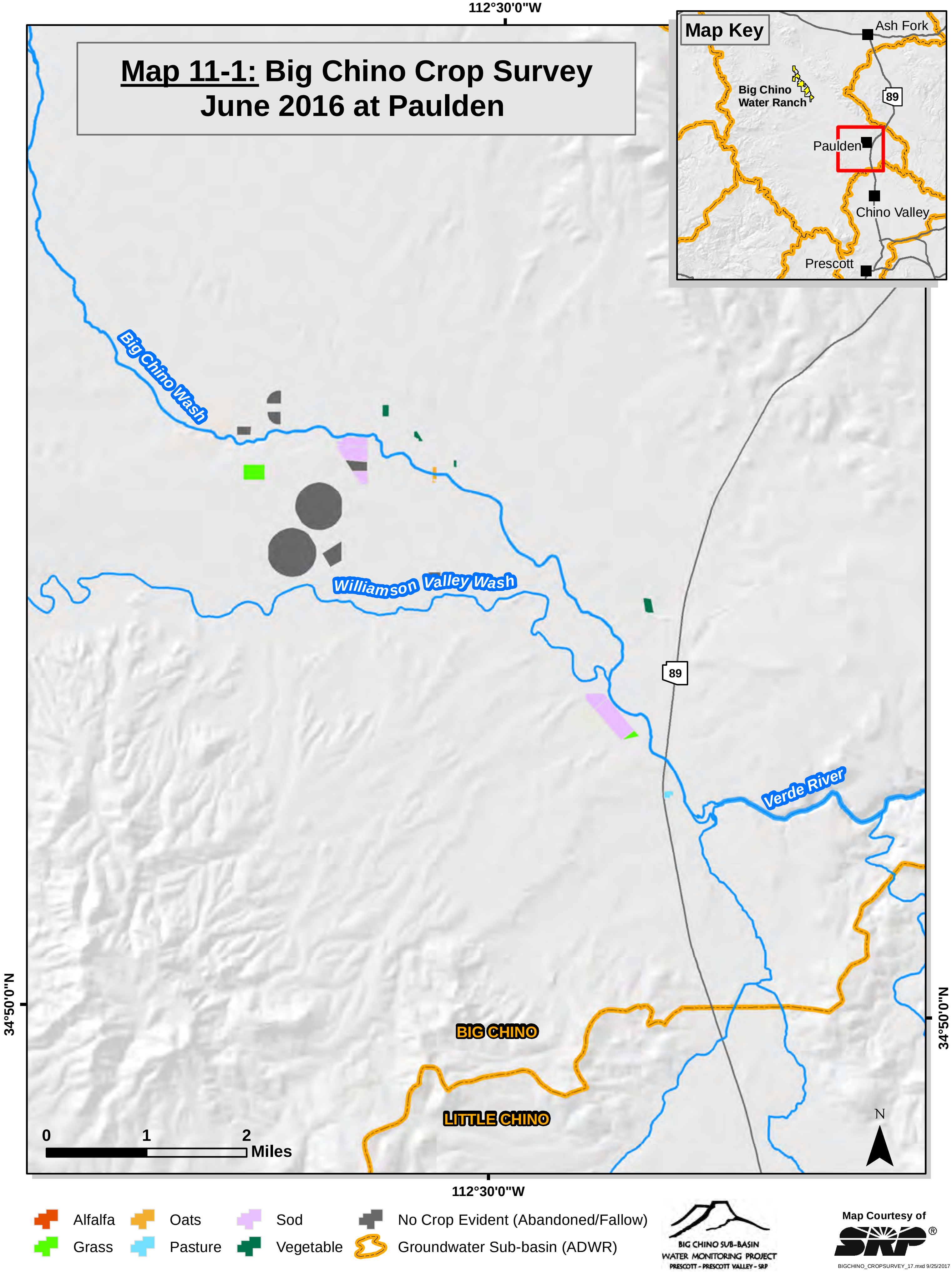
Map 10
Big Chino Sub-basin Water Monitoring Project
USGS Geophysical Profiles

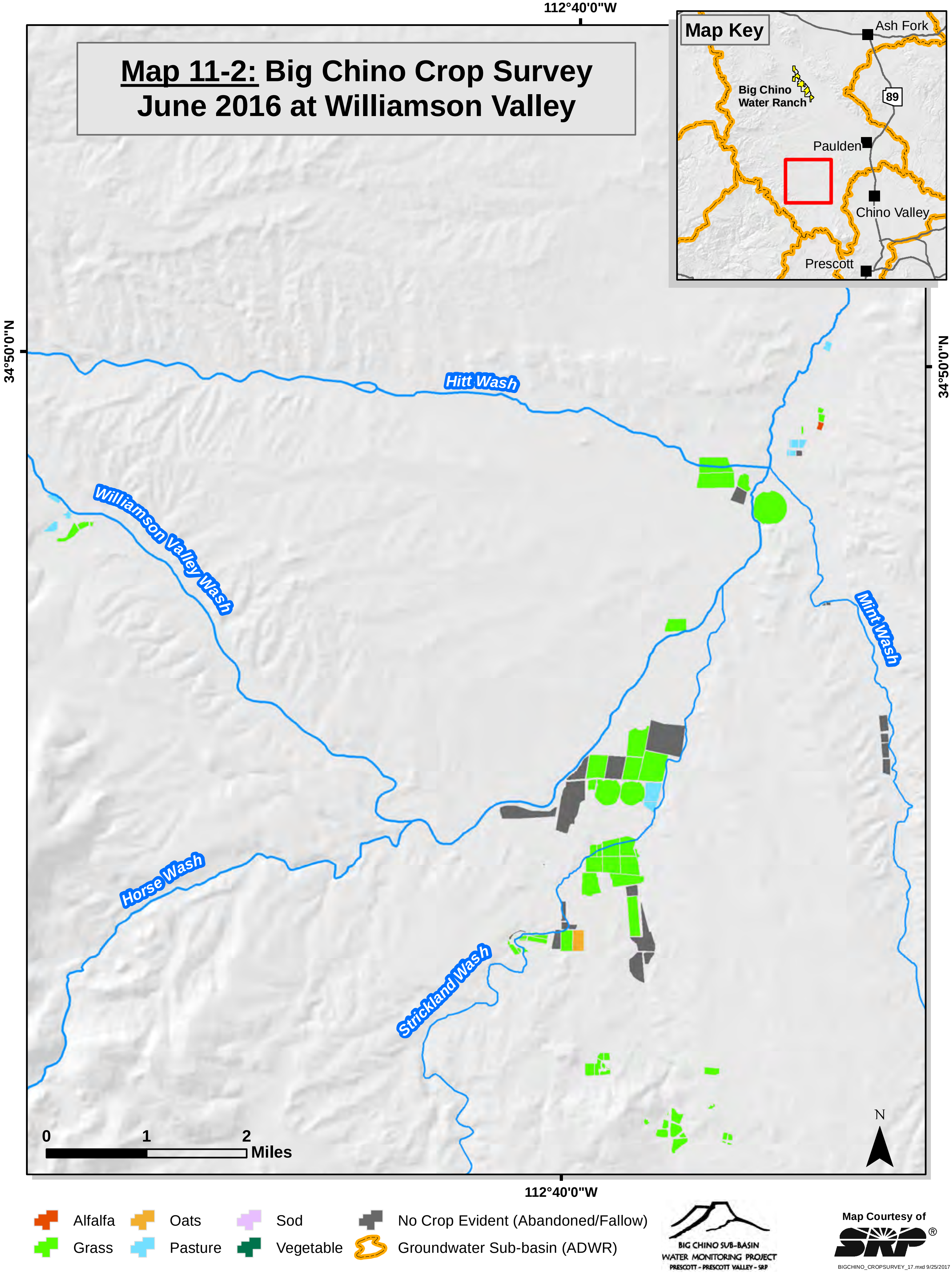
BIG CHINO SUB-BASIN
WATER MONITORING PROJECT
PRESCOTT - PRESCOTT VALLEY - SRP

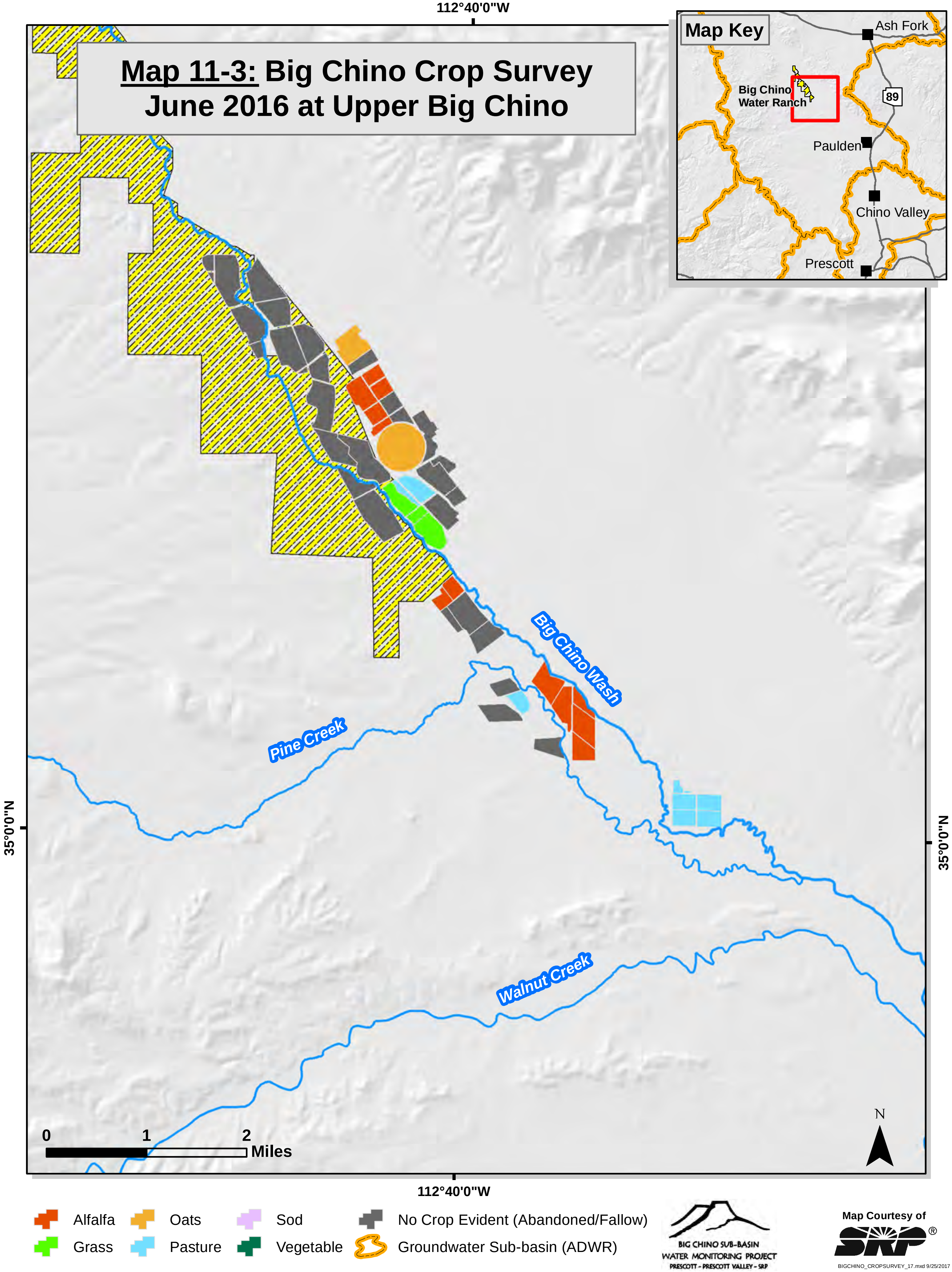
Map Courtesy of SRP

BIGCHINO_GEOPHYSICAL_17.mxd 9/25/2017

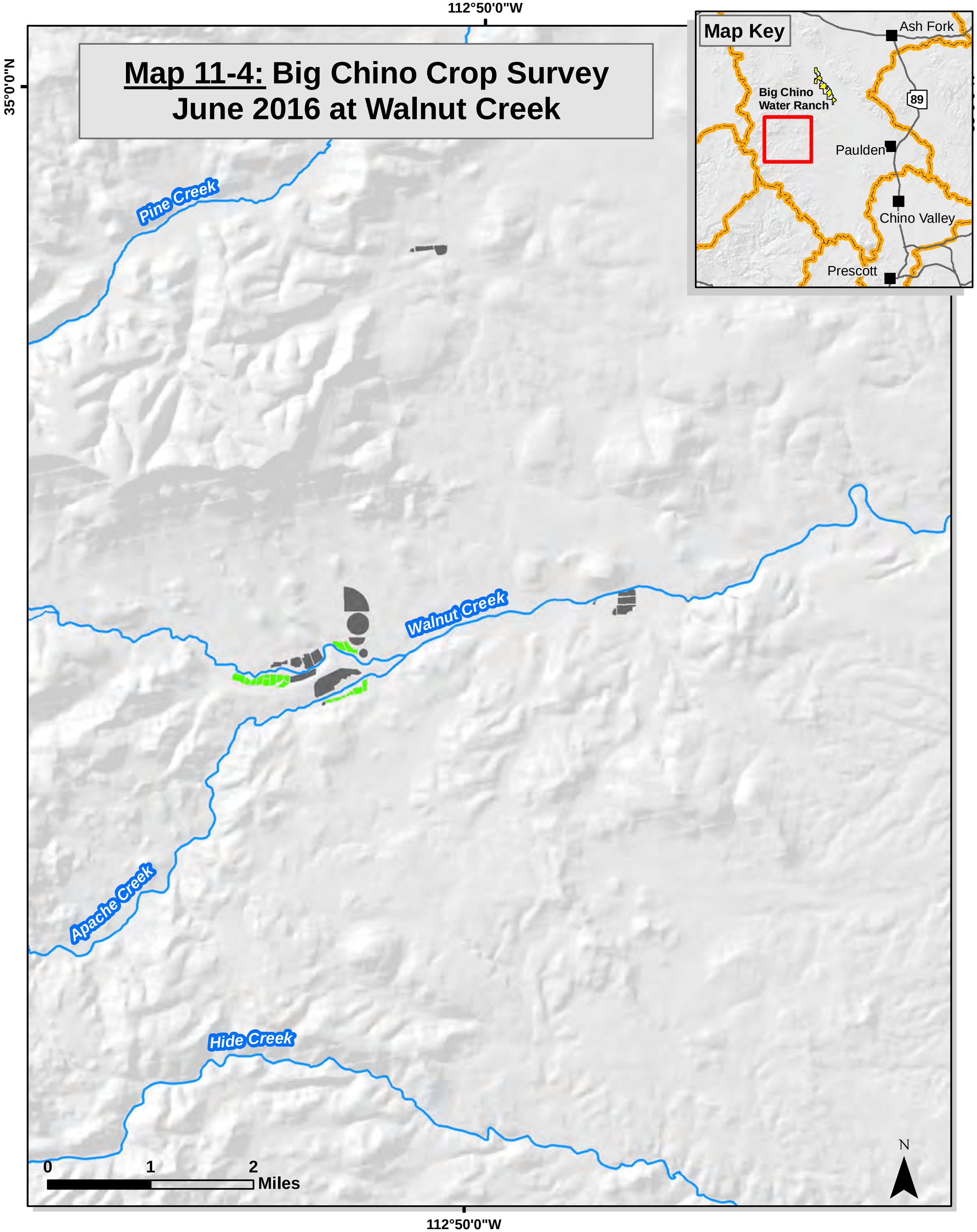
Map 11-1: Big Chino Crop Survey June 2016 at Paulden




Map 11-2: Big Chino Crop Survey
June 2016 at Williamson Valley
112°40'0"W
34°50'0"N
Map Key
Ash Fork
Big Chino
Water Ranch
89
Paulden
Chino Valley
Prescott
Hitt Wash
Williamson Valley Wash
Mint Wash
Horse Wash
Strickland Wash
0
1
2
Miles
N
Alfalfa
Grass
Oats
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
BIGCHINO_CROPSURVEY_17.mxd 9/25/2017


Map 11-3: Big Chino Crop Survey
June 2016 at Upper Big Chino
112°40'0"W
35°0'0"N
Map Key
Ash Fork
Big Chino Water Ranch
89
Paulden
Chino Valley
Prescott
Big Chino Wash
Pine Creek
Walnut Creek
0
1
2
Miles
N
Alfalfa
Grass
Oats
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
BIGCHINO_CROPSURVEY_17.mxd 9/25/2017

Map 11-4: Big Chino Crop Survey June 2016 at Walnut Creek



Alfalfa
Grass
Oats
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

BIGCHINO_CROPSURVEY_17.mxd 9/25/2017