DECLARATION OF RICH BURTELL ON THE NON-NAVIGABILITY OF THE UPPER GILA RIVER AT AND PRIOR TO STATEHOOD

In re Determination of Navigability of the Gila River
(Case No. 03-007-NAV)

May 2014

Prepared for:
Freeport-McMoRan Corporation
333 North Central Avenue
Phoenix, AZ 85004

Prepared by:
Plateau Resources LLC
4016 East Jojoba Road
Phoenix, AZ 85044

CONTENTS

TABLES

FIGURES

ATTACHMENTS

DECLARATION OF RICH BURTELL ON THE NON-NAVIGABILITY OF THE UPPER GILA RIVER AT AND PRIOR TO STATEHOOD

I. INTRODUCTION AND SUMMARY OF OPINIONS

1. I am a Registered Geologist (AZ No. 33746) and Principal at Plateau Resources, LLC (Plateau) with degrees in hydrology and geology.

2. Before founding Plateau, I worked at the Arizona Department of Water Resources (ADWR) for twelve years. At ADWR I was manager of the Adjudications Section and, as manager of that section, was frequently involved in evaluating the nature and occurrence of surface water in Arizona streams.

3. My education, experience, and expertise are detailed in my *Curriculum Vitae*, included as **Attachment A**.

4. I have been asked by Freeport-McMoRan Corporation (Freeport) to evaluate the navigability of the upper reach of the Gila River (Upper Gila River) at and prior to statehood. This declaration provides supplemental evidence in a case currently before the Arizona Navigable Stream Adjudication Commission (ANSAC). On October 22, 2012, ANSAC voted to reopen the record for receiving evidence on six remanded cases. These cases address the navigability of the Gila River, San Pedro River, Santa Cruz River, Lower Salt River, Upper Salt River and the Verde River.

5. In evaluating the navigability of the Upper Gila River, I am mindful that ANSAC intends to receive, review, and consider evidence on two issues: (a) the navigability or non-navigability of the Gila River in its "ordinary and natural condition" prior to the State of Arizona's admission to the United States on February 14, 1912, consistent with the Arizona Court of Appeals decision in *State v. Arizona Navigable Stream Adjudication Comm'n*, 224 Ariz. 230, 229 P.3d 242 (App. 2010)[a]; and (b) segmentation of the Gila River consistent with the United States Supreme Court's decision in *PPL Montana, LLC v. Montana*, 556 U.S. ___, 132 S.Ct. 1215 (2012).

6. In preparing this declaration, I reviewed: (a) the evidence compiled from ANSAC's first Gila hearing (Hearing No. 03-007-NAV); (b) ANSAC's January 27, 2009 document *Report, Findings and Determination Regarding the Navigability of the Gila River from the New Mexico Border to the Confluence with the Colorado River*; (c) legal memoranda filed in 2012 by various parties regarding the Gila River and posted on ANSAC's website (www.ansac.az.gov); (d) authorities cited in those legal memoranda; and, (e) evidence regarding the Gila River submitted to ANSAC in 2014. If additional information becomes available, I reserve the right to revise or supplement my opinions.

7. My declaration is organized into nine sections – Introduction and Summary of Opinions (Section I), River Segmentation (Section II), Channel Geomorphology (Section III), Observed Predevelopment Streamflow Conditions (Section IV), Early Transportation Needs (Section V), Streamflow Reconstruction (Section VI), River Depth and Velocity Reconstruction (Section VII), Boating (Section VIII) and

[a] The Arizona Court of Appeals characterized ordinary flow conditions as "usual, absent major flooding or drought" and natural flow conditions as "without man-made dams, canals or other diversions."

Conclusions (Section IX). References cited herein follow the last section. A map showing the general location of the Upper Gila River and important geographic and cultural features is presented in **Figure 1**.

8. After this introduction and summary of opinions, I recommend in Section II that the Upper Gila River be divided into three segments for purposes of determining its navigability. Section III explains the channel characteristic of each segment and concludes that both single and braided channels have occurred along this reach of the river under natural conditions. Navigation of braided channels is unreliable due to their relatively shallow water depth and unstable cross section.

9. Section IV describes how the river appeared to early travelers. Prior to development and under ordinary conditions, travelers along the river observed a shallow stream that was easily crossed by their horses, mules and wagons. The transportation needs of the first settlers in the region are discussed next in Section V and it is found that the Upper Gila River was neither used for trade or travel. Several government assessments at the time also confirm that this portion of the Upper Gila River was not susceptible to navigation.

10. To further assess how the river looked in its ordinary and natural condition, Sections VI and VII reconstruct the flow, depth and velocity at several points along the Upper Gila River. Median monthly flows are reconstructed using an accounting procedure that adjusts gaged records for upstream diversions. Stream depths and velocities are reconstructed using these adjusted flows and hydraulic rating curves developed based on field discharge measurements. The results show that the stream was too shallow to support commercial navigation, either by floating a boat downstream or powering one upstream. In Section VIII, I describe prehistoric, historic and recent attempts to boat the Upper Gila River. Despite a clear need to utilize the river for trade and travel, only a few historic accounts by adventurers floating down the stream and one ferry crossing were identified, as well as recent use by recreational boaters. No evidence was found of sustained commercial use.

11. Based on my review of existing information and the supplemental evidence presented here, I conclude in Section IX that the Upper Gila River was neither actually navigable nor susceptible to navigation in its ordinary and natural condition at and prior to statehood. I also conclude that if the Upper Gila River is divided into segments, which I recommend, none of the segments would have been navigable at that time.

II. RIVER SEGMENTATION

12. The Court in *PPL Montana* found that practical considerations support the segmentation of rivers when determining navigability:

> "Physical conditions that affect navigability often vary significantly over the length of a river. This is particularly true with longer rivers, which can transverse vastly different terrain and the flow of which can be affected by varying local climates…These shifts in physical conditions provide a means to determine appropriate start points and end points for the segment in question. Topographical and geographic indicators may assist." *PPL Montana v. Montana*, 132 S.Ct. 12 (2012)

13. In its June 2012 memorandum on the effects of *PPL Montana*, the Arizona State Land Department (ASLD), an advocate for stream navigability, agreed with the Court's findings and recommended that ANSAC consider several segmentation factors including (a) whether the river is located in a canyon or runs through flats or wide river valleys; (b) the river's flow rate; (c) the classification of rapids by degree of difficulty; (d) whether the river is a gaining or losing stream; and (d) the river's slope or steepness (pp. 2 and 7). Based on these factors, ASLD recommended that the Upper Gila River be divided into three segments (p.7):

- New Mexico to Gila Box
- Gila Box
- Gila Box to San Carlos Reservoir.

14. In its September 2012 memorandum on the navigability of the Upper and Lower Salt, Gila and Verde Rivers, the Arizona Center for Law in the Public Interest, another advocate for stream navigability, joined ASLD's memoranda on these rivers.

15. While my opinion is that no segment of the Upper Gila River was navigable or susceptible to navigation, I believe that it is useful to divide this portion of the Gila River into three segments for purposes of addressing stream characteristics and evaluating navigability.

16. After crossing into Arizona from New Mexico, the Gila River passes through Duncan Valley. Approaching the town of Guthrie, the valley narrows and, about one mile downstream, the Gila River enters the bedrock canyons of the Gila Box. The channel slope steepens from about 0.12% to 0.30% and rapids are encountered, which can be an impediment to navigation. River flows also increase within Gila Box with contributions coming from three perennial streams – the San Francisco River and Eagle and Bonita Creeks. About 2 miles below Bonita Creek, the channel widens and the Gila River enters the relatively broad Safford Valley. As it crosses this valley, the channel slope decreases to 0.15%. Near the location of present day Coolidge Dam, the valley narrows again and the Gila River enters another bedrock canyon with rapids.

17. Based on the above description, I propose dividing the Upper Gila River into three segments:

- Segment A – Duncan Valley, from the New Mexico Border to just below Guthrie (31 miles);
- Segment B – Gila Box (27 miles); and
- Segment C – Safford Valley, from just below Bonita Creek to Coolidge Dam (89 miles).[b]

Segment locations are shown in **Figure 2**.

[b] Plateau calculated segment lengths and river slopes using current and historic USGS topographic maps.

III. CHANNEL GEOMORPHOLOGY

18. This section of my declaration describes how the channel of the Upper Gila River has changed prior to and since statehood. In response to several large flood events that began in the early 1900s, portions of the river widened substantially and became braided. This was an important event as braided channels are often unsuitable for commercial boat travel due to their relatively shallow water depth and unstable cross section, rendering a stream both inefficient and unreliable for navigation. A description of historic channel conditions along the three segments of the Upper Gila River follows.

A. Safford Valley (Segment C)

19. From 1846 through 1904, the channel of the Gila River in Safford Valley (Segment C) was relatively narrow (150 to 300 feet), stable and meandered through a floodplain covered with willow, cottonwood and mesquite. (Burkham, 1972, pp.G22-23) Mainly as a result of large winter floods occurring between 1905 and 1917, the average width of the channel increased to 1,000 to 2,000 feet, destroying the river's meander pattern and the riparian vegetation along its banks. The braided channel that resulted from this flooding narrowed over time and, as of 1964, a single, meandering channel had been reestablished, less than 200 feet wide with dense vegetation, mainly tamarisk, growing on its floodplain. Smaller flood events occurred in the early 1890s, early 1940s and late 1960s that temporarily widened this section of the channel, but these increases were less significant. **Figure 3** illustrates how the width of the Gila River in Safford Valley varied historically and **Figure 4** presents photographs from the late 1920s and early 1930s that show braiding along this segment.

20. The channel widening observed in the Safford Valley during the early 1900s was not necessarily unique and likely occurred before. As stated by Huckleberry (1993, p.VII-3), "if changes in annual stream flow correspond with changes in large flood frequency, then one can expect the upper Gila River to have a channel geometry subject to dramatic changes through time at decadal time scales." Huckleberry added on p.VII-2 that "this undoubtedly resulted in alternating periods of channel stability and instability, and specifically, changes in channel form (e.g., braided vs. meandering) during the Holocene." Mussetter (2014, p.9) further examined this topic and showed that a relationship does, in fact, exist along the Upper Gila River between annual stream flow and large flood frequency. He also showed that annual stream flows, reconstructed from tree rings, have varied widely in the Upper Gila River over the past several centuries with successive years of relatively high flow.

21. I conclude from the foregoing discussion that the width of the Gila River in Safford Valley has varied naturally in response to changes in the frequency and magnitude of flood events. Following large and frequent floods, the width of the channel can increase significantly and the channel will become braided. When braided, the channel is even less susceptible to navigation due to its shallow depth and unstable cross section. Over time and absent more large floods, the channel recovers and eventually returns to a single, meandering stream. Both channel conditions were observed along the Upper Gila River prior to statehood.

B. Duncan Valley (Segment A)

22. Historic channel changes in the Duncan Valley (Segment A) have received less attention by researchers than in Safford Valley. The Duncan Valley segment of the Upper Gila River extends from the New Mexico border to Gila Box.

23. According to the Bureau of Reclamation (BOR, 2004, p.4), the historic channel changes noted by Burkham in Safford Valley "may or may not apply to Duncan Valley." However, BOR analysis of aerial photography did show that, from 1935 through 2000, channel widening had also occurred in Duncan Valley following large flood events. Moreover, review of early U.S. Geological Survey (USGS) discharge measurements show that the channel in Duncan Valley was frequently braided. From 1923 through 1931, USGS found the Gila River at its gaging station below Duncan split into two or more channels during 24 of 114 site visits or 21% of the time (USGS, 2014a). Similarly, downstream at its York gage, USGS found the river split into two or more channels during 29 of its 111 site visits or 26% of the time. Such conditions would not have been conducive to commercial boat travel.

24. Nonetheless, in comparison to Safford Valley, the channel of the Gila River in Duncan Valley has been relatively stable:

> "This is shown best by the presence of several, long stable reaches in Duncan Valley, compared to a few short stable reaches in Safford Valley. Major channel changes generally occurred following large floods; this highlights the important point that the largest floods in the Gila River system have lasting effects that can be observed in channel morphology following their occurrence…The largest floods have occurred in water years 1891, 1907, 1941, 1973, 1979, and 1984." (BOR, 2004, pp.4-5)

C. Gila Box (Segment B)

25. In contrast to the Safford and Duncan Valleys, the channel of the Gila River within Gila Box (Segment B) has probably changed little over time. Fuller (2003, p.4-18) noted that "Bedrock along the channel margins in these canyons precludes significant movement of the river channel or other channel changes." Huckleberry (1993, p.VII-1) added that "Alluvial reaches, i.e. segments not confined by bedrock, are prone to greater changes in channel position and form."

26. Early discharge measurements support these opinions (USGS, 2014a). The gaging station near Clifton was visited 190 times between 1928 and 1933 and the river was only found split into two or more channels five times, or during about 3% of visits. Below Bonita Creek, the river was never found spilt into multiple channels during any of 90 site visits between 1932 and 1933.

27. **Figure 4** presents two photographs from the early 1930s that show a single, meandering channel within Gila Box, one above the confluence with the San Francisco River dated August 20, 1930 and the other below Bonita Creek dated April 14, 1932.

IV. OBSERVED PREDEVELOPMENT STREAMFLOW CONDITIONS

28. In this section of my declaration I describe streamflow conditions observed by early travelers along the Upper Gila River before the area was largely settled and substantial diversions for irrigation began. Also presented is an historic photograph of the river from the early settlement period. Taken together, this information indicates that, prior to development, the Upper Gila River was a shallow stream, typically easily crossed on horseback or by wagon. The river was at times deeper and more difficult to cross, but usually only following storm events and/or during spring snowmelt. These

findings support the conclusion that the Upper Gila River was not navigable in its ordinary and natural condition prior to statehood.

A. Historic Accounts

29. **Table 1** summarizes historic accounts of Upper Gila River streamflow conditions made before 1880.[c] The accounts were taken from various sources that are listed in the table along with their location, date and associated comments. I specifically selected accounts when cultural impacts on streamflows were limited. As indicated in **Table 2**, from the 1820s through 1872 less than approximately a few hundred acres were being irrigated along the Upper Gila River and its tributaries at any given time.[d] Irrigation by American settlers increased rapidly after that time and, by 1879, irrigated acreage in the area approached 5,000 acres. As discussed further in Sections VI and VII, it is unlikely that even this level of development would have substantially changed the depth of the stream and impacted its susceptibility to navigation.

30. Trapper James Ohio Pattie completed three trips along the Upper Gila River in the 1820s. Maps showing his routes are presented in **Figure 5** and relevant sections from his personal narrative of the expeditions are provided in **Attachment B**. Although crossing the river numerous times in the fall, winter, and spring when traveling and trapping beaver, he never mentions using a canoe or raft along the Upper Gila River.

31. In October 1846, General Kearny led a military reconnaissance down the Gila River beginning in New Mexico. A map showing his route is presented in **Figure 6**. Four of the men that accompanied Kearny kept notes and journals that were later published. Relevant sections from these documents are provided in **Attachment C**. The documents describe a shallow river when it was first encountered upstream of the Arizona border. Downstream from this point, the troops made several river crossings with their horses, mules and wagons. Below the confluence with the San Francisco River and Eagle and Bonita Creeks, the river's cross section was reportedly about "70 feet by 4 feet." (Emory, 1848, p.67) Another account made on the same day indicated that it had been raining since the previous night which, along with the tributary inflows, probably explains this increased river depth. (Griffin, 1943, p.26) Even with the rain and inflows, the Gila River they encountered downstream in the Safford Valley was described as "still not deep fording." (Johnston, 1848, p.586)

32. Kearny reached the confluence with the San Pedro River in November 1846. About six miles downstream from that point, Johnston (1848, pp.592-593) noted that "the (Gila) river is slightly larger here than where we first saw it, although we were told otherwise; it has about 18 inches water on the shoals here, and canoes might pass down it very readily, and good sized boats, if it was not for the round rocks in its bed." (Johnston, 1848, pp.592-593). In contrast, none of the four travelers that accompanied Kearny recorded any observation related to navigability along the Upper Gila River.

[c] Since the historic accounts pre-date 1880, they record conditions prior to the flooding of the early 1900s that caused channel braiding.

[d] Early American travelers along the Upper Gila River noted numerous Indian ruins, but no active irrigation.

33. In 1849, several groups travelled down the Upper Gila River on their way to the California gold fields. They all travelled by land and two from the same group kept journals that were later published. Relevant sections from their journals are provided in **Attachment D**. This group first encountered the Gila River in New Mexico during July and noted that it was "about 12 yards wide and 18 inches deep." (Chamberlain, 1945, p.160) Like earlier travelers and other 49ers at the time, they crossed the Upper Gila River numerous times with their horses and mules but did not note any difficulties. However, when this group finally reached the Colorado River in August, they describe in detail their difficulties in transporting mules and supplies across that stream (Green, 1955, pp.73-74).

34. Fifteen years later, to support military efforts against Apache Indians in the area, Fort Goodwin was established in the Safford Valley near present day Geronimo. In 1867, the commander of the post wrote to his superiors that the nearby Gila River was "50 feet broad with an average depth of 2 feet." (Burkham, 1970, p.G5)

35. In summer 1872, Governor Safford, returning from a tour of mining prospects along the San Francisco, traveled down the Gila River through Gila Box. He noted to a local paper that "we were compelled to cross the river many times and, as the water was high, had considerable swimming to do, but at an ordinary stage of the water, there is not the least difficulty in passing with a cavalry company through this canon." (Weekly Miner, 1872)

36. Lastly, in his autobiography, a Mormon settler named Hyrum Weech recalled crossing the Gila River near Fort Thomas (Safford Segment) in February 1879. He noted that the river was running high and swiftly at the time due to melting snow and his group had to swim their horses across. He returned to Safford Valley a month later with wagons and crossed the river with "oxen, cows and young stock" but mentions no difficulty at that time (Weech, 1931, pp.14-16).

B. Historic Photograph

37. **Figure 7** shows an 1880 photograph of a covered wagon and trailer crossing the Gila River near present day Calva. The photograph is noteworthy since it was taken during the period of early settlement in the Safford Valley when impacts from irrigation diversions were still relatively minor. By 1880, the acreage irrigated upstream of the wagon crossing totaled about 5,700 acres (**Table 2**).

38. The photograph is also noteworthy because the width and depth of the Gila River can be approximated by reference to the length and height of the wagon and the livestock. Using this information, the river appears to be less than 100 feet wide and about 1 to 2 feet deep, which is consistent with the historic accounts described above. Note also that the stream appears unbraided at this time which is consistent with Burkham's findings presented in Section III.

39. The photograph and historic accounts described above both indicate that, in its natural and ordinary condition, the Upper Gila River typically had relatively shallow flow (about 2 feet or less) that would not have supported commercial navigation prior to statehood.

V. EARLY TRANSPORTATION NEEDS

40. The first Americans to occupy the watershed of the Upper Gila River were miners and the military. Although both required that supplies be shipped to their operations, neither miners nor the military utilized the Upper Gila River for that purpose, further indicating that the river was not navigable. This section of my declaration describes how supplies were delivered to Fort Goodwin, located near the Gila River in Safford Valley, and to the mines of the Clifton-Morenci District, located north of Gila Box along and adjacent to the San Francisco River. Also described are several early assessments by government officials that concluded that this reach of the Gila River was not navigable.

A. Fort Goodwin

41. As mentioned in Section IV, Fort Goodwin was established near the Gila River in Safford Valley during 1864. It operated until 1871 when, because of malaria, it was abandoned and eventually replaced nearby by Fort Thomas in 1876 (Brandes, 1960, pp.32-34, 67) **Figure 8** shows the location of these and other early military posts and settlements in Arizona.

42. When in operation, Fort Goodwin supported military efforts against Apaches in the area and supplied rations to several hundred Indians that were encamped there. Most supplies were transported to the post via land from the Yuma Depot. General Mason reported the following in 1866:

> "The vessel brought (the supplies for Fort Goodwin) to Fort Yuma, and we were compelled to haul them from there to their destination. Much difficulty and delay was experienced on account of the very limited amount of transportation in the Territory…Already we have near nine hundred Indians on the reservation at Fort Goodwin, and they are reported as coming in daily." (Secretary of War, 1867, pp.96-98)

43. Three years later, the means of transporting supplies to Fort Goodwin had not improved. As General Ord described in 1869:

> "…expenditures (by the Department of California) are principally due to the cost of transporting supplies. The expense of supplying rations at Camp Goodwin, one of the posts in Arizona, and of feeding animals there, can be compared with similar expenses in San Francisco, when it is known that a barrel of good flour is bought in San Francisco for the army for from $4 to $5 in gold; and it has heretofore cost, to take two hundred pounds of freight to Camp Goodwin, in Arizona, about $30 in gold, going by land from Yuma Depot. A barrel of flour purchased in Arizona costs, delivered at Camp Goodwin, about $25 in gold; so that it has cost the government purchasing supplies there or thereabout five or six times as much to feed the soldiers there as here…" (Secretary of Water, 1869, p124)

44. In addition to the expense and time required, there were safety concerns in freighting supplies to Fort Goodwin. In December 1870, wagon trains from the firm of Tully and Ochoa were attacked by Indians en route from Tucson to Camp Goodwin and 30 oxen were lost (Miller, 1989. p.298).

45. Conditions at Fort Goodwin during this period are described in an inspection report by Lieutenant Jones. On the issue of transportation, he noted that "The transportation does not exceed the wants of the command…the mules are in good order, but the (seven) wagons are in very bad condition." (Jones, 1869)

46. No documents were found from this period of the use boats on the Gila River to transport supplies to Fort Goodwin. And with the exception of a ferry built to cross the river during a flood (see Section VIII), there is no record that any of the soldiers stationed there used boats. This is significant because the need for reliable and inexpensive transportation to the fort clearly existed and it was a time when the region was largely unsettled, with little water diverted for agriculture. Had it been navigable, the Gila River would have provided a direct route to transport supplies from the Yuma Depot, located near its mouth, to Fort Goodwin, established near its headwaters.

B. Clifton-Morenci Mining District

47. The first mining claims were located in the Clifton-Morenci District during the early 1870s. By 1875, the Leszinsky Brothers had built a smelter to process ores from their Longfellow Mine. The following year they built a larger smelter in Clifton, located about 5 miles below the mine. Charcoal was used to fuel these smelters (Dunning, 1959, pp.73-74).

48. The following quote from Henry Leszinsky describes how charcoal and other supplies reached Clifton at this time:

> "The fuel used for smelting purposes is charcoal, this we buy from a hundred different persons; men who have a wagon or two bring it to us…A great portion is brought from Pueblo Viejo (present day Solomonville), there the people burn the mesquite growing on their own lands…People on the Gila who have taken up farms clear the land of mesquite roots, make coal and bring it to us…We made roads to Pueblo Viejo, built a bridge across the Gila, and through our own energy in opening up the county the Gila has been settled for fifty miles…It is thus that several hundred people make their living through these works. They bring grain, vegetables, meat and all other necessaries of life and business. The farmers on the Gila and Pueblo Viejo find here a ready market for their produce." (The Arizona Citizen, 1877a) [emphasis added]

49. Another quote from the same newspaper describes how people travelled to Clifton during the period:

> "There are two ways to get to Clifton. You can go via Bowie to Silver City (New Mexico) and thence northwest to Clifton, or you can go to Camp Grant and thence via Pueblo Viejo and the Pinal road to its junction with the Silver City road and turn northwest to Clifton. The latter is the route for one to take going from Tucson…we left Silver City…and after crossing the Gila nine times on the route, we left the river and ascended the hills (to Clifton)…" (The Arizona Citizen, 1877b)

50. Both quotes indicate that the Gila River was not a viable means of transportation from the Safford and Duncan Valleys to Clifton in the mid- to late-

1870s. Roads were in use, but no mention is made of boats. Based on acreage data compiled in **Table 2** and presented by the Gila Water Commissioner (2012, Plate 32), less than approximately 4,000 acres were being irrigated above Solomonville at this time. As discussed further in Section VI, this indicates that about 40 cubic feet per second (cfs) or less were being diverted from the river upstream and return flows could have totaled 30% or more of this. Such depletions would not have changed the navigability status of the stream and, since the need for local transportation existed, it can be concluded that these segments of the Upper Gila River were not susceptible to navigation at the time.

51. Ore processed from the Longfellow Mine near Clifton was initially shipped via ox teams through New Mexico and up the Santa Fe Trail to Kansas City, 1200 miles away. In 1881, apparently due to the continued high cost of haulage and falling copper prices, the Lesinskys sold their mining interests which the Arizona Copper Company purchased in 1882. That same year, the company's board of directors decided to build a 36-inch gauge railroad from Lordsburg, New Mexico to Clifton.[e] By 1883, the railroad from Lordsburg had reached the town of Guthrie, near the east end of Gila Box, and was hauling freight cars up to that point loaded with mine, mill and railroad supplies as well as a passenger coach (Colquhoun, 1924, pp.14-15, 17 and 20).

52. The Arizona & New Mexico line eventually reached Clifton in December 1884 (Patton, 1945, p.iii). **Figure 9** shows its route from Lordsburg. Note that it followed the Gila River for nearly 25 miles through Duncan Valley before leaving the river downstream of Guthrie. The Gila River was not used by the mine as a means of transportation.

53. As documented in **Table 2**, when the decision to construct the railroad to Clifton was made in 1882, there were less than approximately 500 acres being irrigated along the Gila River upstream of Clifton. Diversions from the river were, therefore, minor at that time and would not have affected the potential to navigate this reach of the river. This is further evidence that the Gila River through Duncan Valley was not navigable in its ordinary and natural condition. Otherwise, the Arizona Copper Company would surely have considered using the river to avoid the considerable cost of constructing a 70-mile railroad from Lordsburg.

C. Government Assessments

54. From 1850 to 1853, John Bartlett of the U.S. Army Corps of Topographic Engineers attempted to survey the boundary between the United States and Mexico which, at the time, was defined by the Treaty of Guadalupe Hidalgo as the Gila River. Regarding the navigability of the Gila River he wrote "It is doubtful whether it can ever be navigated, except at its floods, and these are by no means regular. At such times flat-bottomed boats might pass to the mouth of the Salinas (Salt River), near the Pima Villages." (Fuller, 2003, p.3-14)

55. In a December 1865 memorial, the legislature of the Arizona Territory asked Congress for an appropriation to improve the navigability of the Colorado River. As stated in their memorial:

"…the Colorado River is the <u>only navigable water in this Territory</u>; that

[e] The Southern Pacific Railroad had reached Lordsburg in fall 1880 (Carmichael and Kiddle, 1924, p.7).

> it is navigable, in high stages of water, five hundred miles; that by the expenditure of a small amount of money, it may be rendered navigable much higher up. That portion of the river between Fort Yuma and Fort Mohave has a changeable channel and is obstructed by boulders, snags, and sand bars rendering the navigation difficult and dangerous; that the removal of said obstructions would greatly facilitate the navigation of this part of the river…that if navigation of said river is improved it will accommodate the General Government and greatly increase and hasten the development of vast mineral other resources of this Territory." (Territory of Arizona, 1866, p.77) [emphasis added]

Although written at a time of little or no irrigation along the Upper Gila River, the memorial makes no mention of the Gila River.

56. In the late 1800s, the General Land Office completed several cadastral surveys along the Upper Gila River before irrigation diversions were significant (**Table 2**). The location and dates of the surveys are listed below:

Duncan Valley

- Township 8 South, Range 32 East (January to February 1882)
- Township 8 South, Range 31 East (January to February 1882)

Safford Valley

- Township 7 South, Range 27 East (January 1875)
- Township 7 South, Range 26 East (December 1874 to February 1875)
- Township 6 South, Range 25 East (January to February 1875)
- Township 6 South, Range 24 East (January to February 1875)
- Township 5 South, Range 24 East (January 1875)
- Township 5 South, Range 23 East (February 1875)
- Township 4 South, Range 23 East (October to November 1875).

Review of the survey plats and accompanying field notes shows that both banks of the Gila River were not meandered during any of these surveys. This is important since, as explained by Littlefield (2013, pp.21-23), surveyors at the time were instructed to meander both banks of rivers that they believed were navigable.

57. Each of the government assessments described above was made before substantial settlement by Americans and prior to the flooding of the early 1900s that caused channel braiding. And yet none of these assessments determined that the Upper Gila River was susceptible to navigation. These assessments, combined with the fact that neither miners nor the military actually used the river to supply their early

operations in the area, demonstrates that the Upper Gila River was not susceptible to navigation in its ordinary and natural condition prior to statehood.

VI. STREAMFLOW RECONSTRUCTION

58. In this section of my declaration I describe how ordinary and natural streamflow conditions were reconstructed at several USGS gaging stations along the Upper Gila River. The purpose of reconstructing these streamflows was to further assess how the river looked prior to the effects of man and determine whether it was susceptible to navigation in this undisturbed condition. Undepleted streamflows were determined using an accounting approach that adjusted (increased) gaged flows for upstream diversions. In the paragraphs below, the period that the streamflows were reconstructed is described first followed by a discussion of the gages used and upstream diversions. Results from the analysis are presented next and then compared to other undepleted flow estimates.

59. I conclude from this analysis that undepleted streamflows along the Upper Gila River were greatest during spring snowmelt (March and April) and the monsoon (August). Through these months of higher runoff, flows in the Duncan Valley and upper Gila Box nevertheless typically have remained below 350 cfs. Undepleted flows were higher in the Safford Valley and, during these higher flow months, would typically have increased up to 600 to 700 cfs at the upper end of the valley and 750 to 900 cfs at the lower end. Because the quantities diverted upstream of the gages and added back to the river to reconstruct flows were not corrected for canal spills and return flows and the effects from infiltration and evapotranspiration (ET), these values for undepleted streamflow should be considered an *upper estimate*. Actual undepleted flows along the Upper Gila River would have been lower. Results from this analysis are used in Section VII to estimate the depth and velocity of the reconstructed flows and their suitability for navigation.

A. Analysis Period

60. Several factors were considered before selecting a flow period to reconstruct along the Upper Gila River including:

a) Availability of flow and diversion data;

b) Whether runoff conditions during the period were representative of long-term conditions;

c) Quantity of well pumpage; and

d) Changes in cultural depletions.

Each factor is discussed briefly below. Based on these factors, the period beginning in the early 1920s and ending in the early 1930s was selected.

61. For the period analyzed, there were at least six or more years of data from each gaging station and at least that length of record was available for the major upstream diversions in the area.

62. When reconstructing streamflows it is also important to consider whether runoff during the period analyzed is representative of long-term conditions. In other words, it should be determined whether the period selected for reconstruction was wet, dry or about normal. In characterizing ordinary streamflow conditions, a period of near normal flows is desirable. **Figure 10** shows annual streamflows in the Gila River near Solomonville reconstructed from 1820 to 1940 using tree rings. Also shown in this figure is the median annual streamflow at this point on the Gila River based on tree rings dating back to the year 1332. These data show that, for the period analyzed, annual flows along the Upper Gila River were near their long-term median with about an equal number of years above and below the median and no extreme wet or dry years.[f]

63. Determining the effects of well pumpage on streamflows can be complex. An effort was therefore made to reconstruct streamflows when there was relatively little pumping along the Upper Gila River. Major agricultural districts in the region include the Duncan-Virden Valley and Safford Valley. According to Turner (1946, p.2), the use of irrigation wells in the Safford Valley began in the early 1930s. The use of irrigation wells in the Duncan-Virden Valley started later, beginning about 1935 (Halpenny and others, 1946, p.2). Since the quantity of water pumped from irrigation wells typically far exceeds that pumped for other purposes, the period selected for streamflow reconstruction was largely unaffected by well pumpage.

64. The last factor considered when selecting a streamflow period to reconstruct is changes in cultural depletions. Since periods of record are rarely the same for all gages and diversion points, it helps when reconstructing flows to select a time when diversion rates are relatively stable. Fortunately, by the early 1920s, the acreage of lands irrigated in the Safford and Duncan Valleys, the largest cultural water use in the region, had largely stabilized (Gila Water Commissioner, 2012, Plate 30).

B. Gages

65. Undepleted streamflows were reconstructed at four USGS gages along the Upper Gila River:

- below Blue Creek, near Virden, New Mexico (09432000);
- near Clifton (09442000);
- near Solomonville, at the head of Safford Valley (09448500); and
- at Coolidge Dam (09469500).

Figure 2 shows the location of the gages. The gage near Virden is upstream of Duncan Valley, the Clifton gage is within the upper Gila Box, and the gages near Solomonville and at Coolidge Dam are at the upper and lower ends of Safford Valley, respectively.

[f] Meko and Hirschboek (2008) reconstructed these streamflows by first correlating recent tree ring widths to the quantity of flow measured at a nearby USGS gaging station. This correlation and older tree ring data were then used to estimate flow conditions before data were available from the gage. The researchers did not adjust the recent streamflow data for upstream diversions which, as shown in this section, have been significant. As such, the flow data they reconstruct using tree rings is useful as a relative rather than absolute measure of prior flows along the Upper Gila River.

66. Data for the gages are presented in **Tables 3** through **6**. Median monthly flows and upstream diversions are listed for each gage over the period analyzed. Medians were used for flow reconstruction rather than averages since the former are more representative of typical flow conditions and less affected by large flow events. As noted by Fuller (2003, p.8-6), "the average annual discharge rate may not be as representative of 'typical' flow conditions as the median (50%) flow rate or the 90% flow rate, which may give a better indication of their susceptibility to navigation."

C. Diversions

67. To reconstruct natural and ordinary streamflow conditions along the Upper Gila River, diversions upstream of the USGS gaging stations were added to the gaged flows. Since irrigation diversions were by far the largest cultural water use in the region at this time, these diversions were evaluated in detail.

68. Specific irrigation diversions upstream of the gages are presented in **Tables 7** through **9**. **Table 7** lists irrigation diversions in the Gila River headwaters and along its tributaries circa 1930. Irrigation diversions in the Duncan-Virden Valley and vicinity from 1922 to 1931 are listed in **Table 8** and irrigation diversions in the Safford Valley from 1921 to 1929 are listed in **Table 9**.[g]

69. Acreages irrigated in the Duncan-Virden and Safford Valleys were relatively stable during this time, totaling about 8,100 acres and 32,500 acres, respectively. Surface water diverted from the Gila River to irrigate these lands was measured by the USGS at gaging stations established on most of the major irrigation canals and ditches in the area. Diversions at canals and ditches that were not gaged or regularly field measured by the USGS were estimated by summing monthly data from the gaged diversions and prorating the total based on irrigated acreage. Since diversions for irrigation in the Gila River headwaters and along its tributaries were also not gaged or frequently measured, these diversions were estimated using a similar prorating procedure based on reported irrigated acreage and diversions measured in the Duncan-Virden Valley.

70. Non-agricultural diversions were also identified upstream of the gages and included those for mining, other industrial purposes and domestic use. As noted in **Tables 3** through **6**, diversions for domestic use during this period were estimated based on population records from the U.S. Census (1932) and a typical per capita use rate. Diversions for mining in the Clifton-Morenci area were provided in annual reports by the Gila Water Commissioner and Halpenny and others (1952) provided estimates of water use for other industrial purposes in the Safford area.

D. Results and Qualifications

71. Reconstructed flows at the four USGS gaging stations are summarized in **Table 10**. My analysis showed that, in its ordinary and natural condition, flows in the Upper Gila River were typically highest in March and April, as a result of snow melt, and during the monsoon in August. During these months of higher runoff, median flows near Virden and Clifton would have remained below 350 cfs. Near Solomonville and at Coolidge Dam, median flows during these high runoff months

[g] Based on reported diversions and cropped acreages during this period, each cubic foot per second diverted from the Upper Gila River irrigated an average of about 75 acres in the Duncan-Virden Valley and about 125 acres in Safford Valley.

would have been greater and typically ranged from 600 to 700 cfs and from 750 to 900 cfs, respectively.

72. When reviewing these results, it is important to remember that no corrections were made for canal spills[h], return flows, infiltration or ET. It was assumed in the analysis that none of the water diverted upstream of a gage site for irrigation, mining or domestic use returned to the river via surface runoff or baseflow and was measured by the gage. It was also assumed that no canal spills or irrigation returns were diverted again and reused. Inevitably these assumptions caused some diversions to be double counted in my analysis. It was further assumed that all of the diverted water added back to the river reached the downstream gage (i.e. none was naturally lost along the channel due to infiltration and ET). These assumptions are unlikely and, as a result, my reconstructed flows should be considered an upper estimate. Actual Upper Gila River streamflows would be less in their natural and ordinary condition.

73. Available information indicates that an appreciable amount of the water diverted for irrigation along the Upper Gila River did, in fact, return to the river and was diverted again by downstream irrigators or was lost along the stream due to infiltration and ET. As noted by the first Gila Water Commissioner (1936, pp.13-14):

> "Diversions between canals are not always consistent with relative rights owing to the influx of water below some diversions…During the periods of low river flow in the upper valleys, a large portion of the water supply is made up of return flow which occurs at various points along the river…Owing to the presence of return flow available for some of the lower canals, the quantities diverted are sometimes in excess of the amounts that may be due them on a relative priority..."[i] [emphasis added]

74. A few early attempts were made to quantify irrigation return flows and canal spills in the Duncan and Safford Valleys. Seepage measurements made during March and April 1899 indicated that up to 36% of irrigation diversions in these valleys returned to the river (**Table 11**). Canal spills were also significant at this time. In the Safford Valley, from 15 to 73% of the water diverted into three canals was spilled when measured during 1899 and 1917 (**Table 12**). The quantity spilled by irrigators apparently varied by canal and the time of year. Detailed spill data were collected for the Brown Canal between 1921 and 1929. These data are summarized in **Table 13** and show that monthly spills typically ranged from less than 5% to over 40% and were highest in the winter and spring when streamflows were also higher.

75. Due to the above variability and lack of detailed data during the period of analysis, no attempt was made to correct the upstream diversions for spills, returns, infiltration and ET. Nonetheless, the existing information indicates that these corrections would be significant and would substantially lower the reconstructed flow rates.

[h] Spills occur when an irrigator diverts more than can (or should) be conveyed through the canal. The extra water is spilled into a wasteway or otherwise returns to the river.

[i] The Gila Water Commissioner administers the Globe Equity No. 59 Consent Decree which establishes the quantity of certain surface water rights to divert water from the Gila River for irrigation in the Duncan-Virden and Safford Valleys.

E. Comparison to Other Estimates

76. Two earlier studies were identified that reconstructed streamflows along the Upper Gila River. In 1952, BOR published a report on the water supply of the Lower Colorado River Basin. In that report, undepleted streamflows were calculated at numerous gaging stations within the basin for the period 1914 through 1945. Flow records were adjusted for depletions upstream of the gages including consumptive uses, channel losses, and ET.

77. In 1987, the USGS prepared a map of average annual runoff across the United States. In preparing this map, gaging station records were used and also adjusted for upstream diversions, in this case for the period 1951-1980. According to Krug and other (1987, p.4), if the station records "indicated an amount of upstream diversion, it was used to adjust the streamflow." Since irrigation diversions were commonly described in these records by the number of acres irrigated, upstream diversions were quantified by multiplying the irrigated area "by the amount of water typically used for irrigation in that area (minus an allowance for return flows)."

78. Each of these earlier studies estimated the *average* or *mean annual* undepleted flow at the four gaging stations that I evaluated. For comparison to these estimates and as an independent check on my results, I calculated the *median annual* undepleted flow at the gages based on summing my monthly reconstructions. Results from the comparison are summarized in **Table 14**.

79. As expected and explained in paragraph 66, my median annual reconstructed flows were lower than the average annual undepleted flow estimates at two of the gaging stations (near Virden and near Solomonville). However, because I did not correct the upstream diversions to avoid double counting, the differences were minor and at the other two gaging stations (near Clifton and below Coolidge Dam) my median annual reconstructed flows were actually greater than the average annual undepleted flow estimates. Had some correction to these diversions been made, my median values would likely have been less than the means in all cases and the difference between the mean and median estimates would have been larger. In either case, undepleted flows along the Upper Gila River are relatively small and, when evaluated in the next section in terms of their depth and velocity, would not have been suitable for commercial navigation.

VII. RIVER DEPTH AND VELOCITY RECONSTRUCTION

80. The median monthly streamflows reconstructed in Section VI are used in this section to reconstruct the depth and velocity of the Upper Gila River. The depth and velocity of the stream prior to development were determined using hydraulic rating curves developed at several points along the river. The rating curves are based on USGS field discharge measurements and are presented in **Attachment E**.

81. By combining the reconstructed streamflows with the hydraulic rating curves, it was found that undepleted flows along the Upper Gila River typically had a mean depth of less than 2.0 feet and average velocities greater than 1.5 feet per second. Flows were generally deeper and/or velocities were greater during the spring snowmelt and summer monsoon, but even at those times, flow depths at most points typically remained less than 2 feet. Such stream depths would not have supported commercial boat travel in light of prior court decisions (e.g. *United States v. Utah*, discussed below in paragraph 87) and certain navigability guidelines (see paragraph 89 below).

82. As a further test of the susceptibility of the Upper Gila River to commercial navigation, the reconstructed depths and velocities were analyzed using the engineering methodology of Langbein (1962). This method considers stream depth and velocity, among other factors, in assessing the feasibility of upstream boat travel. Results from that analysis show that flow conditions along the Upper Gila River prior to development would also not have supported upstream commercial navigation.

A. Depth

83. To reconstruct the depth of undepleted streamflows along the Upper Gila River, the median monthly flows reconstructed in Section VI were compared to hydraulic rating curves that relate stream discharge to mean depth.[j] The rating curves were developed based on hundreds of USGS field measurements taken over multiple years during the analysis period. **Attachment E** presents rating curves for each of the four USGS stations where streamflows were reconstructed. Also in this appendix are rating curves developed for four additional gaging stations on the Upper Gila River. The additional stations include a gage at York, located within Duncan Valley and upstream of the station near Clifton; a gage below Bonita Creek, located in the lower Gila Box and upstream of the station near Solomonville; and, gages near Ashurst and at Calva, both located in the central Safford Valley upstream of the gage at Coolidge Dam. **Figure 2** shows the location of all stations.

84. The additional gaging stations were used to evaluate predevelopment stream depths and velocities at intermediate points where flows were not reconstructed. Data were insufficient to reconstruct streamflows at these additional stations, so flows reconstructed at the nearest *downstream* station were used. Routing these reconstructed flows through the upstream station was justified since there were no major cultural diversions between the stations. However, it was recognized that during warmer months, evapotranspiration by riparian vegetation may decrease streamflows from an upper to a lower station. For this reason and based on local evapotranspiration studies performed by Gatewood and others (1950, pp.115, 117, 152-153 and 187), reconstructed flows were only routed upstream during the months of November through April when water use by riparian vegetation is minimal.

85. Results from reconstructing stream depths along the Upper Gila River are summarized in **Table 10**. Mean flow depths typically remained less than 2.0 feet at all stations and for all months evaluated. An exception was the gage below Bonita Creek within lower Gila Box. The rating curve for this gage showed a relatively wide range of stream depths for a given flow rate. This indicates that, although the river was not braided at this point, its channel cross section was rather variable. As a result, there were months when typical flow depths here would have ranged between 1.1 to 2.2 feet and between 1.5 to 2.5 feet.

86. Note that the reconstructed stream depths listed in **Table 10** represent conditions at discrete points along the river where (and when) the channel was not braided. However, as described in Section III, portions of the river have historically remained braided for years. In those areas, the channel would have been broader, sand bars more common, and reconstructed stream depths less. Also, no attempt was made to reconstruct the height of rapids that form locally within Gila Box. The size of these rapids is expected to vary with flow and their location likely changes following large

[j] Also referred to as hydraulic depth, mean depth is equivalent to the average depth of the stream across the channel cross-section.

flood events. As noted by Fuller (2003, p.5-45), such conditions "may, in some cases, preclude or at least hinder use by any boat, especially for travel in the upstream direction."

87. When compared to the findings of the Special Master in *United States v. Utah*, the mean stream depths reconstructed along the Upper Gila River indicate that this reach of the river would not be found navigable in its ordinary and natural condition prior to statehood. *United States v. Utah*, 283 U.S. 64, 51 S.Ct. 438 (1931). In the *Utah* case, the Special Master determined that the San Juan River was not navigable, a finding that the U.S. Supreme Court later adopted. Among the factors that the Special Master cited in his report was the relatively shallow depth of the river which he found had a mean depth of less than 2 feet during 167 days or over 5 months of the year (Warren, 1930, pp.154-181). By comparison, along the Upper Gila River, reconstructed stream depths were less than 2 feet for all months evaluated and at all gaging stations except the one below Bonita Creek, as explained above. Since stream depths were reconstructed based on median monthly flows, then during at least half of the days each year, average stream depths were less than 2.0 feet at the Gila River gage sites, a frequency of shallow flow conditions greater than observed for the San Juan River. This comparison weighs even more for the non-navigability of the Upper Gila River considering the conservative nature of my streamflow reconstructions (see paragraphs 72 through 75).

88. Also cited in the Special Master's report were results from a "low water" survey of the Green and Grand Rivers. The survey had been conducted by the War Department in November 1908 to determine the navigability of the two Utah rivers and whether their improvement by the Federal Government was advisable. The survey found that:

> "There are many 'cross-overs' in both rivers which have a depth of between 2½ and 3 feet during the low-water stage. This depth is sufficient for light draft boats suitable to these rivers, and 3 feet is, therefore taken as the governing low-water depth to be considered in improvement. The maintenance of a greater depth is not warranted by the probable commerce." (Warren, 1930, pp.101-102)

The War Department determined that both rivers were navigable, a conclusion that the Special Master indicated, while not binding on the United States:

> "has a certain amount of relevancy. I find that (the) conclusions as to depths, velocities, etc. are amply confirmed by the evidence in this suit as to actual boat trips on these Rivers made by witnesses." (Warren, 1930, p.130)

The Special Master, who ultimately also found both rivers to be navigable, determined that the mean depths of the Green and Grand Rivers only fell below 3 feet during 53 days and 16 days of the year, respectively. These flows were considerably deeper than those of the Upper Gila River in its ordinary and natural condition.

89. It is also helpful when reviewing the reconstructed stream depths for the Upper Gila River to consider thresholds established by the State of Washington for assessing the navigability potential of rivers. According to Magirl and Olsen (2009, p.2), Washington considers streams with an mean depth of less than 2 feet "probably not" navigable while streams with mean depths between 2 and 3.5 feet "may be

(navigable) depending on (the) balance of factors." Streams with mean depths greater than 3.5 feet are considered "probably" navigable. The Upper Gila River is also non-navigable in its ordinary and natural condition using these criteria.

B. Velocity

90. A similar procedure to that described above for stream depths was used to reconstruct the velocity of undepleted flows along the Upper Gila River. In this case, rating curves were developed based on the USGS field measurements that relate discharge to average stream velocity. The rating curves are included in **Attachment E** and results from these analyses are also summarized in **Table 10**.[k]

91. At all gaging stations and for all of the months evaluated, the average velocity of the reconstructed streamflows typically exceeded 1.5 feet per second. Velocities were generally lower at the York and Clifton gages and higher at the other gages where velocities typically exceeded 2.0 feet per second for most months. As described below, these velocity data were used together with reconstructed stream depths to assess the feasibility of upstream boat travel along the Upper Gila River.

C. Feasibility of Upstream Boat Travel

92. This section concludes with an analysis of the feasibility of upstream boat travel along the Upper Gila River based on the reconstructed flow depths and velocities described above. Langbein (1962, p.W-23) determined that the ratio of the force exerted by a vessel in motion to its weight ("specific tractive force") was related to whether upstream navigation was practical for commercial vessels on a river. He found that rivers requiring a specific tractive force greater 0.002 were not being used for navigation and for those requiring that this force range from 0.001 to 0.002, navigation were "usually limited to ferry or short-run operations."

93. On page W-21 of his report, Langbein provides a figure which can be used to determine specific tractive force based on stream depth and velocity. Using this figure and the median reconstructed depths and velocities summarized in **Table 10**, I found that upstream navigation along the Upper Gila River would require specific tractive forces at and above 0.002. Based on Langbein's criteria, the river would not be useful for upstream navigation and, at best, would be limited to "ferry or short-run operations."

94. Langbein calculated the specific tractive force for several rivers in the United States, including the San Juan River in Utah. He calculated that boats on the San Juan would require a specific tractive force greater than 0.01 and, therefore, the river would not be navigable using his criteria. This result is consistent with the findings of Special Master Warren.

95. As a final comparison, I calculated the specific tractive force needed for boats on the Colorado River using field measurements taken by the Wheeler Survey in 1875 and 1876 (Mueller and Marsh, 2002, p.10). At Fort Yuma, the specific tractive force was found to be less than 0.001 at this time and at Fort Mohave it was between

[k] **Attachment E** also includes a rating curve for each gaging station that shows how the width of the Upper Gila River varied with its discharge based on USGS field measurements.

0.001 and 0.002.[1] Using Langbein's criteria, upstream commercial boat travel would have been feasible at Fort Yuma and marginal at Fort Mohave. As described above in paragraph 55, these results are consistent with the 1865 memorial of the Arizona legislature which requested federal funds to improve the channel of the Colorado River between Fort Yuma and Fort Mohave for boat travel. The results are also consistent with documented steamboat boat travel along the lower Colorado River during the mid to late 1800s which, under normal (low water) conditions, would reach Hardyville located just upstream of Fort Mohave (Arizona Historical Society, 2014).

VIII. BOATING

96. This section describes prehistoric, historic and recent efforts to boat the Upper Gila River. No evidence of prehistoric boating by native Americans was found. Four historic accounts of boating the Upper Gila River were identified including three accounts of one- and two-man parties floating down the river prior to 1900. The fourth historic account involved using a ferry to cross the river during a period of high flows. Regarding recent efforts to boat the river, evidence has been presented to ANSAC on the recreational use of the river by kayakers, canoeists and rafters, primarily within Gila Box.

97. As indicated by the U.S. Supreme Court in *PPL Montana*, extensive and continued historical use of a river for commercial purposes is the most persuasive evidence of navigability. As to evidence of present-day boat use, the Court noted that it:

> "may be considered to the extent it informs the historical determination whether the river segment was susceptible of use for commercial navigation at the time of statehood. For the susceptibility analysis, it must be determined whether trade and travel could have been conducted 'in the customary modes of trade and travel on water' over the relevant river segment 'in [its] natural and ordinary condition'…At a minimum, therefore, the party seeking to use present-day evidence for title purposes must show…the watercraft are meaningfully similar to those in customary use for trade and travel at the time of statehood…If modern watercraft permit navigability where the historical watercraft would not…then the evidence of present-day use has little or no bearing on navigability at statehood…Modern recreational fishing boats, including inflatable rafts and lightweight canoes or kayaks may be able to navigate waters much more shallow or with rockier beds than the boats customarily used for trade and travel at statehood." *PPL Montana v. Montana*, 132 S.Ct. 1215, 1233-34 (2012)

98. The fact that the Upper Gila River was not used for commercial navigation before substantial diversions occurred (see Section V) suggests that the few historic attempts to float the river were a novelty by adventurers and not a reflection of the practical utility of the river for trade and travel. Results from my undepleted flow analysis (see Sections VI and VII) further support the conclusion that the river in its ordinary and natural condition was not suitable for commercial boat travel. The recent

[1] On March 20, 1876, the Colorado River at Fort Yuma had a mean depth of 5.85 feet, an average velocity of 2.8 feet per second, and a discharge of 7,659 cubic feet per second. On September 2, 1875, the river at Camp Mohave had a mean depth of 4.1 feet, an average velocity of 2.5 feet per second, and a discharge of 11,611 cubic feet per second.

and current use of portions of the Upper Gila River by recreational boaters does not, in my opinion, change this conclusion since the modern, low draft boats now in use are not "meaningfully similar to those in customary use for trade and travel at the time of statehood." (*PPL Montana*, 132 S. Ct. at 1233).

A. Prehistoric

99. According to Fuller (2003, p.2-23) "Archeological research has not documented any use of the (Upper Gila) river for commercial trade and travel nor any regular flotation of logs."

B. Historic

100. **Table 15** summarizes four historic accounts of boating along the Upper Gila River. Included in the table is the month and year of the account, the type of boat used and its length, if known, the boat's cargo and number of passengers, and the purpose and direction of the trip.

101. The earliest account of boating the Upper Gila River involved troops from Fort Goodwin using a raft to cross the river near their post. The crossing occurred in March 1869, a month when flows on the river are typically high due to snowmelt (see **Table 10**). In addition and as reported to The Weekly Arizona Miner (1869), heavy rains had occurred before the crossing and there had been a "good deal of rain (that) month…the Gila (was) pretty high."

102. The three other historic accounts of boating the Upper Gila River occurred during the winter or early spring of 1886, 1891 and 1895. The purposes of these trips were prospecting, hunting/trapping and recreation, respectively. Each boating party consisted of a one- or two-man crew and the only known cargo was their supplies. One boat was referred to as a "dugout" and a second as "flat-bottomed," 18 feet long by 3.5 feet wide. Both are considered small, low-draft boats. The type and length of the third boat is unknown. All three trips began at or above Clifton and proceeded downstream with each boat reportedly capsizing, at least two in the canyons below Coolidge Dam.

103. Taken together, these historic accounts do not demonstrate that the Upper Gila River was reliably used or could have been used for trade or travel prior to statehood. When the troops from Fort Goodwin used a raft to cross the stream, the river was running high due to snowmelt and recent rains and not in its ordinary and natural condition. Considering that only three other historic accounts of boating this portion of the river were identified, all of which were downstream floats, there is no evidence of extensive or continued use of the river at that time for commercial purposes.

C. Recent

104. Recent accounts of boating the Upper Gila River were summarized by Fuller (2003, pp.6-4 through 6-6). The purpose of these trips was (and continues to be) recreational. Most trips occur in the winter and spring and utilize canoes, kayaks and inflatable rafts. Inner tubes are also used, particularly during low flows in the summer. Boaters often put in at the east entrance to the Gila Box National Riparian Conservation Area (NRCA) and take out at its west entrance. Depending on flow conditions, the reach extending from the Gila River headwaters in New Mexico

through the Duncan Valley can also be floated. Anderson and Hopkinson (1982) do not recommend recreational boating below Gila Box in Safford Valley due to numerous obstructions in the form of barbed wire fences.

105. According to Southwest Paddlers (2009), there are no outfitters or shuttle services located on or near this section of the Gila River so they recommend that boaters "bring everything you need and be prepared to run your own shuttles." Commercial rafting trips have been reported in the past, but these were limited to the Gila Box reach and occurred during optimum flow conditions in the late spring (Fuller, 2003, pp.6-4 and 6-6).

106. Guidelines on floating the river through Gila Box were published by the website Great Outdoor Recreation Pages and reproduced in Fuller (2003, pp. A-1 and A-2). The guidelines recommend that canoes and inflatable kayaks be used when flows in the river range from 150 to 500 cfs. At these flows, the river reportedly narrows considerably with "nice chutes with some white water" but "floaters may have to pull their boats through short shallow stretches." When flows increase to 500 to 1,500 cfs, Gila Box can be run with 14 foot or smaller river rafts, inflatable and hard shell kayaks, and by experienced canoeists. These higher flows are reportedly suitable for canoeists and novice inflatable kayakers but larger river rafts "will have to maneuver frequently to find deep water to float."

107. The above guidelines are consistent with those provided by Southwest Paddlers (2009). For the reach from Virden, New Mexico to Solomonville, Southwest Paddler states "At lower to moderate levels (the Gila River) is great in canoes, kayaks and inflatable kayaks, while at moderate to high levels it is best suited for experienced kayakers and rafters. Rafts need a flow of at least 500 cfs for a decent trip with minimal dragging."

108. It is clear from these guidelines and the evidence presented to ANSAC that single or double-person canoes and kayaks can currently float this portion of the Upper Gila River during some months of the year. Using existing USGS gage data, Fuller (2003, p.5-43) calculated that flows near the upstream end of Gila Box average about 206 cfs with a median flow of 80 cfs. Near the downstream end of Gila Box, these flows average 433 cfs with a median flow of 174 cfs. Such average and median flows would not, however be conducive to commercial boating, which explains why those trips are often limited to optimal flow conditions that occur some years during snowmelt in the late spring.

109. In November 2005, Jon Colby of Cimarron Adventures and River Company (Cimarron) testified before ANSAC that he had guided river trips through Gila Box. I contacted Mr. Colby, who still manages Cimarron, in February 2014 and he stated that he no longer offers trips along the Upper Gila River, indicating that they were not frequent enough to be commercially viable. He was unaware of anyone who currently leads boating trips through Gila Box.

110. Gila Outdoor, a local outfitter in Thatcher, previously rented canoes and provided a shuttle service for Gila Box boaters. When I contacted the outfitter in February 2014, they indicated that they no longer provide this service nor apparently does anyone else in the area. This was confirmed through my discussions with the local office of the Bureau of Land Management who manages the Gila Box RNCA.

111. ANSAC has been presented with evidence that shows portions of the Upper Gila River being used by recreational boaters for non-commercial purposes. What has not been presented is evidence of sustained use of the river by commercial boating operations. As a result, these recent boating accounts do not support the contention of the navigability proponents that the Upper Gila River was susceptible to use for commercial navigation at statehood

IX. CONCLUSIONS

112. It is my opinion that, in its ordinary and natural condition, the Upper Gila River was neither navigable nor susceptible to navigation at and prior to statehood.

113. It is also my opinion that if the Upper Gila River is divided into segments, which I recommend, none of the segments would have been navigable in their ordinary and natural condition.

114. I base these opinions on my review of existing and supplemental evidence presented in this declaration including, but not limited to: (a) channel geomorphology; (b) observed predevelopment streamflow conditions; (c) early transportation needs in the area; (d) reconstruction of the ordinary flow, depth and velocity of the river prior to development; and (e) past and recent efforts at boating.

I declare under penalty of perjury that, to the best of my knowledge, the foregoing is true and correct.

Executed on this 16th *day of May, 2014.*

RICHARD T. BURTELL

REFERENCES

Anderson, F. and Hopkinson, A., 1982. *Rivers of the Southwest: A Boaters Guide to the Rivers of Colorado, New Mexico, Utah, and Arizona.* Pruett Publishing, Boulder, Colorado.

Arizona Department of Water Resources, 1999. *Technical Assessment of the San Carlos Apache Tribe Water Rights Settlement*. Phoenix.

Arizona Historical Society, 2014. *Colorado River Ports*. Display at the Arizona History Museum, Tucson.

Brandes, R., 1960. *Frontier Military Posts of Arizona*. Dale Stuart King, Globe, Arizona.

Burkham, D.E., 1972. *Channel Changes of the Gila River in Safford Valley, Arizona, 1846-1970.* U.S. Geologic Survey Professional Paper 655-G.

Carmichael, N. and Kiddle, J., 1924. *Development of Mine Transportation in Clifton-Morenci District.* Transactions of the American Institute of Mining and Metallurgical Engineers.

Chamberlain. W.H., 1945. *From Lewisburg to California in 1849, Notes from the Diary of William H. Chamberlain.* Edited by L.B. Bloom, New Mexico Historical Review, v.20, nos. 2 and 3.

Colquhoun, J., 1924. *The Early History of the Clifton-Morenci District*. John Murray, London.

Davis, G.P., 1982. *Man and Wildlife in Arizona: The American Exploration Period, 1824-1865.* Arizona Game and Fish Department, Phoenix.

Dunning, C.H, 1959. *Rock to Riches*. Southwest Publishing Company, Inc.

Emory, W.H., 1848. *Notes of a Military Reconnaissance, from Fort Leavenworth, in Missouri, to San Diego, in California, Including Part of the Arkansas, Del Norte, and Gila Rivers.* U.S. 30th Congress, First Session, Executive Document No. 41.

JE Fuller/ Hydrology & Geomorphology, Inc. (Fuller), 2003. *Arizona Stream Navigability Study for the Upper Gila River, Safford to the State Boundary and San Francisco River, Gila River Confluence to the State Boundary*. Original prepared by SFC Engineering Company in June 1997; revised by Fuller in June 2003.

Gatewood, J.S., Robinson, T.W., Colby, B.R., Hem, J.D., and Halpenny, L.C., 1950. *Use of Water by Bottom-Land Vegetation in Lower Safford Valley, Arizona.* U.S. Geological Survey Water-Supply Paper 1103.

Gila Water Commissioner, 2012. *Distribution of Waters of the Gila River, 2011.*

_____, 1945. *Distribution of Waters of the Gila River, 1944.*

_____, 1944. *Distribution of Waters of the Gila River, 1943.*

_____, 1943. *Distribution of Waters of the Gila River, 1942.*

_____, 1937. *Distribution of Waters of the Gila River, 1936.*

Green, R.B., 1955. *On the Arkansas Route to California in 1849, the Journal of Robert B. Green of Lewisburg, Pennsylvania.* Edited by J.O. Oliphant, Bucknell University Press.

Griffin, J.S., 1943. *A Doctor Comes to California, the Diary of John S. Griffin, Assistant Surgeon with Kearny's Dragoons, 1846-1847.* Notes by G.W. Ames, California Historical Society, San Francisco.

Halpenny, L.C., Babcock, H.M., Morrison, R.B. and Hem, J.D., 1946. *Ground-water Resources of the Duncan Basin, Arizona.* Prepared by the U.S. Geological Survey in cooperation with Arizona State Land Department.

Halpenny, L.C. and others, 1952. *Ground Waters in the Gila River Basin and Adjacent Areas, Arizona – A Summary.* Prepared by the U.S. Geological Survey in cooperation with the Underground Water Commission of Arizona.

Huckleberry, G., 1993. *Historical Geomorphology of the Gila River*. Report submitted to CH2MHill as part of the Arizona River Navigability Project.

Johnston, A.R., 1848. *Journal of Captain A.R. Johnston, First Dragoons.* In Emory's *Notes* (see above).

Jones, R., 1869. Letter to General Fry regarding inspection of Camp Goodwin. Dated May 2, 1869.

Krug, W.R., Gebert, W.A., and Graczyk, 1989. *Preparation of Average Annual Runoff Map of the United States, 1951-1980.* U.S. Geological Survey Open-File Report 87-535.

Langbein, W.B., 1962. *Hydraulics of River Channels as Related to Navigability.* U.S. Geological Survey Water-Supply Paper 1539-W.

Littlefield, D.R., 2013. *Assessment of the Navigability of the Gila River Between the Mouth of the Salt River and the Confluence with the Colorado River Prior to and on the Data of Arizona's Statehood, February 14, 2012.* Revised and updated report.

Magirl, C.S. and Olsen, T.D., 2009. *Navigability Potential of Washington Rivers and Streams Determined with Hydraulic Geometry and a Geographic Information System.* U.S. Geological Survey Scientific Investigation Report 2009-5122.

Meko, D.M. and Hirschboeck, K.K, 2008. *The Current Drought in Context: A Tree Ring Based Evaluation of Water Supply Variability for the Salt-Verde River Basin*. Prepared by the Laboratory of Tree-Ring Research, University of Arizona, for Sal River Project.

Miller, D.A., 1989. *Soldiers and Settlers, Military Supply in the Southwest, 1861-1865.* University of New Mexico Press.

Mueller, G.A. and Marsh, P.C, 2002. *Lost, A Desert River and Its Native Fishes: A Historical Perspective of the Lower Colorado River*. U.S. Geological Survey Information and Technology Report 2002-0010.

Mussetter, R.A., 2014. *Declaration, Navigability of the Gila River between the Arizona-New Mexico Stateline and the Confluence with the Colorado River*. Prepared by TetraTech on behalf of Salt River Project.

Pattie, J.O., 1905. *The Personal Narrative of James O. Pattie of Kentucky*. Edited by R.G. Thwaites, Arthur H. Clark Company.

Patton, J.M., 1945. *The History of Clifton*. Masters Thesis, University of Arizona, Tucson.

Secretary of War, 1869. *Report of the Secretary of War, Being Part of the Message and Documents Communicated to the Two Houses of Congress at the Beginning of the Second Session of the 49th Congress*. Volume I, Government Printing Office, Washington.

_____, 1867. *Report of the Secretary of War, Part I.* In Message of the President of the United States and Accompanying Documents, to the Two Houses of Congress at the Commencement of the Second Session of the 40th Congress. Government Printing Office, Washington.

Southwest Paddlers, 2009. *Gila River, Virden (NM) to Solomon, ~65 miles*. Report by Marc W. McCord, downloaded in January 2014 at http://southwestpaddler.com/docs/gila2.html.

Southworth, C.H., 1919. *Report on the San Carlos Irrigation Project and the History of Irrigation Along the Gila River.* Appendix A, Hearing before the Commissioner on Indian Affairs on the Condition of Various Tribes of Indians, House of Representatives, 66th Congress.

Territory of Arizona, 1866. *Acts, Resolutions and Memorials, Adopted by the Second Legislative Assembly of the Territory of the Arizona.* Office of The Arizona Miner, Prescott.

The Arizona Citizen, 1877a. *The Clifton Copper Mines* (letter to the editor from Henry Leszinsky). Florence, December 28, 1877.

_____, 1877b. *Clifton*. Florence, July 21, 1877.

The Arizona Sentinel, 1895. *Four Hundred Miles, Down the Gila River – Incidents of the Trip.* Yuma, March 9, 1895.

The Arizona Silver Belt, 1886. *Territorial Topics.* April 3, 1886.

The Weekly Arizona Miner, 1869. *Letter from Camp Goodwin*. Prescott, April 10, 1869.

Tombstone Prospector. 1891. *Down the Gila, Adventurous Trip of Two Men in a Boat* (story from Yuma Times). Tombstone, April 19, 1891.

Turner, H.S., 1966. *The Original Journals of Henry Smith Turner, with Stephen Watts Kearny to New Mexico and California, 1846-1847.* Edited by D.L. Clarke, University of Oklahoma Press.

Turner, S.F. and others, 1946. *Ground-water Resources and Problems of the Safford Basin, Arizona*. Prepared by the U.S. Geological Survey in cooperation with Arizona State Land Department.

U.S. Army Corps of Engineers, 1962. Clifton topographic map, 1:250,000 scale. Army Map Service.

_____, 1954. Mesa and Silver City topographic maps, 1:250,000 scale. Army Map Service.

U.S. Bureau of Reclamation (BOR), 2004. *Upper Gila River Fluvial Geomorphology Study, Final Report, Arizona*. Technical Service Center, Denver, Colorado.

_____, 1952. *Report on Water Supply of the Lower Colorado River Basin.* Project Planning Report, Region 3.

U.S. Census, 1932. *Fifteenth Census of the United States: 1930, Population.* Volume III, Parts I and II.

U.S Geological Survey (USGS), 2014a. Early photographs at streamflow gaging stations in Arizona. Water Science Center, Tucson.

_____, 2014b. Early field measurement records for streamflow gaging stations in Arizona. Water Science Center, Tucson...

_____, 2013. National Water Information System – Surface Water. Accessed in fall 2013 at http://waterdata.usgs.gov/nwis/sw.

_____, 1947. *Surface Water Supply of the United States, 1945, Part 9, Colorado River Basin.* Water-Supply Paper 1039.

_____, 1921. *Surface Water Supply of the United States, 1917, Part IX. Colorado River Basin.* Water-Supply Paper 459.

_____, 1901. *Twenty-first Annual Report of the United Stated Geological Service to the Secretary of the Interior, 1899-1900, Part IV, Hydrography.* Government Printing Office, Washington.

Warren, C. 1930. *Report of the Special Master, the United States of America, Complainant, v. The State of Utah.* Supreme Court of the United States, October Term, 1930, No.14, Original.

Weech, H., 1931. *Our Pioneer Parents, Autobiography of Hyrum Weech.*

Weekly Miner, 1872. *Letter from Gov. Safford*. Prescott, August 31, 1872.

TABLES

TABLE 1 - PRE-1880 ACCOUNTS OF UPPER GILA RIVER STREAMFLOW CONDITIONS[a]

DATE	DESCRIPTION	SOURCE	REFERENCE	COMMENTS
HEADWATERS THROUGH DUNCAN-VIRDEN VALLEY (Segment A and upstream)				
December 1824	*"On the morning of the 13th we started early, and crossed the river, here a beautiful clear stream about thirty yards in width, running over a rocky bottom…made but little advance this day, as bluffs came in so close to the river, as to compel us to cross it thirty-six times"*	Pattie	(1905, p.87)	Numerous river crossings indicate a relatively shallow stream
October 1846	*"Its section, where we struck it…was 50 feet wide and an average of two feet deep…we crossed the river, its large round pebbles and swift current causing the mules to tread wearily."*	Emory	(1848, p.61)	Relatively shallow river depth noted in fall.
	"The howitzers arrived, and we marched at 10, crossing the Gila several times, as we move down it for four miles; we then crossed it, and made a circuit of 14 miles to the south side, to get around a canyon through which the river flows…"	Johnston	(1848, p.581)	Numerous river crossings with wagons indicate a relatively shallow stream
July 1849	*"At this point* (the Gila River) *is about 12 yards wide and 18 inches deep…It is a swift flowing stream…"*	Chamberlain	(1945, p.160)	Relatively shallow river depth noted in summer.
	"We crossed the river three times to-day…We are encamped at the point (above Gila Box)*."*		(1945, p.162)	Numerous river crossings indicate a relatively shallow stream.
GILA BOX (Segment B)				
January 1825	*The stream, we discovered, carried as much water as the Helay, heading north. We called it the River St. Francisco.*	Pattie	(1905, p.90)	Discharge of the Gila and San Francisco Rivers appeared similar.
October 1846	*"The Gila at this place is much swollen by the affluence of the three streams just mentioned* (San Francisco River and Eagle and Bonita Creeks) *and its cross section here is about 70 feet by 4."*	Emory	(1848, p.67)	According to Griffin (1943, p.26), on the day Emory's of account (October 27th), there had been "some rain last night, and it is now raining. A few days wet weather will use up the remainder of our animals..." This likely also explains the increased river depth Emory observed.
July 1849	*"As it is wet we leave camp about 1/2 past 9 to start on his Satanic Majesties turnpike. We start upon it by crossing the river and commence ascending from it…"*	Green	(1955, p.60)	River crossing indicates a relatively shallow stream.
	"…we finally groped our way to the river, whither it led us, crossed over and encamped…From the amount of drift and other indications, the Gila rises to a great height during the wet season."	Chamberlain	(1945, p.163)	Wet and dry season flows are differentiated.
	"After a long but pretty gradual descent we again reached the water of the Gila and traveled down the stream crossing it nine times, when we emerged upon a flow, which widened out, and is covered with mezquite and other bushes…"		(1945, p.163)	Numerous river crossings indicate a relatively shallow stream
	"The distressed New York company has just passed our camp instead of going off to the mountains above they kept the river all the way saved 10 miles of distance & recrossed the river 54 times."	Green	(1955, p.60)	
late July - early August 1872	*"Our Indian guide advised returning by following down the Francisco and Gila to old Camp Goodwin. It has always been the impression that the Gila Canon from the mouth of the Francisco down, was impassable, but as the Indian seemed confident it could be done, and to retrace our steps was to insure two or three days of hunger, we determined to take the chances; and, true to his word, he did take us through. We were compelled to cross the river many times and, as the water was high, had considerable swimming to do, but at an ordinary stage of the water, there is not the least difficulty in passing with a cavalry company through this canon."*	Safford	Weekly Miner (1872)	Former Governor of Arizona Territory; indicates river is typically shallow but becomes deeper during the monsoon when he travelled down it.
SAFFORD VALLEY (Segment C)				
October 1846	*"…the Rio Gila, which in consequence of the accession it has received from the tributaries mentioned in our last day's travel has become a much more rapid and deep stream…"*	Turner	(1966, p.94)	Recent rains and inflows from the San Francisco and Eagle and Bonita Creeks both explain the deeper stream observed at this point.
	"The Gila is getting to be much larger - still not deep fording."	Johnston	(1848, p.586)	
	"The River at this point is some 60 yds broad and very rapid and quite deep it is cloudy, and has been raining in the mountains to our left all day."	Griffin	(1943, p.27)	
1867	*"*(The Gila River was) *sandy under smooth stretches of water while slight rapids occur at intervals of one or two miles - no rocks in place are found in the river, the channel of water being 50 feet broad with an average depth of 2 feet."*	Chapin	Burkham (1972, p.G5)	Chapin was commander of Camp Goodwin and made his observations near present day Geronimo; relatively shallow river depth noted.
February 1879	*"The trail led to the river opposite Fort Thomas. The river was swollen by the melting snow and to cross it we had to swim our horses. The Gila then was a stream with well defined banks and sloping graveled bottom. It was about four to six rods wide. The stream was running very swiftly, which made swimming very difficult, but we cross in safety...We camped for the night, a few miles above San Jose and next day, crossed over to the river...When we came to the river, we found it running very high. We tried in two places to cross it, but it swept the horse down and they could not swim across it. So we went up the stream to a ford, where the wagons crossed. Here it is fordable and were crossed over and went on up the river."*	Weech	(1931, pp.14-15)	Increased flows in February caused by snow melt; Weech returns a month later with wagons and livestock and crosses the Gila River again with apparently no difficulty.
March 1879	*"We traveled twelve miles, all down hill, crossed the river and traveled up for several miles and camped. We laid over the next day, so that the sore-footed oxen, cows and young stock might rest."*		(1931, p.16)	
BELOW SAFFORD DAM TO SAN PEDRO RIVER (downstream of Segment C)				
November 1846	*"Followed down the Gila through the canon for four miles, cross the river repeatedly; the high water mark was frequently above our heads on the rocks…crossed the Gila three miles from* (our) *camp* (on the San Pedro River)*…we kept down the right bank of the Gila until we entered the fifth canon, where we crossed it frequently...about six miles below the San Pedro...the* (Gila) *river is slightly larger here than where we first saw it, although we were told otherwise; it has about 18 inches water on the shoals here, and canoes might pass down it very readily, and good sized boats, if it was not for the round rocks in its bed."*	Johnston	(1848, pp.592-593)	First mention by Johnston of potential to boat the Gila River; relatively shallow depth and numerous wagon crossings noted.

Notes:

[a] Most of the historic accounts in this table represent a period when cultural impacts on Upper Gila River streamflows were minimal. As indicated in **Table 2**, from the 1820's through 1872, less than a few hundred acres were being irrigated at any one time. Since then irrigation by American settlers increased rapidly and, when Weech visited and settled in the Safford Valley during 1879, irrigated acreage along the Upper Gila River and its tributaries approached 5,000 acres.

TABLE 2 - HISTORIC IRRIGATED ACREAGE ALONG THE UPPER GILA RIVER AND ITS TRIBUTARIES

STREAM	REPORTED IRRIGATED ACREAGE											Reference in Southworth (1919)
	1872	1873	1875	1876	1880	1883	1885	1890	1895	1900	1905	
Gila River Headwaters (above Virden)[a]	0	0	0	0	0	149	1,386	2,221	3,489	3,489	3,596	p.211
Duncan-Virden Valley	0	0	504[d]	8	250	NA	687	1,469	2,551	3,662	4,654	p.38
San Francisco River[a,b]	60	65	65	65	456	456	1,008	1,127	1,468	1,706	1,706	pp.205, 208
Eagle Creek[a]	0	0	0	0	0	0	0	117	117	217	264	p.201
Safford Valley	32[d]	80[d]	1,180	NA	4,895	NA	11,221	16,110	18,373	21,146	23,408	p.43
San Carlos Apache Reservation (along the Gila River)[c]	Not reported[e]	100	200	340	70	560	560	1,450	1,250	2,000	835	p.177
San Carlos River[c]		0	30	50	30	240	240	400	450	500	450	

NA = not available.

Notes:

[a] Based on the year that canals along the stream were first constructed; associated acreage was determined by Southworth in 1914. If no irrigation was reported in a given year, the cultivated acreage previously reported was used.

[b] Includes the Blue River.

[c] 1885, 1890 and 1905 acreages were unavailable so values from 1884, 1889 and 1904 were substituted, respectively.

[d] Based on the priority date of decreed acreage in this area, as determined by the Gila Water Commissioner (2012, Plate 30).

[e] Probably less than 100 acres; Americans traveling along the Upper Gila River prior to 1872 noted numerous Indian ruins, but no active irrigation.

TABLE 3. RECONSTRUCTED NATURAL AND ORDINARY STREAMFLOWS IN THE GILA RIVER NEAR VIRDEN, NEW MEXICO (1927-1934)[a]

FLOW COMPONENT	MEDIAN MONTHLY FLOW (in cubic feet per second)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Reconstructed flows not corrected for canal spills, irrigation returns, infiltration and riparian evapotranspiration [b]												
USGS Gage 09432000[c]	94	108	239	184	116	32	74	191	112	93	99	99
Irrigation diversions upstream of gage[d]	59.7	67.3	75.7	97.8	92.7	48.0	58.1	51.8	51.8	56.6	60.4	55.9
Reconstructed Total: [e]	***153.7***	***175.3***	***314.7***	***281.3***	***208.7***	***80.0***	***132.1***	***242.3***	***163.3***	***149.6***	***159.4***	***154.9***

Notes:

[a] Natural streamflows were reconstructed at USGS Gage 09432000 by adding upstream diversions to gaged flows over a common period of record. Median flows were calculated as a measure of ordinary streamflow conditions.

[b] Assumes that none of the water diverted for irrigation returned to the river via surface runoff or baseflow and was measured at the gage. Also assumes that none of the water added back to the river would have been lost naturally to evapotranspiration or infiltration before reaching the gage site. Both assumptions are unlikely and result in an overestimation of the reconstructed flows.

[c] 1927-1934 daily streamflow data were compiled by USGS (2013); see **Figure 2** for a map of the gage site.

[d] **Table 7** lists the data sources used to estimate these upstream irrigation diversions.

[e] Domestic water use upstream of the Virden gage was considered insignificant and likely totaled less than 1 cfs (724 acre-feet per year) during the period. Census data indicate that the local population was approximately 1,000 in 1930 (U.S. Census, 1932). Assuming a rate of 100 gallons per capita per day and no returns to the river, this water consumption would have totaled about 110 AFA (0.15 cfs).

TABLE 4 - RECONSTRUCTED NATURAL AND ORDINARY STREAMFLOWS IN THE GILA RIVER NEAR CLIFTON, ARIZONA (1928-1933)[a]

FLOW COMPONENT	MEDIAN MONTHLY FLOW (in cubic feet per second)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Reconstructed flows not corrected for canal spills, irrigation returns, infiltration and riparian evapotranspiration [b]												
USGS Gage 09442000[c]	102	117	230	163	69	24	57	195	79	88	105	107
Irrigation diversions upstream of Virden gage[d]	59.7	67.3	75.7	97.8	92.7	48.0	58.1	51.8	51.8	56.6	60.4	55.9
Irrigation diversions in the Duncan-Virden Valley[e]	107.2	120.9	136.0	175.7	166.6	86.3	104.3	93.0	93.0	101.7	108.4	100.4
Reconstructed Total: [f]	***268.9***	***305.2***	***441.8***	***436.5***	***328.3***	***158.3***	***219.4***	***339.8***	***223.2***	***246.4***	***273.8***	***263.4***

Notes:

[a] Natural streamflows were reconstructed at USGS Gage 09442000 by adding upstream diversions to gaged flows over a common period of record. Median flows were calculated as a measure of ordinary streamflow conditions.

[b] Assumes that none of the water diverted for irrigation returned to the river via surface runoff or baseflow and was measured at the gage. Also assumes that none of the water added back to the river would have been lost naturally to evapotranspiration or infiltration before reaching the gage site. Both assumptions are unlikely and result in an overestimation of the reconstructed flows.

[c] 1928-1933 daily streamflow data were compiled by USGS (2013); see **Figure 2** for a map of the gage site.

[d] **Table 7** lists the data sources used to estimate these upstream irrigation diversions.

[e] **Table 8** lists diversion data for ditches and canals in the Duncan-Virden Valley during the period.

[f] Domestic water use upstream of the Clifton gage was considered insignificant and likely totaled less than 1 cfs (724 acre-feet per year) during the period. Census data indicate that the local population was approximately 2,700 in 1930 (U.S. Census, 1932). Assuming a rate of 100 gallons per capita per day and no returns to the river, this water consumption would have totaled about 297 AFA (0.41 cfs).

TABLE 5 - RECONSTRUCTED NATURAL AND ORDINARY STREAMFLOWS IN THE GILA RIVER NEAR SOLOMONVILLE, ARIZONA (1921-1933)[a]

FLOW COMPONENT	MEDIAN MONTHLY FLOW (in cubic feet per second)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Reconstructed flows not corrected for canal spills, irrigation and mining returns, infiltration and riparian evapotranspiration [b]												
USGS Gage 09448500[c]	209	194	348	329	165	78	192	440	235	163	192	213
Irrigation diversions upstream of Virden gage[d]	59.7	67.3	75.7	97.8	92.7	48.0	58.1	51.8	51.8	56.6	60.4	55.9
Irrigation diversions in the Duncan-Virden Valley[e]	107.2	120.9	136.0	175.7	166.6	86.3	104.3	93.0	93.0	101.7	108.4	100.4
Irrigation diversions along the San Francisco River[d]	39.9	45.0	50.6	65.4	62.0	32.1	38.8	34.6	34.6	37.9	40.3	37.4
Irrigation diversions along Eagle Creek[d]	7.0	7.9	8.9	11.5	10.9	5.7	6.9	6.1	6.1	6.7	7.1	6.6
Mining diversions along the San Francisco River and Eagle Creek[f]	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
Reconstructed Total: [g]	***436.7***	***449.0***	***633.2***	***692.7***	***511.0***	***263.9***	***413.9***	***639.3***	***433.7***	***379.7***	***422.0***	***427.2***

Notes:

[a] Natural streamflows were reconstructed at USGS Gage 09448500 by adding upstream diversions to gaged flows over a common period of record. Median flows were calculated as a measure of ordinary streamflow conditions.

[b] Assumes that none of the water diverted for irrigation or mining returned to the river via surface runoff or baseflow and was measured at the gage. Also assumes that none of the water added back to the river would have been lost naturally to evapotranspiration or infiltration before reaching the gage site. Both assumptions are unlikely and result in an overestimation of the reconstructed flows.

[c] 1921-1933 daily streamflow data were compiled by USGS (2013); see **Figure 2** for a map of the gage site.

[d] **Table 7** lists the data sources used to estimate these upstream irrigation diversions.

[e] **Table 8** lists diversion data for ditches and canals in the Duncan-Virden Valley during the period.

[f] Annual reports from the Gila Water Commissioner state that Phelps Dodge diverted approximately 10,000 AFA (13.8 cfs) from the San Francisco River and Eagle Creek during 1942-1944 for its mining operations in the area. For purposes of reconstructing Gila River streamflows, this rate of water use was assumed in 1930 but likely overestimates the actual use at that time due to increased copper production during World War II.

[g] Domestic water use upstream of the Solomon gage was considered insignificant and likely totaled less than 1 cfs (724 acre-feet per year) during the period. Census data indicate that the local population, not including the mining towns of Morenci, Clifton, and Metcalf, was approximately 3,000 in 1930 (U.S. Census, 1932). Assuming a rate of 100 gallons per capita per day and no returns to the river, this water consumption would have totaled about 330 AFA (0.46 cfs).

TABLE 6 - RECONSTRUCTED NATURAL AND ORDINARY STREAMFLOWS IN THE GILA RIVER BELOW COOLIDGE DAM, ARIZONA (1921-1928)[a]

FLOW COMPONENT	MEDIAN MONTHLY FLOW (in cubic feet per second)											
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Reconstructed flows unadjusted for canal spills, irrigation and mining returns, infiltation and riparian evapotranspiration[b]												
USGS Gage 09469500[c]	184	101	99	54	20	1	11	203	101	48	71	189
Irrigation diversions upstream of Virden gage[d]	59.7	67.3	75.7	97.8	92.7	48.0	58.1	51.8	51.8	56.6	60.4	55.9
Irrigation diversions in the Duncan-Virden Valley[e]	107.2	120.9	136.0	175.7	166.6	86.3	104.3	93.0	93.0	101.7	108.4	100.4
Irrigation diversions along the San Francisco River[d]	39.9	45.0	50.6	65.4	62.0	32.1	38.8	34.6	34.6	37.9	40.3	37.4
Irrigation diversions along Eagle Creek[d]	7.0	7.9	8.9	11.5	10.9	5.7	6.9	6.1	6.1	6.7	7.1	6.6
Mining diversions along the San Francisco River and Eagle Creek[f]	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
Irrigation diversions in the Safford Valley[g]	329.8	328.6	448.1	332.2	194.3	138.3	265.2	304.0	246.7	258.9	292.9	317.3
Irrigation diversions along the San Simon River[d]	7.9	9.0	10.1	13.0	12.3	6.4	7.7	6.9	6.9	7.5	8.0	7.4
Domestic and industrial diversions[h]	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1
Reconstructed Total:	***751.5***	***695.6***	***844.5***	***765.5***	***574.8***	***333.7***	***508.0***	***715.3***	***555.9***	***533.3***	***604.0***	***730.0***

Notes:

[a] Natural streamflows were reconstructed at USGS Gage 09469500 by adding upstream diversions to gaged flows over a common period of record. Median flows were calculated as a measure of ordinary streamflow conditions.

[b] Assumes that none of the water diverted for irrigation, mining, and domestic use returned to the river via surface runoff or baseflow and was measured at the gage. Also assumes that none of the water added back to the river would have been lost naturally to evapotranspiration or infiltration before reaching the gage site. Both assumptions are unlikely and result in an overestimation of the reconstructed flows.

[c] 1920-1928 daily streamflow data were compiled by USGS (2013); see **Figure 2** for a map of the gage site.

[d] **Table 7** lists the data sources used to estimate these upstream irrigation diversions.

[e] **Table 8** lists diversion data for ditches and canals in the Duncan-Virden Valley during the period.

[f] Annual reports from the Gila Water Commissioner state that Phelps Dodge diverted approximately 10,000 AFA (13.8 cfs) from the San Francisco River and Eagle Creek during 1942-1944 for its mining operations in the area. For purposes of reconstructing Gila River streamflows, this rate of water use was assumed in 1930 but likely overestimates the actual use at that time due to increased copper production during World War II. Circa 1914, Southworth (1919, p.200) reported that water for the mining camps in Clifton and Morenci were supplied by a pumping plant on Eagle Creek that delivered 2 million gallons per day (2,240 AFA or 3.1 cfs).

[g] **Table 9** lists diversion data for ditches and canals in the Safford Valley during the period. Includes San Carlos Apache Tribe diversions along the Gila and San Carlos Rivers.

[h] Census data indicate that the local population upstream of Coolidge Dam, not including the mining towns of Morenci, Clifton, and Metcalf, was approximately 12,100 in 1930 (U.S. Census, 1932). Assuming a rate of 100 gallons per capita per day and no returns to the river, this water consumption would have totaled about 1,330 AFA (1.8 cfs). Halpenny and others (1952, p.48) reported that, in 1949, another 200 AFA (0.3 cfs) was pumped from wells in the Safford Basin for industrial use. Although the latter likely exceeded the rate of industrial water use in 1930, it was added to the estimated domestic water use during this period.

TABLE 7 - IRRIGATION DIVERSIONS IN THE GILA RIVER HEADWATERS AND ALONG ITS UPPER TRIBUTARIES CIRCA 1930

STREAM	REPORTED IRRIGATED ACREAGE[a]		ESTIMATED IRRIGATED ACREAGE CIRCA 1930[b]	ESTIMATED MEDIAN MONTHLY DIVERSION IN 1930 (in cubic feet per second)[c]											
	1914	1945		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Gila River Headwaters (above Duncan-Virden Valley)	3,621	5,400	4,510	59.7	67.3	75.7	97.8	92.7	48.0	58.1	51.8	51.8	56.6	60.4	55.9
San Francisco River	2,730	3,300	3,015	39.9	45.0	50.6	65.4	62.0	32.1	38.8	34.6	34.6	37.9	40.3	37.4
Eagle Creek	563	500	532	7.0	7.9	8.9	11.5	10.9	5.7	6.9	6.1	6.1	6.7	7.1	6.6
San Simon River	NA	600[d]	600	7.9	9.0	10.1	13.0	12.3	6.4	7.7	6.9	6.9	7.5	8.0	7.4

Notes:

[a] 1914 and 1945 acreages are from Southworth (1919, p.33) and USGS (1947), respectively.

[b] Circa 1930 estimates were calculated by assuming a linear change in acreage occurred between 1914 and 1945.

[c] Irrigation diversions in the Gila River headwaters and along its tributaries have not been gaged or frequently measured. Estimates were made based on monthly diversion data collected by the USGS in the Duncan-Virden Valley between 1922 and 1931 (see **Table 8**) and prorating these data using the circa 1930 acreages listed above. Irrigated acreage in the Duncan-Virden Valley was relatively stable during this period and totaled about 8,100 acres.

[d] 400 of these 600 acres were reportedly irrigated by well pumpage.

TABLE 8. IRRIGATION DIVERSIONS IN THE DUNCAN-VIRDEN VALLEY AND VICINITY FROM 1922 TO 1931[a]

CANAL / DITCH	YEARS OF RECORD	MEDIAN MONTHLY DIVERSION (in cubic feet per second)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Sunset[b]	1922-31	25.6	30.0	28.5	37.7	37.3	29.3	27.4	21.9	28.7	32.2	28.7	23.4
Cosper & Windham[b]	1922-27	8.9	9.6	12.0	14.6	18.9	6.3	7.3	5.8	5.2	8.9	6.5	8.0
Model[b]	1922-31	22.7	27.5	32.5	42.6	32.3	12.7	20.8	19.8	17.7	18.7	20.4	23.6
Valley[b]	1923-31	21.7	22.9	21.8	27.0	25.8	7.2	14.3	16.7	15.3	12.8	19.8	16.0
Duncan[b]	1923-28	0.0	1.3	2.1	3.4	3.8	3.3	2.9	1.7	1.2	0.9	1.0	0.3
Black-McClesky[b]	1923-31	9.3	7.2	11.0	13.3	12.4	7.0	8.6	7.9	5.5	7.4	12.9	11.4
Colmenero[b]		1.6	2.7	4.7	7.0	6.3	4.1	3.5	2.4	2.7	2.6	1.9	1.9
York[c]		1.7	1.9	3.6	4.3	5.4	3.7	4.3	3.3	3.0	3.3	1.4	1.1
Cosper-Martin[d]	1922-31	8.3	9.4	10.6	13.6	12.9	6.7	8.1	7.2	7.2	7.9	8.4	7.8
Shriver[d]		1.1	1.3	1.4	1.9	1.8	0.9	1.1	1.0	1.0	1.1	1.1	1.1
Sexton[d]		1.3	1.5	1.6	2.1	2.0	1.0	1.3	1.1	1.1	1.2	1.3	1.2
Billingsley[d]		1.4	1.6	1.8	2.3	2.2	1.1	1.4	1.2	1.2	1.3	1.4	1.3
Pumping Plants[d,e]		2.0	2.3	2.6	3.3	3.1	1.6	2.0	1.7	1.7	1.9	2.0	1.9
Other Irrigators[f]		1.5	1.7	2.0	2.5	2.4	1.2	1.5	1.3	1.3	1.5	1.6	1.5
	Total:	***107.2***	***120.9***	***136.0***	***175.7***	***166.6***	***86.3***	***104.3***	***93.0***	***93.0***	***101.7***	***108.4***	***100.4***

Notes:

[a] Irrigated acreage in the Duncan-Virden Valley was relatively stable during this period and totaled about 8,100 acres. According to the Gila Water Commissioner, there were 8,000 decreed acres in the valley in 1920 (2012, Plate 30.) and 8,131 acres were reported as irrigated in 1936 (1937, p.11)

[b] Diversions were calculated based on daily discharge data collected by the U.S. Geological Survey (USGS) at canal/ditch gaging stations and reported in their annual surface water supply papers.

[c] Diversions were calculated using regular USGS field measurements of canal discharge.

[d] The canal/ditch was not gaged or regularly field measured during the years of record. Diversions were estimated by first summing the monthly data from all gaged and measured sites in the valley. These totals were then prorated using the acreage irrigated by the ungaged/unmeasured canal or ditch. Southworth (1919) provided irrigated acreages for all canals and ditches in this area.

[e] Water pumped directly from stream.

[f] Located between Duncan and Safford Valleys.

TABLE 9. IRRIGATION DIVERSIONS IN THE SAFFORD VALLEY FROM 1921 TO 1929[a]

CANAL / DITCH	YEARS OF RECORD	MEDIAN MONTHLY DIVERSION (in cubic feet per second)											
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Brown[b]	1921-29	8.1	8.2	14.1	20.8	11.4	6.3	6.6	10.0	7.3	7.2	7.5	8.5
Fourness[b]		2.3	3.0	3.6	2.6	1.4	0.8	2.0	2.3	1.0	1.9	1.2	1.3
San Jose[b]		39.7	47.0	53.7	44.3	26.4	22.3	38.5	46.3	40.1	29.9	31.7	31.6
Michelena[b]		2.1	3.2	6.6	7.0	5.5	3.4	5.3	6.4	4.2	2.2	4.0	2.1
Montezuma[b]		42.0	45.4	65.2	43.9	28.3	28.9	45.1	45.5	43.6	44.2	39.2	41.5
Union[b]		58.3	70.9	93.4	77.5	40.2	18.0	59.2	70.1	50.1	56.6	61.2	51.2
Graham[b]		36.9	25.7	48.3	29.0	13.7	11.0	17.6	19.9	17.8	22.0	31.2	38.4
Smithville[b]		28.3	28.6	28.7	21.3	13.0	9.6	19.7	23.5	15.5	20.2	22.4	27.3
Dodge-Nevada[b]		20.0	15.5	19.3	18.5	13.3	8.6	12.3	10.9	9.9	12.5	16.9	19.3
Curtis-Kempton[b]		23.2	13.7	24.0	18.6	12.0	7.9	12.4	13.9	12.1	15.5	21.2	22.3
Fort Thomas[b]		35.5	34.0	45.7	14.9	9.4	7.5	19.5	24.4	20.0	20.3	26.7	41.5
Gonzales[c]		0.5	0.5	0.6	0.5	0.3	0.2	0.4	0.4	0.4	0.4	0.4	0.5
Oregon[c]		17.8	17.7	24.2	17.9	10.5	7.5	14.3	16.4	13.3	14.0	15.8	17.1
Bryce[c]		7.2	7.2	9.8	7.3	4.2	3.0	5.8	6.6	5.4	5.7	6.4	6.9
Colvin-Jones[c]		1.1	1.1	1.5	1.1	0.7	0.5	0.9	1.0	0.8	0.9	1.0	1.1
Pumping Plants[c,d]		0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
San Carlos Reservation[e]	1921-27	6.8	6.8	9.2	6.8	4.0	2.8	5.5	6.3	5.1	5.3	6.0	6.5
Total:		***329.8***	***328.6***	***448.1***	***332.2***	***194.3***	***138.3***	***265.2***	***304.0***	***246.7***	***258.9***	***292.9***	***317.3***

Notes:

[a] Irrigated acreage in the Safford Valley was relatively stable during this period and totaled about 32,500 acres. According to the Gila Water Commissioner, there were 32,504 decreed acres in the valley in 1920 (2012, Plate 30) and 32,443 acres were reported as irrigated in 1936 (1937, p.11)

[b] Diversions were calculated based on daily discharge data collected by the U.S. Geological Survey (USGS) at canal/ditch gaging stations and reported in their annual surface water supply papers.

[c] The canal/ditch was not gaged or regularly field measured during the years of record. Diversions were estimated by first summing the monthly data from all gaged sites in the valley. These totals were then prorated using the acreage irrigated by the ungaged/unmeasured canal or ditch. Southworth (1919) provided irrigated acreages for all canals and ditches in this area.

[d] Water pumped directly from stream.

[e] Includes irrigated lands along both the Gila and San Carlos rivers upstream of Coolidge Dam. Based on data in ADWR (1999, p.4-2), an average of 559 acres were irrigated on the reservation from 1921-1927 before the dam was completed in 1928. Plateau could not locate how much the tribe diverted during this period, so the same prorating procedure described in footnote c was used.

TABLE 10 - RECONSTRUCTED STREAM FLOWS, DEPTHS AND VELOCITIES ALONG THE UPPER GILA RIVER

GAGE	HYDRAULIC PARAMETER[a]	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	REFERENCE IN DECLARATION
near Virden	Median flow (cfs)	154	175	315	281	209	80	132	242	163	150	159	155	Table 3
	Mean depth (ft)	<1.7		<1.8		<1.7								Figure E-1
	Average velocity (ft/s)	>2.0		>2.5		>2	>1.5	>2.0						Figure E-2
at York[b]	Median flow (cfs)	269	305	442	437	Not available						274	263	Table 4
	Mean depth (ft)	<1.6										<1.6		Figure E-3
	Average velocity (ft/s)	>2.0										>2.0		Figure E-4
near Clifton	Median flow (cfs)	269	305	442	437	328	158	219	340	223	246	274	263	Table 4
	Mean depth (ft)	<2.0												Figure E-5
	Average velocity (ft/s)	>2.0		>2.5		>2.0	>1.5	>2.0						Figure E-6
below Bonita Creek[c]	Median flow (cfs)	437	449	633	693	Not available						422	427	Table 5
	Mean depth (ft)	1.1 to 2.2		1.5 to 2.5								1.1 to 2.2		Figure E-7
	Average velocity (ft/s)	>2.5										>2.5		Figure E-8
near Solomonville	Median flow (cfs)	437	449	633	693	511	264	414	639	434	380	422	427	Table 5
	Mean depth (ft)	<2.0												Figure E-9
	Average velocity (ft/s)	>2.0					>1.5	>2.0			>1.7	>2.0		Figure E-10
near Ashurst[d]	Median flow (cfs)	752	696	845	766	Not available						604	730	Table 6
	Mean depth (ft)	<2.0[e]										<2.0		Figure E-11
	Average velocity (ft/s)	>2.5										>2.5		Figure E-12
at Calva[d]	Median flow (cfs)	752	696	845	766							604	730	Table 6
	Mean depth (ft)	<1.8										<1.8		Figure E-13
	Average velocity (ft/s)	>2.5										>2.5		Figure E-14
at Coolidge Dam	Median flow (cfs)	752	696	845	766	575	334	508	715	556	533	604	730	Table 6
	Mean depth (ft)	<2.0				<1.8			<2.0	<1.8		<2.0		Figure E-15
	Average velocity (ft/s)	>2.5				>2			>2.5	>2.0		>2.5		Figure E-16

NA = not available.

Notes:

[a] cfs = cubic feet per second, ft = feet and ft/s = feet/second.

[b] Median flows transferred upstream from the downstream gage near Clifton during the cooler months when evapotranspiration by riparian vegetation is minimal.

[c] Median flows transferred upstream from the downstream gage near Solomonville during the cooler months when evapotranspiration by riparian vegetation is minimal.

[d] Median flows transferred upstream from the downstream gage at Coolidge Dam during the cooler months when evapotranspiration by riparian vegetation is minimal.

[e] Estimated by extrapolating the hydraulic rating curve beyond the last field measurement.

TABLE 11 - IRRIGATION RETURNS FROM THE DUNCAN AND SAFFORD VALLEYS IN 1899[a]

VALLEY	DATE	TOTAL CANAL DIVERSIONS (in cfs)	GAINS IN RIVER FLOW VIA SEEPAGE		SEEPAGE AS PERCENTAGE OF CANAL DIVERSIONS[b]
			Distance (mi)	Seepage (cfs)	
Duncan	March 22, 1899	86.0	15	30	34.8
Safford	April 15-17, 1899	429.8	40.7	153.8	35.8

Notes:

[a] Irrigation returns were calculated by the USGS (1901, pp.334-349) based on seepage investigations conducted along the the Gila River above San Carlos.

[b] Some seepage may have originated from natural groundwater inflow and been unrelated to irrigation returns.

TABLE 12. SAFFORD VALLEY CANAL DIVERSIONS AND SPILLS IN 1899 and 1917[a]

DATE	CANAL	FLOW (in cubic feet per second)		PERCENTAGE OF DIVERSION SPILLED
		Diversion	Spill	
April 15, 1899	Montezuma	101.0	27.0	26.7
September 6, 1917	San Jose	71.0	52.0	73.2
September 7, 1917	Montezuma	61.0	31.0	50.8
September 11, 1917	Curtis	26.2	4.0	15.3

Notes:

[a] Diversions and spills were measured by the USGS during seepage investigations of the Gila River in Safford Valley. According to USGS (1901, p.340 and 1921, p.184), conditions were favorable with flows in the river not varying during the investigation.

TABLE 13 - BROWN CANAL DIVERSIONS AND SPILLS FROM 1921 TO 1929[a]

YEAR/ MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Average Diversion (in cubic feet per second)												
1921	17.3	17.1	14.5	12.9	11.3	12.4	8.9	4.2	7.2	12.4	14.5	11.7
1922	10.4	14.0	11.6	14.5	10.7	9.8	12.2	7.9	10.2	7.5	10.0	10.2
1923	10.6	1.6	11.4	22.0	11.4	3.8	3.4	3.9	5.4	8.2	5.1	3.6
1924	0.9	7.1	19.5	20.8	16.0	6.3	5.0	7.0	2.7	2.2	3.1	4.3
1925	3.4	5.8	7.1	3.1	2.3	2.5	5.6	11.4	0.2	4.0	10.3	22.0
1926	25.4	20.4	21.0	26.6	21.5	5.1	11.1	15.0	7.3	8.7	13.8	11.4
1927	6.3	2.5	21.2	28.0	21.5	16.9	16.3	18.9	8.6	6.5	5.5	8.4
1928	8.1	10.6	14.1	22.1	19.7	8.4	5.4	18.9	8.6	7.2	7.5	8.5
1929	6.1	8.2	7.7	7.0	3.6	1.1	6.6	10.0	8.1	2.1	3.3	4.1
Average Spill (in cubic feet per second)												
1921	9.0	9.7	7.4	8.8	9.5	10.3	2.5	1.4	2.8	5.8	6.8	8.8
1922	3.6	6.0	4.3	3.8	4.1	6.6	3.2	3.0	3.2	3.4	4.6	3.2
1923	1.2	0.4	2.3	10.0	4.9	1.2	0.6	0.1	0.2	0.5	0.1	0.6
1924	0.1	5.6	17.3	8.4	0.6	0.3	0.2	0.1	0.0	NA	NA	NA
1925	0.1	0.0	NA	NA	NA	0.0	0.0	2.6	0.0	0.0	0.0	0.8
1926	1.6	0.9	1.0	2.1	0.7	0.2	0.2	0.3	0.8	6.0	7.0	7.0
1927	2.7	1.0	6.2	12.9	9.8	10.9	4.9	5.9	2.6	0.2	0.8	5.2
1928	4.0	0.8	1.6	5.9	9.4	3.9	0.5	0.6	0.0	0.1	0.5	1.1
1929	1.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	NA	NA	NA
Percentage of Diversion Spilled												
1921	52.0	56.7	51.0	68.2	84.1	83.1	28.1	33.3	38.9	46.8	46.9	75.2
1922	34.6	42.9	37.1	26.2	38.3	67.3	26.2	38.0	31.4	46.0	45.8	31.0
1923	11.2	21.9	20.2	45.5	43.0	32.5	16.3	2.3	3.4	6.4	1.2	15.8
1924	9.4	78.4	88.7	40.5	3.9	5.1	3.2	1.4	0.0	NA	NA	NA
1925	3.9	0.5	NA	NA	NA	0.4	0.2	22.7	12.5	0.2	0.0	3.5
1926	6.4	4.5	4.7	8.0	3.2	3.9	1.6	1.7	11.4	69.2	51.0	61.6
1927	43.0	38.1	29.1	46.1	45.6	64.5	29.9	31.2	30.0	2.9	13.7	61.5
1928	49.2	7.6	11.6	26.6	47.8	46.4	10.0	3.3	0.0	0.7	6.9	13.3
1929	16.9	9.2	0.0	0.0	0.0	0.0	0.0	0.0	0.4	NA	NA	NA
Minimum:	***3.9***	***0.5***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.0***	***0.2***	***0.0***	***3.5***
Median:	***16.9***	***21.9***	***24.6***	***33.5***	***40.7***	***32.5***	***10.0***	***3.3***	***11.4***	***6.4***	***13.7***	***31.0***
Maximum:	***52.0***	***78.4***	***88.7***	***68.2***	***84.1***	***83.1***	***29.9***	***38.0***	***38.9***	***69.2***	***51.0***	***75.2***

NA = not available.

Notes:

[a] Diversions and spills were calculated based on daily discharge data collected by the U.S. Geological Survey (USGS) at gaging stations on the canal and wasteway and reported in their annual surface water supply papers.

TABLE 14. COMPARISON OF UNDEPLETED ANNUAL STREAMFLOW ESTIMATES FOR THE UPPER GILA RIVER

LOCATION[a]	DRAINAGE AREA (mi^2)	PERIOD	UNDEPLETED ANNUAL FLOW[b]			DATA SOURCE
			Statistic	AFA	cfs	
below Blue Creek, near Virden, NM	3,218	1914-1945	Average	157,300	217	BOR (1952, p.151)
		1927-1934	Median[d]	133,790	185	Table 3 of this report
		1951-1980[c]	Average	153,740	212	Krug and others (1989, p.316)
near Clifton, AZ	4,037	1914-1945	Average	169,000	233	BOR (1952, p.151)
		1928-1933	Median[d]	211,480	292	Table 4 of this report
		1951-1980	Average	128,320	177	Krug and others (1989, p.316)
near Solomonville, AZ	7,954	1914-1945	Average	399,200	551	BOR (1952, p.152)
		1920-1933	Median[d]	344,280	476	Table 5 of this report
		1951-1980	Average	357,950	494	Krug and others (1989, p.316)
below Coolidge Dam, AZ	12,889	1914-1945	Average	425,800	588	BOR (1952, p.152)
		1920-1928	Median[d]	459,320	634	Table 6 of this report

Notes:

[a] See **Figure 2** for a map of the gaging stations.

[b] AFA = acre-feet per year; cfs = cubic feet per second.

[c] Short gage record adjusted to 1951-1980.

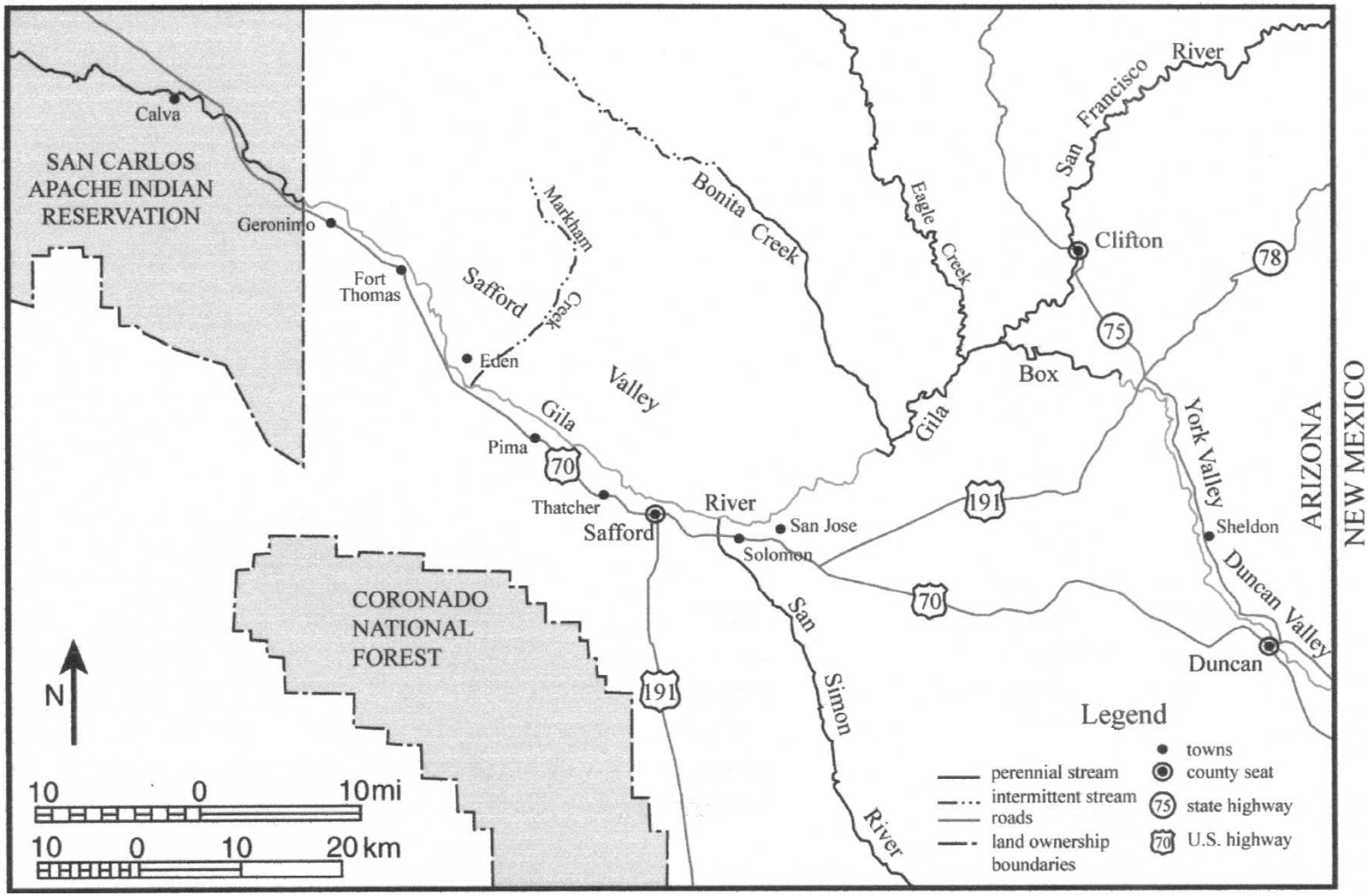
[d] Reconstructed flows not corrected for canal spills, irrigation and mining returns, infiltration and riparian evapotranspiration which all would decrease these values. As such, this is considered an upper estimate of the median annual flow.

TABLE 15 - HISTORIC ACCOUNTS OF BOATING ALONG THE UPPER GILA RIVER

YEAR	MONTH	BOAT		NUMBER OF PASSENGERS AND CREW	CARGO	PURPOSE	DIRECTION	SOURCE	COMMENTS
		Type	Length						
1869	March	Raft	Unknown	Unknown	Troops	Military ferry	Across the river near Fort Goodwin	Weekly Arizona Miner (1869)	Heavy rains before the crossing; also, "good deal of rain this month…the Gila is pretty high."
1886	February - March (?)	Dugout		One	Supplies	Prospecting	Downstream from Clifton, AZ	The Arizona Silver Belt (1886)	Story from the Florence Enterprise which reported a prospector arrived in town last Sunday after capsizing 15 miles above Riverside; The Arizona Silver Belt ran the story on Saturday April 3rd.
1891	November - February (?)	Unknown		Two		Hunting/trapping	Downstream from Black Range, NM	Tombstone Prospector (1891)	Story from the Yuma Times which reported two men arrived in town the previous week after an approximately 6-month trip down the Gila River which included capsizing in February flood waters; the Tombstone Prospector ran the story on April 19th.
1895	January	Flat-bottomed	3.5 ft x 18 ft	Two (Evans and Adams)		Recreation	Downstream from Clifton, AZ	The Arizona Sentinel (1895)	Capsized in canyons downstream of San Carlos.

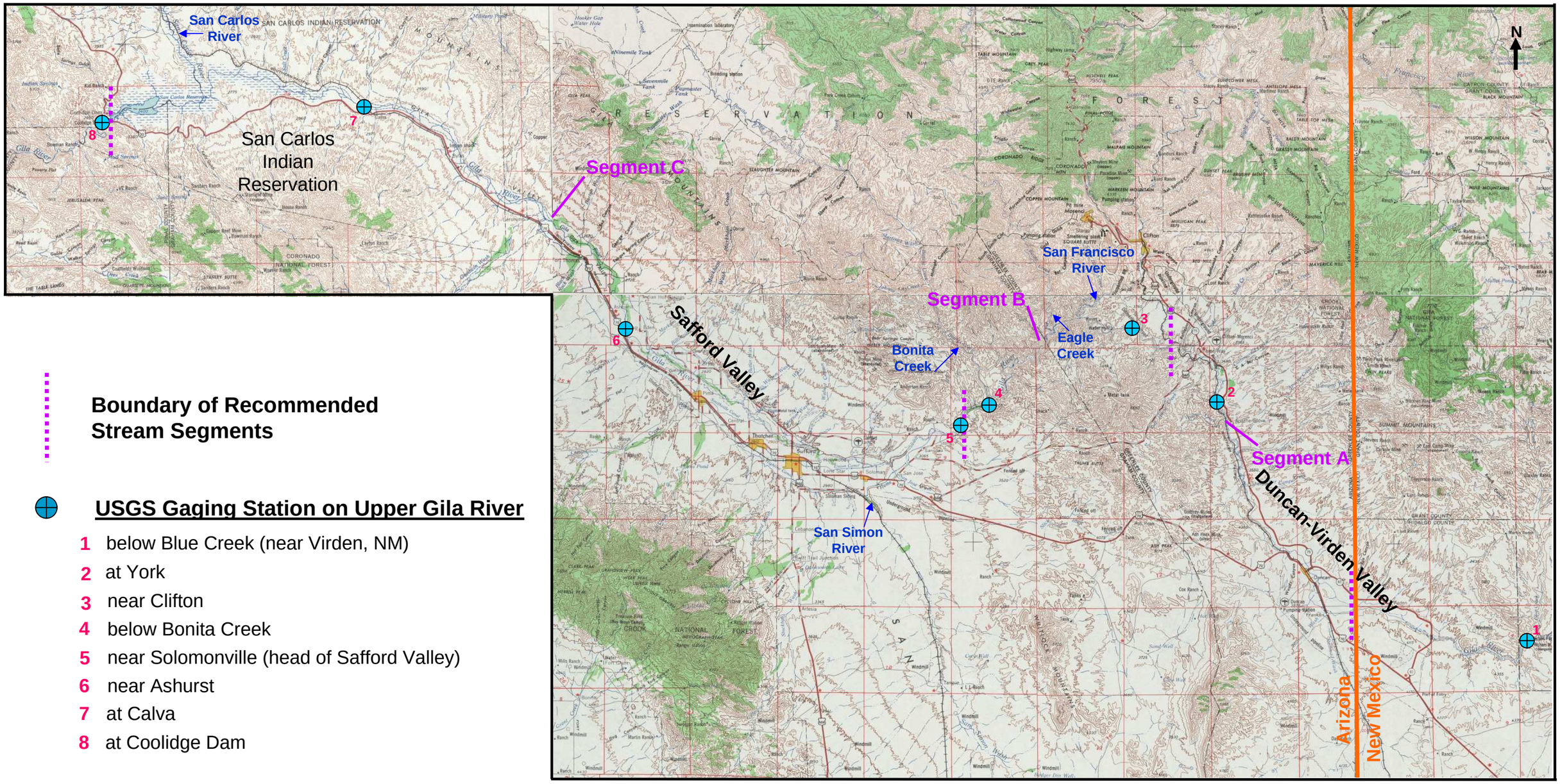
FIGURES

FIGURE 1 – GENERAL LOCATION MAP OF THE UPPER GILA RIVER



Source: BOR (2004, p.2).

FIGURE 2 – STREAM SEGMENTS AND USGS GAGING STATIONS ALONG THE UPPER GILA RIVER



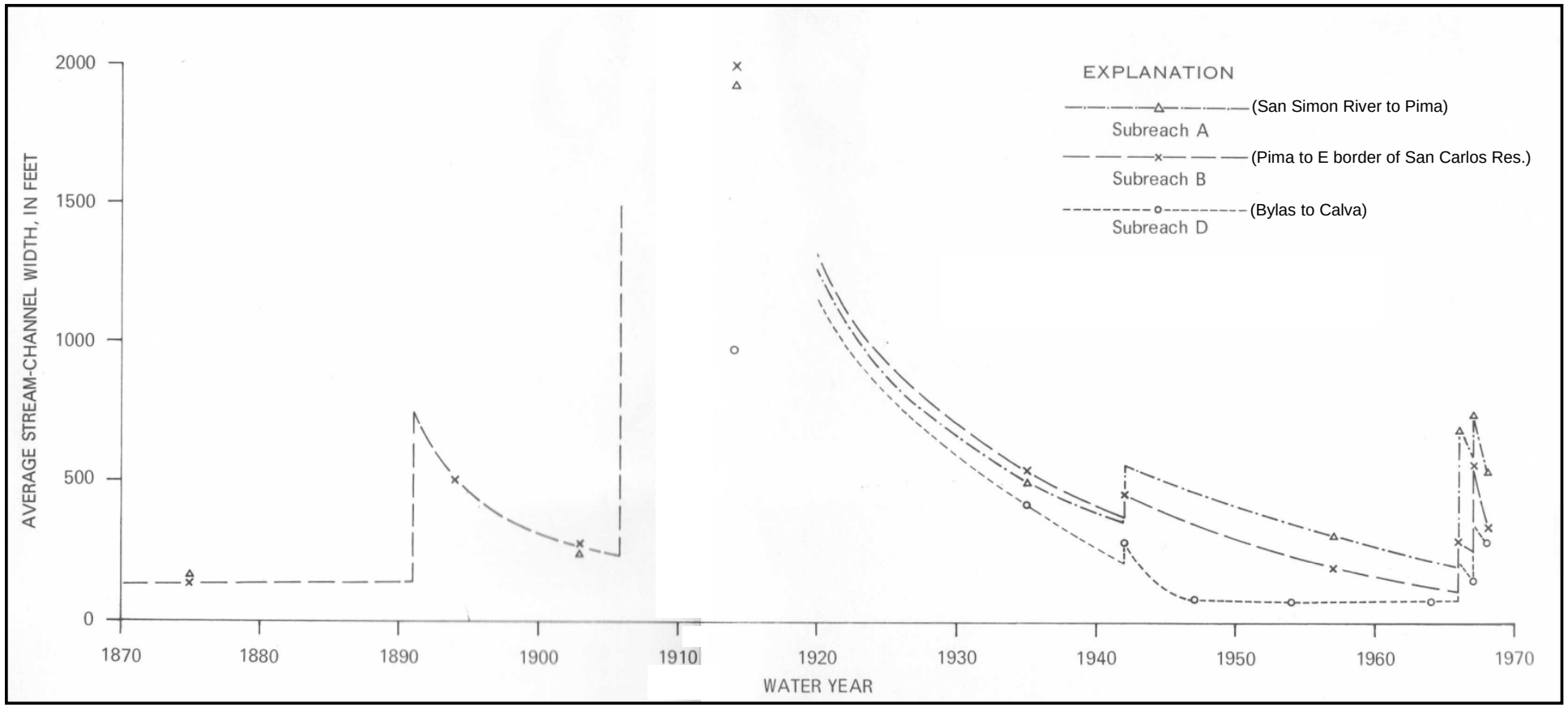
Boundary of Recommended Stream Segments

USGS Gaging Station on Upper Gila River

1. below Blue Creek (near Virden, NM)
2. at York
3. near Clifton
4. below Bonita Creek
5. near Solomonville (head of Safford Valley)
6. near Ashurst
7. at Calva
8. at Coolidge Dam

Base map: U.S. Army Corps of Engineers (1954 and 1962).

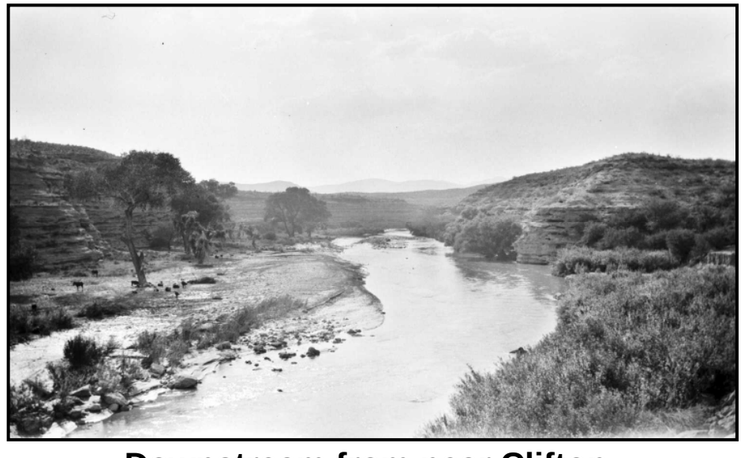
FIGURE 3 – CHANGES IN THE WIDTH OF THE GILA RIVER STREAM CHANNEL IN SAFFORD VALLEY FROM 1870 TO 1970



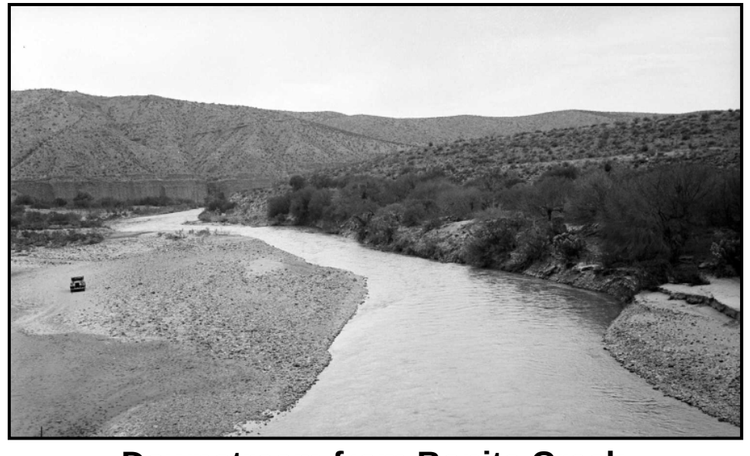
Source: Burkham (1972, Plate 3).

FIGURE 4 – HISTORIC PHOTOGRAPHS AT USGS GAGING STATIONS ALONG THE UPPER GILA RIVER

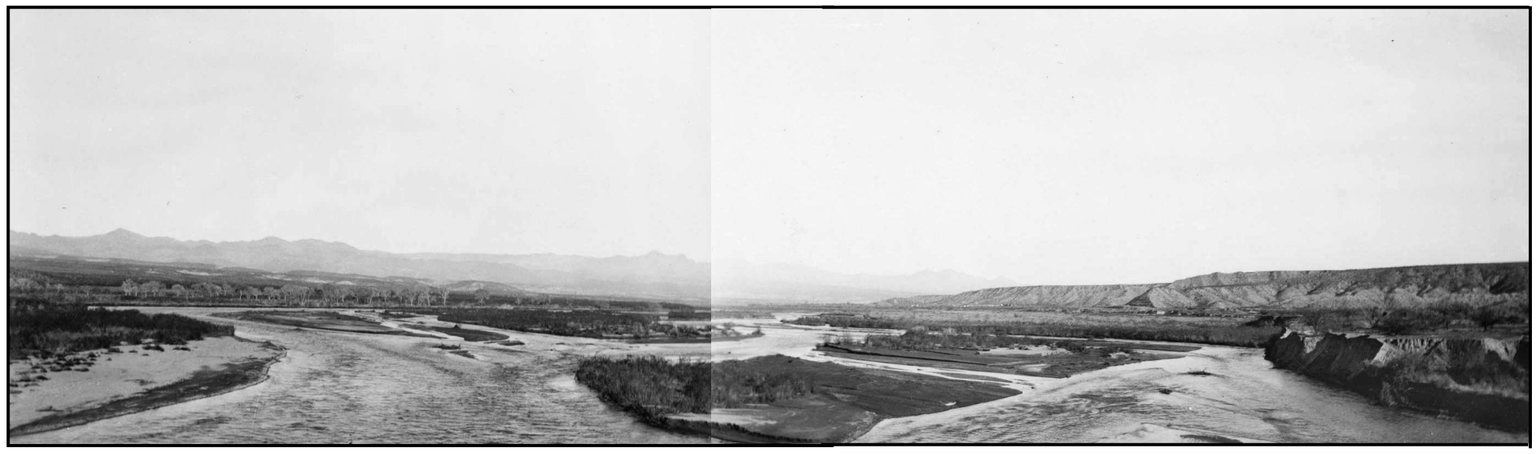
Downstream from Blue Creek (07/23/1931)



Downstream from near Clifton (08/20/1930)



Downstream from Bonita Creek (04/14/1932)



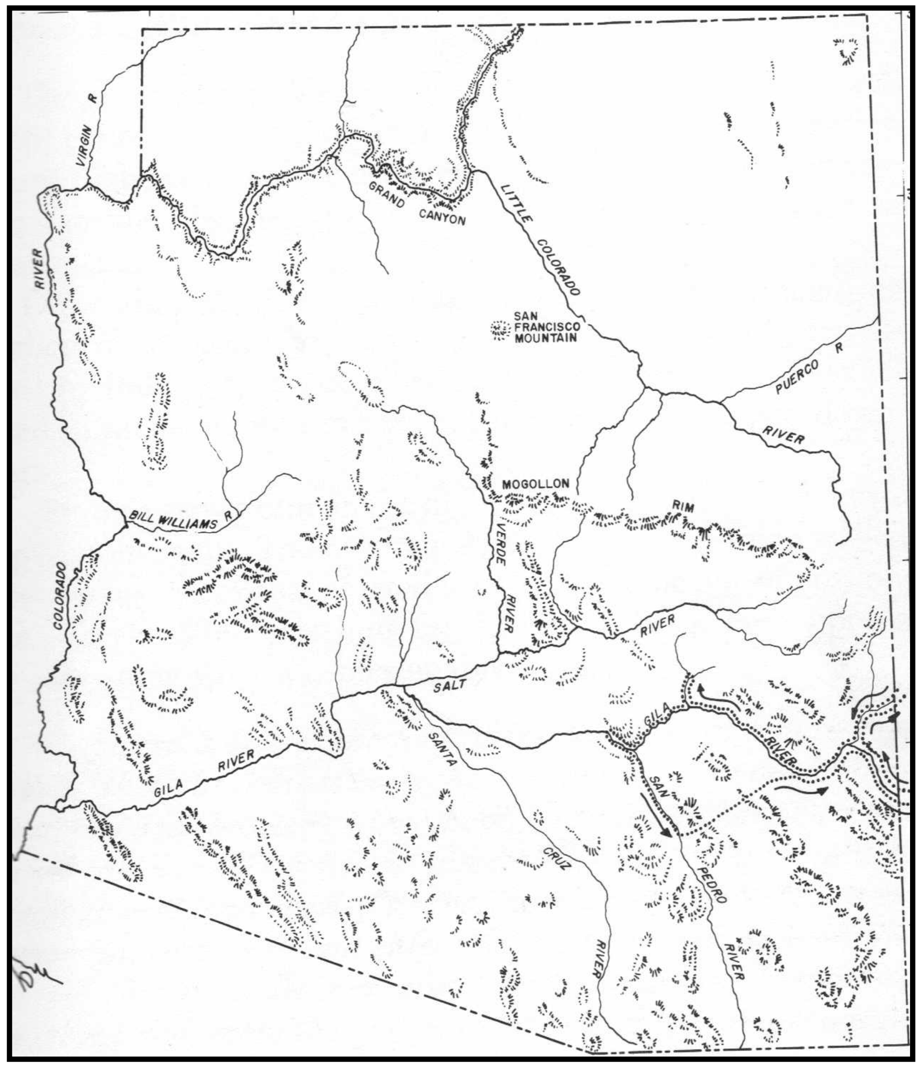
Upstream from Calva (03/06/1932)

Upstream from Coolidge Dam site (02/66/1928)

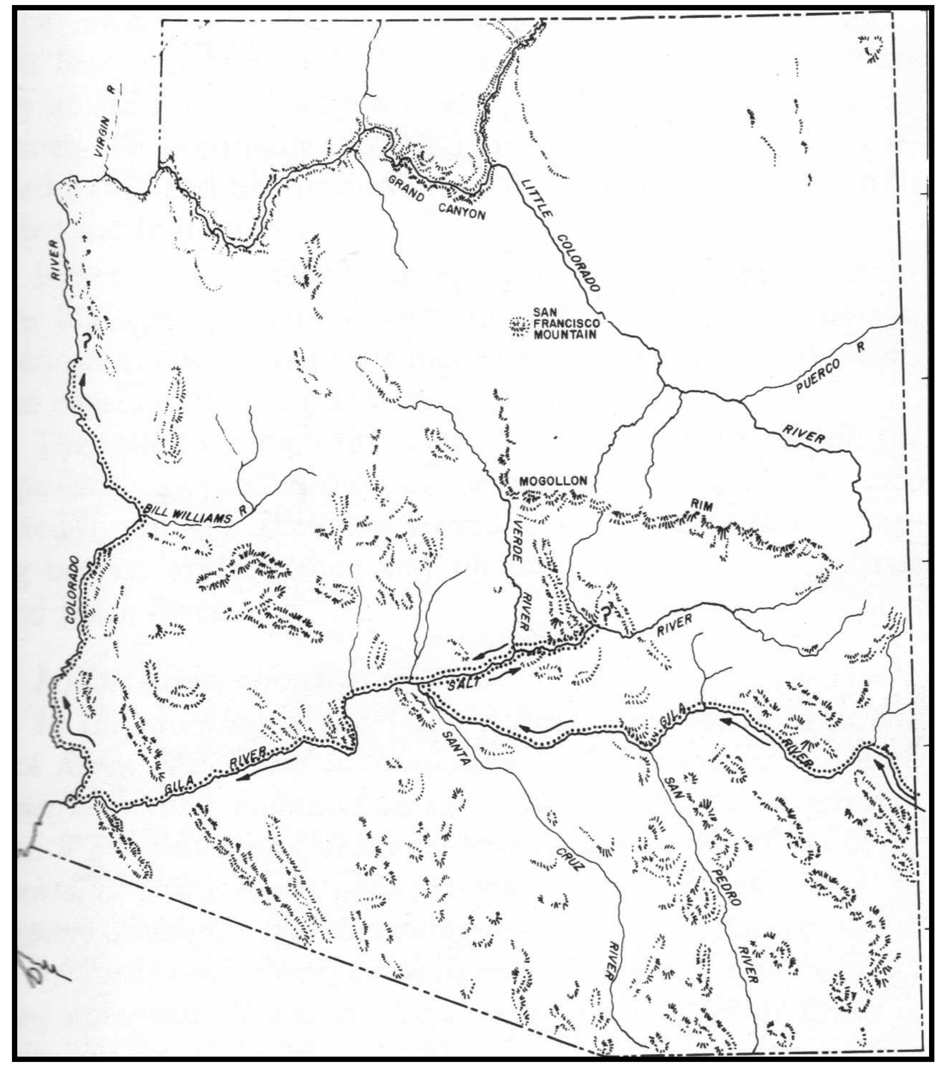
Source: USGS (2014b).

FIGURE 5 – ROUTES FOLLOWED BY TRAPPER JAMES OHIO PATTIE ALONG THE GILA RIVER

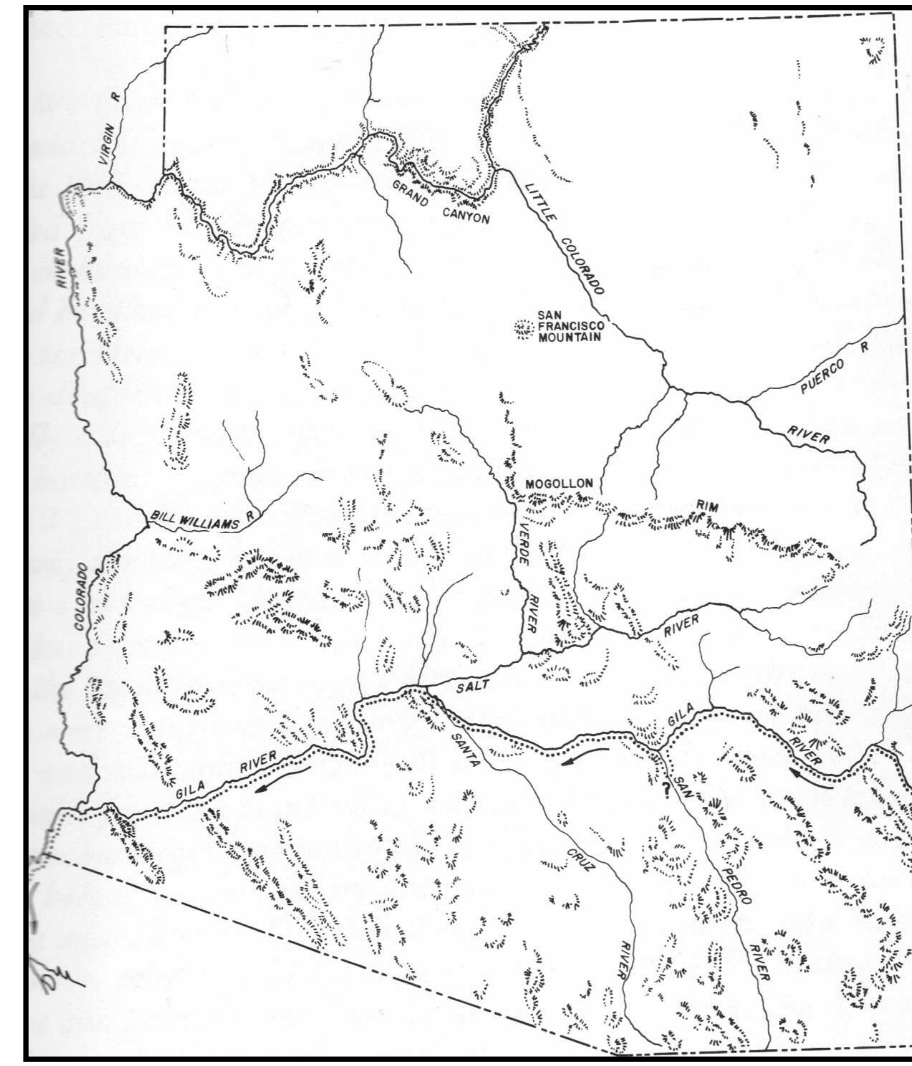
December 1824 – April 1825



January 1826 – April 1826

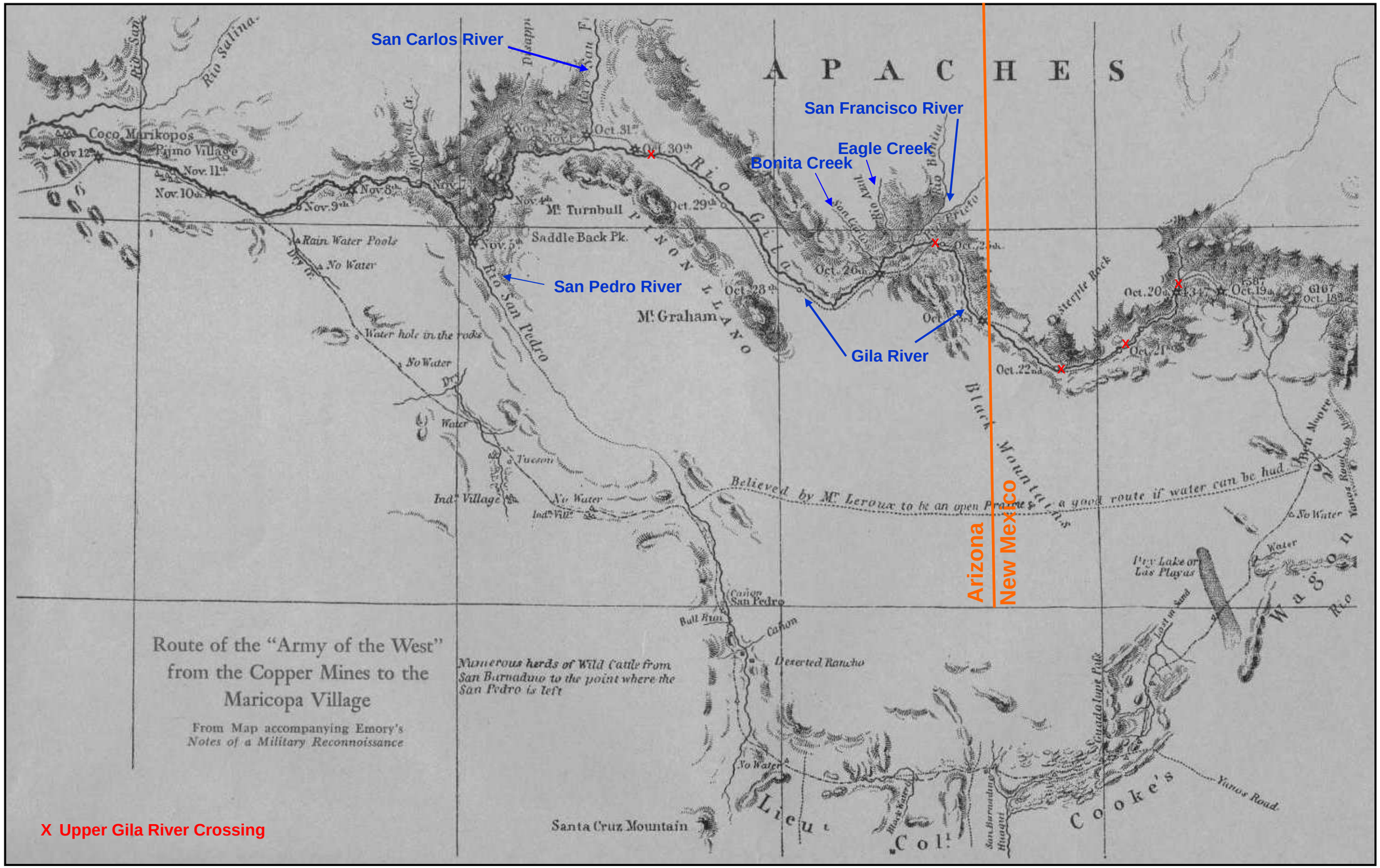


October 1827 – February 1828



Source: Davis (1982, pp.12a, 18a and 21a).

FIGURE 6 – EMORY's MAP SHOWING KEARNY'S 1846 ROUTE ALONG THE UPPER AND MIDDLE GILA RIVER

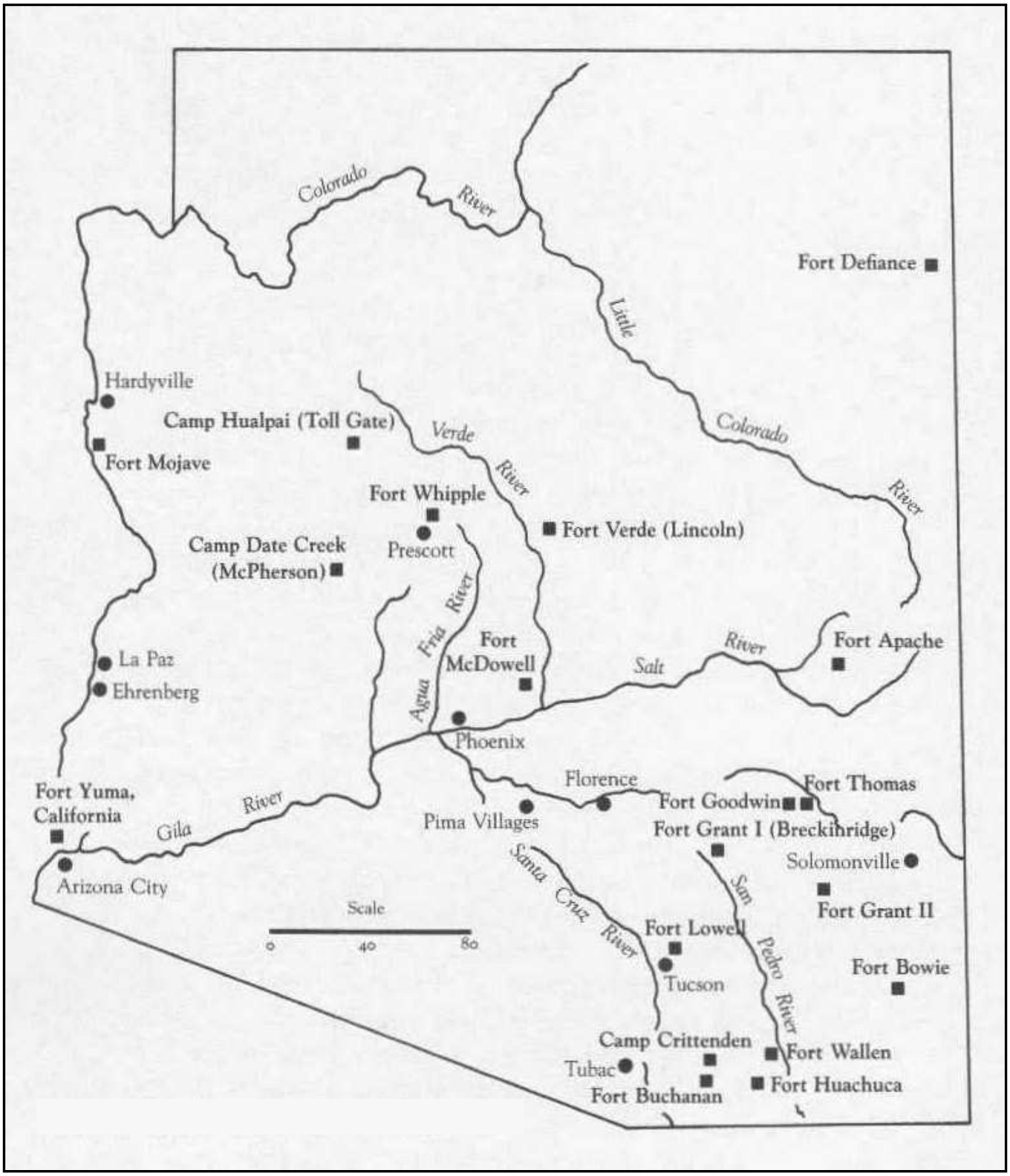


Source: Griffin (1943, p.24a).

FIGURE 7 – 1880 PHOTO OF A COVERED WAGON WITH TRAILER CROSSING THE GILA RIVER NEAR CALVA, ARIZONA

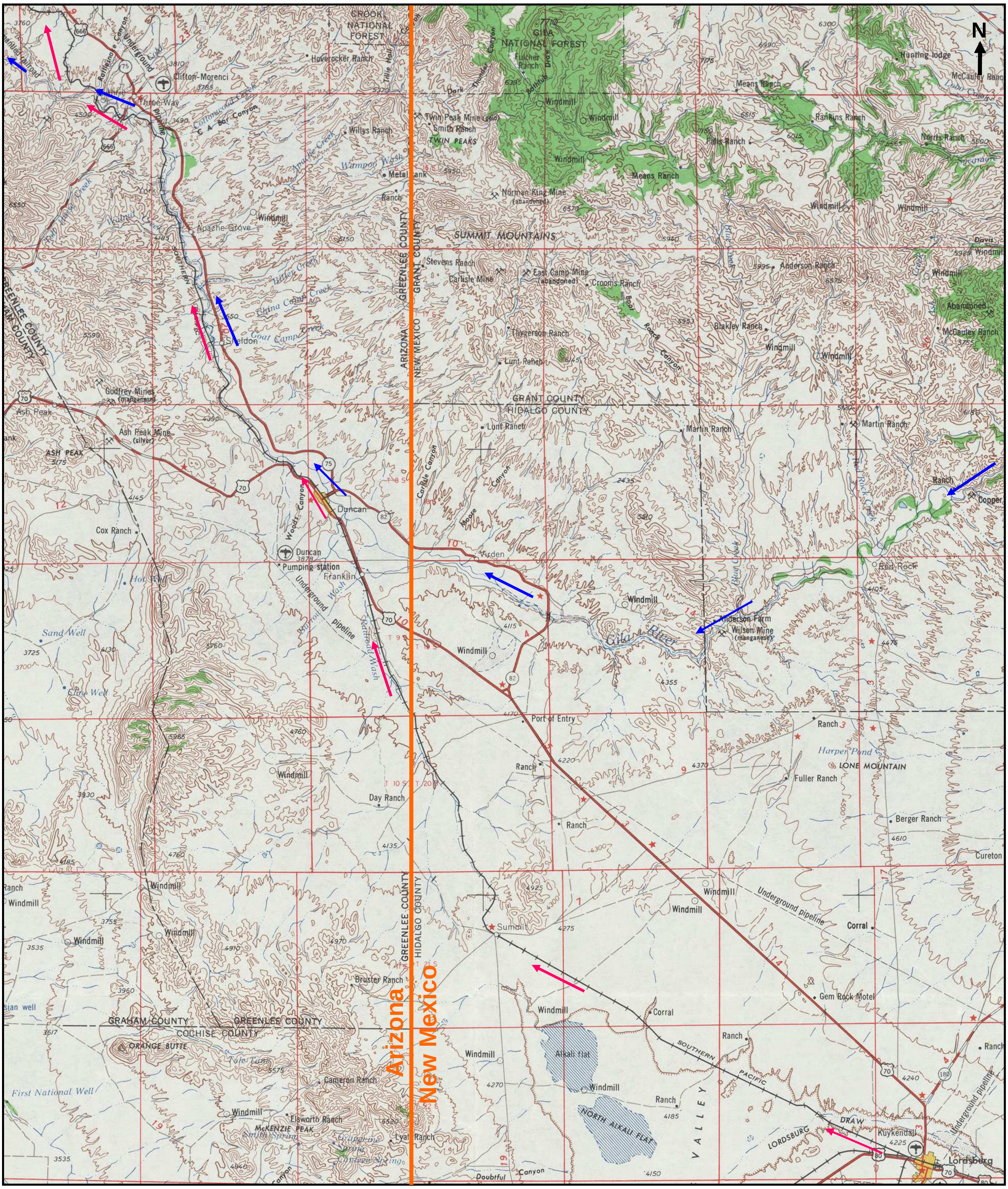
Source: Photograph No. 19,515 of the Gatewood Collection, Arizona Historical Society, Tucson, Arizona.

FIGURE 8 – ARIZONA SETTLEMENTS AND MILITARY POSTS, 1861-85



Source: Miller (1989).

FIGURE 9 – HISTORIC RAILROAD ALONG THE GILA RIVER FROM LORSDBURG, NEW MEXICO TO CLIFTON, ARIZONA



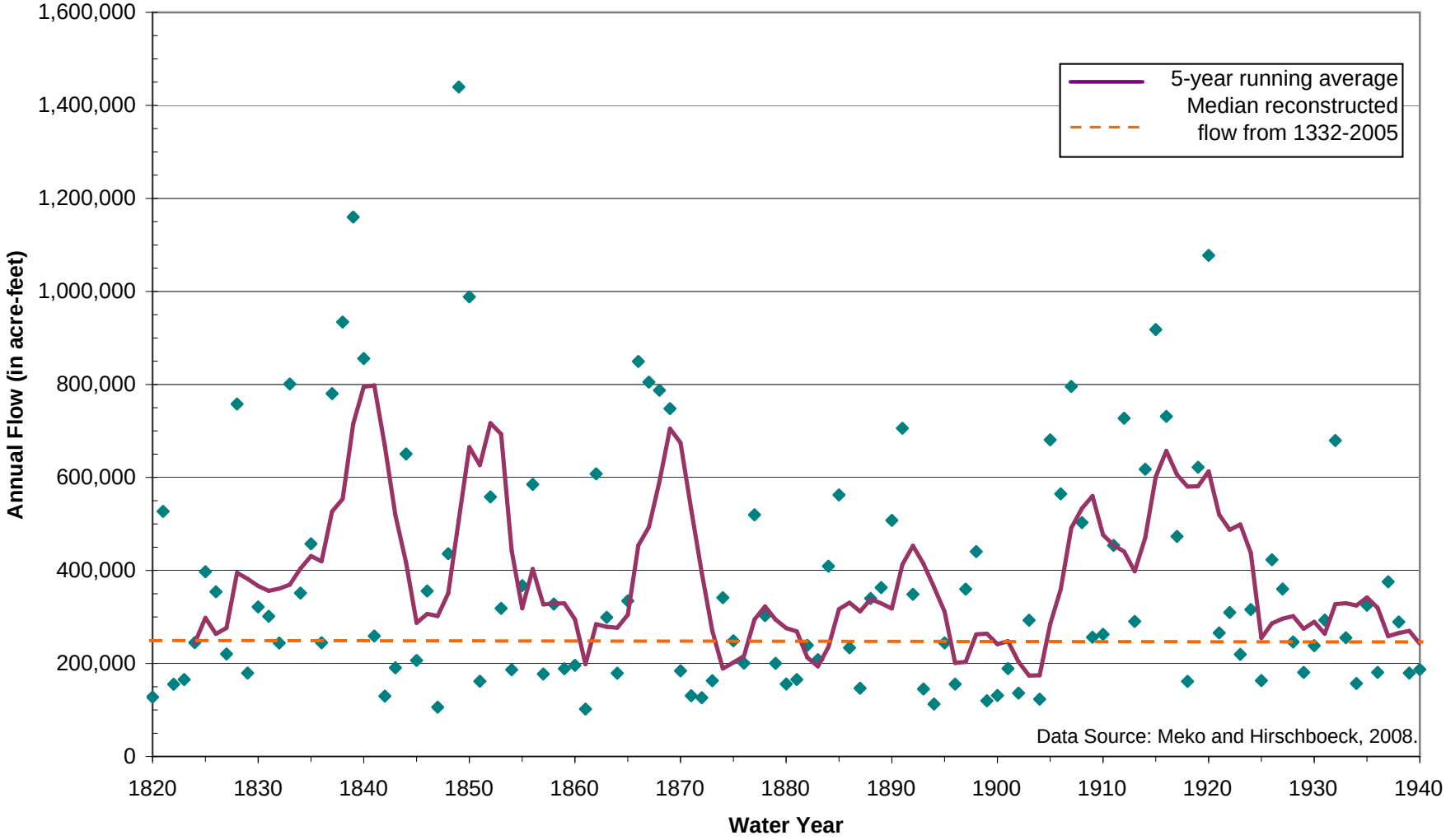
Arizona and New Mexico Railroad (constructed 1883–84)

Gila River

0 — 5 mi

Base map: U.S. Army Corps of Engineers (1954).

FIGURE 10 - ANNUAL GILA RIVER STREAMFLOWS NEAR SOLOMONVILLE, ARIZONA RECONSTRUCTED FROM 1820 TO 1940 USING TREE RINGS



ATTACHMENTS

ATTACHMENT A

Curriculum Vitae for Rich Burtell

RICHARD THOMAS BURTELL

4016 East Jojoba Road
Phoenix, Arizona 85044
602-327-7486
plateauresources@gmail.com

EDUCATION

- M.S. Hydrology, University of Arizona (1989)
- B.S. Geology, University of Pittsburgh (1986)

CERTIFICATION / RECENT TRAINING

- Registered Geologist, Arizona (No. 33746)
- Water Well and Pump Performance (American Ground Water Trust, 2013)
- Mine Geochemistry , Hydrology and Water Treatment Workshops (EPA, 2013)
- Section 404 Permitting and Groundwater Plume Analysis Workshops (AHS, 2012)
- Stream Restoration Course (WMG, 2011)

SUMMARY

Mr. Burtell is an environmental scientist with 25 years of project and management experience. Areas of expertise include water rights and demand analyses; evaluation of ground and surface water resources; remote sensing; land ownership assessments; environmental compliance; investigation of mine, fuel and waste storage facilities; contaminant hydrology; and, collection and analysis of environmental data. Management duties have included supervision of staff and consultants, project planning and coordination, report preparation, and litigation support.

EMPLOYMENT

- Plateau Resources LLC
  Principal and Owner
  Phoenix, AZ (2011-Present)

- Arizona Department of Water Resources
  Manager, Adjudications and Tech Support
  Phoenix, Arizona (1999-2011)

- Golden Environmental Management
  Senior Project Manager
  Tempe, Arizona (1998-1999)

- Montgomery Watson
  Supervising Hydrologist/ Geochemist
  Arizona and Colorado (1992-1998)

- Golder Associates Inc.
  Project Hydrologist/Geochemist
  Denver, Colorado (1990-1992)

- U.S. Geological Survey
  Staff Hydrologist/Geochemist
  Orlando, Florida (1989-1990)

- Phelps Dodge Inc.
  Hydrogeologist – Summer Intern
  Morenci, Arizona (1987)

EXPERIENCE

Project

- Evaluation of ground and surface water resources including aquifer testing, model development and review and GW/SW interactions
- Water rights analysis and legal review
- Stormwater, Section 404 , and mine exploration permits
- Preparation of Environmental Impact Statements and Aquifer Protection Permits
- Water demand determinations for agricultural, municipal, industrial, and riparian uses
- Phase I/II Environmental Site Assessments
- Remote sensing and surface mapping
- Contaminant hydrology and transport/ geochemical modeling
- Characterization of fuel and solid/ hazardous waste facilities
- Collection and analysis of hydrologic, geologic and water quality data

Management

- Supervision of environmental staff (up to 15 geologists, hydrologists, GIS analysts and administrative assistants) and consultants
- Project planning and scheduling
- Proposal and report preparation including document publication
- Coordination with interdisciplinary teams, stakeholders and regulators
- Litigation support (expert testimony, technical advisor to court, and settlement negotiations)
- Third party and peer review
- Budget development and control

COMMITTEES

- Water Resources Development Commission (served on Water Supply and Demand Committee)
- Western Navajo-Hopi Water Supply (Kyl) Study
- Upper San Pedro Partnership (served on Technical Advisory Committee)

AWARDS/HONORS

- Arizona Department of Water Resources
  - Supervisor of the year
  - Section of the year
  - Team and individual special achievement
- University of Arizona
  - Meritorious performance as teaching assistant
- University of Pittsburgh
  - Representative of graduating class
  - Tarr Award, Sigma Gamma Epsilon
  - Summa cum laude

PROFESSIONAL ORGANIZATIONS

- Arizona Geological Society
- Arizona Hydrological Society
- Arizona Riparian Council
- Arizona Water Well Association
- SME (Maricopa Section)

RECENT PUBLICATIONS/REPORTS

- *Water Demand and Conservation Assessment for the Town of Camp Verde* (2014)
- *Unmetered Residential and Non-residential Well Use in the Sierra Vista Subwatershed* (2013)
- *Estimated Water Demand and Conservation Potential of Domestic Wells in the Sierra Vista Subwatershed, Arizona* (2012)
- *Water Supply Options and Potential at the Fancher Mill Site* (2011)
- *Assessing Water Supply Vulnerability in a Water Scarce State: The Arizona Water Sustainability Evaluation* (prepared with Kelly Lacroix and Linda Stitzer and presented at the XIV World Water Congress, 2011)
- *Multi-Sector General Stormwater Permit Applications for the Ajo, Carlota, Fancher and Zonia Mines, Arizona* (2011)
- *Response to Comments and Objections Filed on ADWR's June 2009 Subflow Zone Delineation Report for the San Pedro River Watershed* (2011)
- *Land Ownership Within the San Pedro Riparian National Conservation Area* (2010)
- *Mapping of Holocene River Alluvium along the Verde River, Central Arizona* (prepared in cooperation with the Arizona Geological Survey, 2010)
- *Arizona Water Atlas, Volumes 1 through 8 (*2006-2010)
- *Catalog of Non-Exempt Registered Wells, Zuni Indian Water Rights Settlement* (2009)
- *Subflow Zone Delineation Report for the San Pedro River Watershed* (2009)
- *Preliminary Hydrographic Survey Report for the Hopi Indian Reservation* (2008)
- *Identification of Irrigated Lands in the Gila River Maintenance Area* (2008)
- *Review of the Settlement of Public Water Reserve No. 107 Claims in the San Pedro River Watershed* (2007)
- *Technical Assessment of the Tohono O'odham Nation, Gila River Indian Community, and Zuni Indian Tribe Water Rights Settlements* (2006)

RECENT AND CURRENT PROJECTS

- Aquifer Protection Permit for a marble quarry near Dragoon, AZ (Alpha Calcit Arizona Ltd.)
- Aquifer testing, well siting, and ground-water quality assessment for the proposed Fancher gold mill near Salome, AZ (Luxcor Gold)
- Exploration permit for the Idaho Placer Claim near Prescott Valley, AZ (various investors)
- Geochemical characterization of impacted waters and stormwater and 404 permitting for the Zonia copper mine near Prescott, AZ (Redstone Resources Corporation)
- Hydrogeologic and well permitting support for reclamation of the St. Anthony uranium mine, NM (Pueblo of Laguna)
- Litigation of Bonita Creek water rights issues near Payson, AZ (various plaintiffs)
- Navigability assessment for major intrastate streams, AZ (Freeport McMoRan Corporation)
- Review of federal reserved right claims for Aravaipa Canyon Wilderness Area, AZ (Freeport McMoRan Corporation)
- Water rights analyses, AZ (confidential client)
- Water supply evaluation of the Arctic Ice and Water company, AZ (various investors)
- Water use evaluation and analysis of conservation potential for domestic wells in the Sierra Vista Subwatershed, AZ (City of Sierra Vista and Western Resource Advocates)
- Water use evaluation for the town of Camp Verde, AZ (Western Resource Advocates)

ATTACHMENT B

Personal Narrative of Pattie's Exploration along the Upper Gila River

The Personal Narrative of James O. Pattie of Kentucky

During an expedition from St. Louis, through the vast regions between that place and the Pacific Ocean, and thence back through the City of Mexico to Vera Cruz, during journeyings of six years, etc.
Edited by Timothy Flint (1833)

Edited with Notes, Introductions, Index, etc., by

Reuben Gold Thwaites, LL.D.

Editor of "The Jesuit Relations and Allied Documents," "Original Journals of the Lewis and Clark Expedition," "Hennepin's New Discovery," etc.

(Separate publication from "Early Western Travels: 1748-1846," in which series this appeared as Volume XVIII)

Cleveland, Ohio
The Arthur H. Clark Company
1905

1st trip (1824-25)

over a very mountainous country four days, at the expiration of which time we reached this point of our destination. We were here but one night, and I had not leisure to examine the mode, in which the copper was manufactured. In the morning we hired two Spanish servants to accompany us; and taking a north-west course pursued our journey, until we reached the Helay on the 14th. We found the country the greater part of the two last days hilly and somewhat barren with a growth of pine, live oak, *pinion*, cedar and some small trees, of which I did not know the name. We caught thirty beavers, the first night we encamped on this river. The next morning, accompanied by another man, [53] I began to ascend the bank of the stream to explore, and ascertain if beaver were to be found still higher, leaving the remainder of the party to trap slowly up, until they should meet us on our return. We threw a pack over our shoulders, containing a part of the beavers, we had killed, as we made our way on foot. The first day we were fatigued by the difficulty of getting through the high grass, which covered the heavily timbered bottom. In the evening we arrived at the foot of mountains, that shut in the river on both sides, and encamped. We saw during the day several bears, but did not disturb them, as they showed no ill feeling towards us.

On the morning of the 13th we started early, and crossed the river, here a beautiful clear stream about thirty yards in width, running over a rocky bottom, and filled with fish. We made but little advance this day, as bluffs came in so close to the river, as to compel us to cross it thirty-six times. We were obliged to scramble along under the cliffs, sometimes upon our hands and knees, through a thick tangle of

---

time (1851) the headquarters of the boundary commission for the United States and Mexico. See Bartlett, *Personal Narrative of Explorations* (New York, 1854), i, pp. 226-239. Mining was resumed in 1873; the property is now operated by the Santa Rita Company, and is among the best equipped mines in the territory.— Ed.

grape-vines and under-brush. Added to the unpleasantness of this mode of getting along in itself, we did not know, but the next moment would bring us face to face with a bear, which might accost us suddenly. We were rejoiced, when this rough ground gave place again to the level bottom. At night we reached a point, where the river forked, and encamped on the point between the forks. We found here a boiling spring so near the main stream, that the fish caught in the one might be thrown into the other without leaving the spot, where it was taken. In six minutes it would be thoroughly cooked.

The following morning my companion and myself separated, agreeing to meet after four days at this spring. We were each to ascend a fork of the river. The banks of that which fell to my lot, were very brushy, and frequented by numbers of bears, of whom I felt fearful, as I had never before travelled alone in the woods. I walked on with caution until night, and encamped near a pile of drift wood, which I set on fire, thinking thus to frighten any animals that might approach during the night. [54] I placed a spit, with a turkey I had killed upon it, before the fire to roast. After I had eaten my supper I laid down by the side of a log with my gun by my side. I did not fall asleep for some time. I was aroused from slumber by a noise in the leaves, and raising my head saw a panther stretched on the log by which I was lying, within six feet of me. I raised my gun gently to my face, and shot it in the head. Then springing to my feet, I ran about ten steps, and stopped to reload my gun, not knowing if I had killed the panther or not. Before I had finished loading my gun, I heard the discharge of one on the other fork, as I concluded, the two running parallel with each other, separated only by a narrow ridge. A second discharge quickly followed the first, which led me to suppose, that my comrade was attacked by Indians.

I immediately set out and reached the hot spring by day

break, where I found my associate also. The report of my gun had awakened him, when he saw a bear standing upon its hind feet within a few yards of him growling. He fired his gun, then his pistol, and retreated, thinking, with regard to me, as I had with regard to him, that I was attacked by Indians. Our conclusion now was, to ascend one of the forks in company, and then cross over, and descend the other. In consequence we resumed the course, I had taken the preceding day. We made two day's journey, without beaver enough to recompense us for our trouble, and then crossed to the east fork, trapping as we went, until we again reached the main stream. Some distance below this, we met those of our party we had left behind, with the exception of the seven, who joined us on the del Norte. They had deserted the expedition, and set off upon their return down the river. We now all hastened on to overtake them, but it was to no purpose. They still kept in advance, trapping clean as they went, so that we even found it difficult to catch enough to eat.

Finding it impossible to come up with them, we ceased to urge our poor horses, as they were much jaded, and tender footed beside, and travelled slowly, catching what beaver we [55] could, and killing some deer, although the latter were scarce, owing, probably to the season of the year. The river here was beautiful, running between banks covered with tall cotton-woods and willows. This bottom extended back a mile on each side. Beyond rose high and rather barren hills.

On the 20th we came to a point, where the river entered a cavern between two mountains. We were compelled to return upon our steps, until we found a low gap in the mountains. We were three day's crossing, and the travelling was both fatiguing and difficult. We found nothing to kill.

On the 23d we came upon the river, where it emptied into a beautiful plain. We set our traps, but to no purpose, for

the beavers were all caught, or alarmed. The river here pursues a west course. We travelled slowly, using every effort to kill something to eat, but without success.

On the morning of the 26th we concluded, that we must kill a horse, as we had eaten nothing for four day's and a half, except the small portion of a hare caught by my dogs, which fell to the lot of each of a party of seven. Before we obtained this, we had become weak in body and mind, complaining, and desponding of our success in search of beaver. Desirous of returning to some settlement, my father encouraged our party to eat some of the horses, and pursue our journey. We were all reluctant to begin to partake of the horse-flesh; and the actual thing without bread or salt was as bad as the anticipation of it. We were somewhat strengthened, however, and hastened on, while our supply lasted, in the hope of either overtaking those in advance of us, or finding another stream yet undiscovered by trappers.

The latter desire was gratified the first of January, 1825. The stream, we discovered, carried as much water as the Helay, heading north. We called it the river St. Francisco.[54] After travelling up its banks about four miles, we encamped, and set all our traps, and killed a couple of fat turkies. In the morning we examined our traps, and found in them 37 beavers! This success restored our spirits instantaneously. Exhilarating [56] prospects now opened before us, and we pushed on with animation. The banks of this river are for the most part incapable of cultivation being in many places formed of high and rugged mountains. Upon these we saw multitudes of mountain sheep.[55] These animals are not found on level ground, being there slow of foot, but on these cliffs and rocks they are so nimble and expert in jumping

[54] The present name of this stream, one of the initial forks of the Gila. The confluence is in Arizona, a few miles over the New Mexican border.— Ed.

[55] The Rocky Mountain sheep (*Ovis montana*) was well described by Lewis and Clark.— Ed.

from point to point, that no dog or wolf can overtake them. One of them that we killed had the largest horns, that I ever saw on animals of any description. One of them would hold a gallon of water. Their meat tastes like our mutton. Their hair is short like a deer's, though fine. The French call them the *gros cornes*, from the size of their horns which curl around their ears, like our domestic sheep. These animals are about the size of a large deer. We traced this river to its head, but not without great difficulty, as the cliffs in many places came so near the water's edge, that we were compelled to cross points of the mountain, which fatigued both ourselves and our horses exceedingly.

The right hand fork of this river, and the left of the Helay head in the same mountain, which is covered with snow, and divides its waters from those of Red river. We finished our trapping on this river, on the 14th. We had caught the very considerable number of 250 beavers, and had used and preserved most of the meat, we had killed. On the 19th we arrived on the river Helay, encamped, and buried our furs in a secure position, as we intended to return home by this route.

On the 20th we began to descend the Helay, hoping to find in our descent another beaver stream emptying into it. We had abandoned the hope of rejoining the hunters, that had left us, and been the occasion of our being compelled to feed upon horse flesh. No better was to be expected of us, than that we should take leave to imprecate many a curse upon their heads; and that they might experience no better fate, than to fall into the hands of the savages, or be torn in pieces by the white bears. At the same time, so ready are the hearts of mountain hunters to relent, that I have not a doubt that each man of us would [57] have risqued his life to save any one of them from the very fate, we imprecated upon them.

In fact, on the night of the 22d, four of them, actually

half starved, arrived at our camp, declaring, that they had eaten nothing for five days. Notwithstanding our recent curses bestowed upon them, we received them as brothers. They related that the Indians had assaulted and defeated them, robbing them of all their horses, and killing one of their number. Next day the remaining two came in, one of them severely wounded in the head by an Indian arrow. They remained with us two days, during which we attempted to induce them to lead us against the Indians, who had robbed them, that we might assist them to recover what had been robbed from them. No persuasion would induce them to this course. They insisted at the same time, that if we attempted to go on by ourselves, we should share the same fate, which had befallen them.

On the morning of the 25th, we gave them three horses, and as much dried meat as would last them to the mines, distant about 150 miles. Fully impressed, that the Indians would massacre us, they took such a farewell of us, as if never expecting to see us again.

In the evening of the same day, although the weather threatened a storm, we packed up, and began to descend the river. We encamped this night in a huge cavern in the midst of the rocks. About night it began to blow a tempest, and to snow fast. Our horses became impatient under the pelting of the storm, broke their ropes, and disappeared. In the morning, the earth was covered with snow, four or five inches deep. One of our companions accompanied me to search for our horses. We soon came upon their trail, and followed it, until it crossed the river. We found it on the opposite side, and pursued it up a creek, that empties into the Helay on the north shore. We passed a cave at the foot of the cliffs. At its mouth I remarked, that the bushes were beaten down, as though some animal had been browsing upon them. I was aware, that a bear had entered the cave. We collected some pine knots, split them with our toma-

to attack such a dangerous animal in its den, when the failure to kill it outright by the first shot, would have been sure to be followed by my death.

Four of us were detached to the den. We were soon enabled [59] to drag the bear to the light, and by the aid of our beast to take it to camp. It was both the largest and whitest bear I ever saw. The best proof, I can give, of the size and fatness is, that we extracted ten gallons of oil from it. The meat we dried, and put the oil in a trough, which we secured in a deep crevice of a cliff, beyond the reach of animals of prey. We were sensible that it would prove a treasure to us on our return.

On the 28th we resumed our journey, and pushed down the stream to reach a point on the river, where trapping had not been practised. On the 30th, we reached this point, and found the man, that the Indians had killed. They had cut him in quarters, after the fashion of butchers. His head, with the hat on, was stuck on a stake. It was full of the arrows, which they had probably discharged into it, as they had danced around it. We gathered up the parts of the body, and buried them.

At this point we commenced setting our traps. We found the river skirted with very wide bottoms, thick-set with the musquito trees,[56] which bear a pod in the shape of a bean, which is exceedingly sweet. It constitutes one of the chief articles of Indian subsistence; and they contrive to prepare from it a very palatable kind of bread, of which we all became very fond. The wild animals also feed upon this pod.

On the 31st we moved our camp ten miles. On the way we noted many fresh traces of Indians, and killed a bear,

[56] There are at least three varieties of mesquit-tree (*prosopis*) in New Mexico and Arizona. It is related to the acacia and locust; and the fruit, consisting of ten or twelve beans in a sweet, pulpy pod, is gathered by the Indians, pounded in a mortar, and made into bread. A prolific tree will yield ten bushels of beans in the hull. The Comanche also concoct an intoxicating drink from this bean.— Ed.

that attacked us. The river pursues a west course amidst high mountains on each side. We trapped slowly onward, still descending the river, and unmolested by the Indians. On the 8th of February, we reached the mouth of a small river entering the Helay on the north shore. Here we unexpectedly came upon a small party of Indians, that fled at the sight of us, in such consternation and hurry, as to leave all their effects, which consisted of a quantity of the bread mentioned above, and some robes made of rabbit skins. Still more; they left a small child. The child was old enough to distinguish us from its own people, for it opened its little throat, and screamed so lustily, that we feared it would have fits. The poor thing meanwhile made its [60] best efforts to fly from us. We neither plundered nor molested their little store. We bound the child in such a manner, that it could not stray away, and get lost, aware, that after they deemed us sufficiently far off, the parents would return, and take the child away. We thence ascended the small river about four miles, and encamped. For fear of surprize, and apprehending the return of the savages, that had fled from us, and perhaps in greater force, we secured our camp with a small breast-work. We discovered very little encouragement in regard to our trapping pursuit, for we noted few signs of beavers on this stream. The night passed without bringing us any disturbance. In the morning two of us returned to the Indian camp. The Indians had re-visited it, and removed every thing of value, and what gave us great satisfaction, their child. In proof, that the feelings of human nature are the same every where, and that the language of kindness is a universal one; in token of their gratitude, as we understood it, they had suspended a package on a kind of stick, which they had stuck erect. Availing ourselves of their offer, we examined the present, and found it to contain a large dressed buck skin, an article, which we greatly needed for moccasins, of which some of us

were in pressing want. On the same stick we tied a red handkerchief by way of some return.

We thence continued to travel up this stream four days in succession, with very little incident to diversify our march. We found the banks of this river plentifully timbered with trees of various species, and the land fine for cultivation. On the morning of the 13th, we returned to the Helay, and found on our way, that the Indians had taken the handkerchief, we had left, though none of them had shown any disposition, as we had hoped, to visit us. We named the stream we had left, the deserted fork, on account of having found it destitute of beavers. We thence resumed our course down the Helay, which continues to flow through a most beautiful country. Warned by the frequent traces of fresh Indian foot-prints, we every night adopted [61] the expedient of enclosing our horses in a pen, feeding them with cotton-wood bark, which we found much better for them than grass.

On the 16th, we advanced to a point, where the river runs between high mountains, in a ravine so narrow, as barely to afford it space to pass. We commenced exploring them to search for a gap, through which we might be able to pass. We continued our expedition, travelling north, until we discovered a branch, that made its way out of the mountains. Up its ravine we ascended to the head of the branch. Its fountains were supplied by an immense snow bank, on the summit of the mountain. With great labor and fatigue we reached this summit, but could descry no plains within the limits of vision. On every side the peaks of ragged and frowning mountains rose above the clouds, affording a prospect of dreariness and desolation, to chill the heart. While we could hear the thunder burst, and see the lightning glare before us, we found an atmosphere so cold, that we were obliged to keep up severe and unremitting exercise, to escape freezing.

ten beavers in our traps, and Allen was detached with me to clear away a path, through which the pack horses might pass. We were obliged to cross the river twelve times in the course of a single day. We still discovered the fresh foot-prints of Indians, who had deserted their camps, and fled before us. We were continually apprehensive, that they would fire their arrows upon us, or overwhelm us with rocks, let loose upon us from the summits of the high cliffs, directly under which we were obliged to pass. The third day, after we had left our company, I shot a wild goose in the river. The report of my gun raised the screams of women and children. Too much alarmed to stop for my game, I mounted my horse, and rode toward them, with a view to convince them, or in some way, to show them, that we intended them no harm. We discovered them ahead of us, climbing the mountains, the men in advance of the women, and all fleeing at the top of their speed. As soon as they saw us, they turned, and let fly a few arrows at us, one of which would have despatched my companion, had he not been infinitely dextrous in dodging. Hungry and fatigued and by no means in the best humor, my companion returned [63] them abundance of curses for their arrows. From words he was proceeding to deeds, and would undoubtedly have shot one of them, had I not caught his gun, and made him sensible of the madness of such a deed. It was clearly our wisdom to convince them, that we had no inclination to injure them. Some of them were clad in robes of rabbit skins, part of which they shed, in their hurry to clamber over the rocks.

Finding ourselves unable to overtake them, we returned to their camp, to discover if they had left any thing that we could eat. At no great distance from their camp, we observed a mound of fresh earth, in appearance like one of our coal kilns. Considering it improbable, that the Indians would be engaged in burning coal, we opened the mound,

and found it to contain a sort of vegetable that had the appearance of herbage, which seemed to be baking in the ground, to prepare it for eating. I afterwards ascertained, that it was a vegetable, called by the Spanish, mascal, (probably maguey.)[57] The Indians prepare it in this way, so as to make a kind of whiskey of it, tasting like crab-apple cider. The vegetable grows in great abundance on these mountains.

Next day we came to the point, where the river discharges its waters from the mountains on to the plains. We thence returned, and rejoined our company, that had been making their way onward behind us. March 3d, we trapped along down a small stream, that empties into the Helay on the south side, having its head in a south west direction. It being very remarkable for the number of its beavers, we gave it the name of Beaver river. At this place we collected 200 skins; and on the 10th continued to descend the Helay, until the 20th, when we turned back with as much fur, as our beasts could pack. As yet we had experienced no molestation from the Indians, although they were frequently descried skulking after us, and gathering up the pieces of meat, we had thrown away. On the morning of the 20th we were all prepared for an early start, and my father, by way of precaution, bade us all discharge our guns at the word of command, and then re-load them afresh, [64] that we might, in case of emergency, be sure of our fire. We were directed to form in a line, take aim, and at the word, fire at a tree. We gave sufficient proofs, that we were no strangers to the rifle, for every ball had lodged close to the centre of our mark. But the report of our guns was answered by the yell of more

[57] The maguey is the American aloe (*Agave americana*). The Mexicans and Indians cut off the leaves near the root, leaving a head the size of a large cabbage. The heads are placed in the ground, overlaid with earth, and for a day a fire is kept burning on top of them; they are then eaten, tasting something like a beet. The roasted heads are also placed in a bag made of hides, and allowed to ferment, producing the liquor known as "mescal."— Ed.

in silence and concealment, until we were close by it. We found the persons women and children. Having no disposition to harm them, we fired a gun over their heads, which caused them instantly to fly at the extent of their speed. Hunger knows no laws: and we availed ourselves of their provision, which proved to be mascal, and grass seed, of which we made mush. Scanty as this nutriment was, it was sufficient to sustain life.

We commenced an early march on the 6th, and were obliged to move slowly, as we were bare-footed, and the mountains rough and steep. We found them either wholly barren, or only covered with a stinted growth of pine and cedar, live oak and barbary bushes. On the 8th, our provisions were entirely exhausted, and so having nothing to eat, we felt the less need of water. Our destitute and forlorn condition goaded us on, so that we reached the Helay on the 12th. We immediately began to search for traces of beavers, where to set our traps, but found none. On the morning of the 13th, we killed a raven, which we cooked for seven men. It was unsavory flesh in itself, and would hardly have afforded a meal for one hungry man. The miserable condition of our company may be imagined, when seven hungry men, who had not eaten a full meal for ten days, were all obliged to breakfast on this nauseous bird. We were all weak and emaciated. But I was young [71] and able to bear hardships. My heart only ached for my poor father who was reduced to a mere skeleton. We moved on slowly and painfully, until evening, when we encamped. On my return from setting our two traps, I killed a buzzard, which, disagreeable as it was, we cooked for supper. In the morning of the 18th, I found one of the traps had caught an otter.

This served for breakfast and supper. It seemed the means of our present salvation, for my father had become so weak, that he could no longer travel. We therefore

encamped early, and three of us went out to hunt deer among the hills. But in this sad emergency we could find none. When we returned, my father had prepared lots, that we should draw, to determine who of us should kill one of the dogs. I refused through fear that the lot would fall to me. These faithful companions of our sufferings were so dear to me, that I felt as though I could not allow them to be killed to save my own life; though to save my father, I was aware that it was a duty to allow it to be done.

We lay here until the 18th, my father finding the flesh of the dog both sweet, nutritive and strengthening. On the 18th, he was again able to travel; and on the 20th, we arrived at Bear creek, where we hid the bears oil, which we found unmolested. We lay here two days, during which time we killed four deer and some turkies. The venison we dried, and cased the skin of one of the deer, in which to carry our oil. We commenced an early march on the 23d, and on the 25th reached the river San Francisco, where we found our buried furs all safe. I suffered exceedingly from the soreness of my feet, giving me great pain and fever at night. We made from our raw deer skins a very tolerable substitute for shoes. The adoption of this important expedient enabled us to push on, so that we reached the Copper mines on the 29th.

The Spaniards seemed exceedingly rejoiced, and welcomed us home, as though we were of their own nation, religion and kindred. They assured us, that they had no expectation ever to see us again. The superintendent of the mines, especially, who appeared to me a gentleman of the highest order, received [72] us with particular kindness, and supplied all our pressing wants. Here we remained, to rest and recruit ourselves, until the 2d of May. My father then advised me to travel to Santa Fe, to get some of our goods, and purchase a new supply of horses, with which to return, and bring in our furs. I had a horse, which we had taken

2nd trip (1826)

is not worked, as not being so profitable, as either the copper or gold mines.

We remained here to the last of December, when the settlement was visited by a company of French trappers, who were bound for Red river.[81] We immediately made preparations to return with them, which again revived the apprehensions of don Juan, that the Indians would break in upon the settlement as soon as we were gone, and again put an end to the working of the mines. To detain us effectually, he proposed to rent the mines to us for five years, at a thousand dollars a year. He was willing to furnish provisions for the first year gratis, and pay us for all the improvements we should make on the establishment. We could not but be aware, that this was an excellent offer. My father accepted it. The writings were drawn, and my father rented the establishment on his own account, selecting such partners as he chose.

I, meanwhile, felt within me an irresistible propensity to resume the employment of trapping. I had a desire, which I can hardly describe, to see more of this strange and new country. My father suffered greatly in the view of my parting with him, and attempted to dissuade me from it. He strongly painted the dangers of the route, and represented to me, that I should not find these Frenchmen like my own country people, for companions. All was unavailing to change my fixed purpose, and we left the mines, January 2d, 1826.

We travelled down the river Helay, of which I have formerly [82] given a description, as far as the point where we had left it for Battle-hill. Here, although we saw fresh Indian signs, we met with no Indians. Where we encamped for the night, there were arrows sticking in the ground. We made an early start on the 16th, and at evening came upon

[81] The Red is here used as one of the rather infrequent names for the Colorado.— Ed.

3rd trip (1827-28)

of that sort down Red river. My father joined this company, and in the name of the companions made application for license of safe transit through the province of Chihuahua, and Sonora, through which runs the Red river, on which we meant to trap. The governor gave us a passport in the following terms:

[133] Custom House of the frontier town of Santa Fe, in the territory of New Mexico.

Custom House Certificate.

Allow Sylvester Pattie, to pursue his journey with certain beasts, merchandize and money, in the direction of Chihuahua and Sonora; to enter in beasts and money an amount equal to this invoice, in whatsoever place he shall appear, according to the rules of the Custom House, on his passage; and finally let him return this permit to the government of this city in days. Do this under the established penalties.

Given at Santa Fe, in New Mexico.

RAMON ATTREN

September 22d, 1827.

On the 23d, my father was chosen captain or commander of the company, and we started on our expedition. We retraced our steps down the del Norte, and by the mines to the river Helay, on which we arrived on the 6th of October, and began to descend it, setting our traps as we went, near our camp, whenever we saw signs of beavers. But our stay on this stream was short, for it had been trapped so often, that there were but few beavers remaining, and those few were exceedingly shy. We therefore pushed on to some place where they might be more abundant, and less shy. We left this river on the 12th, and on the 15th reached Beaver river. Here we found them in considerable numbers, and we concluded to proceed in a south course, and trap the river in its downward course. But to prevent the

ATTACHMENT C

Notes and Journals from Kearny's March along the Upper Gila River

THIRTIETH CONGRESS—FIRST SESSION.

Ex. Doc. No. 41.

NOTES OF A MILITARY RECONNOISSANCE,

FROM

FORT LEAVENWORTH, IN MISSOURI,

TO

SAN DIEGO, IN CALIFORNIA,

INCLUDING PART OF THE

ARKANSAS, DEL NORTE, AND GILA RIVERS.

BY LIEUT. COL. W. H. EMORY.

MADE IN 1846-7, WITH THE ADVANCED GUARD OF THE "ARMY OF THE WEST."

FEBRUARY 9, 1848.—Ordered to be printed.

FEBRUARY 17, 1848.—*Ordered*, That 10,000 extra copies of each of the Reports of Lieutenant Emory, Captain Cooke, and Lieutenant Abert, be printed for the use of the House; and that of said number, 230 copies be furnished for the use of Lieutenant Emory, Captain Cooke, and Lieutenant Abert, respectively.

WASHINGTON:

WENDELL AND VAN BENTHUYSEN, PRINTERS.

1848.

An Apache has just come in, and says the people who agreed to meet us at the spring yesterday are coming on with some mules to trade.

Three miles from the camp of last night we had reached the "divide," and from that point the descent was regular and continuous to Night creek. The ravines on either side of the "divide" are covered with fragments of blue limestone and rich specimens of the magnetic oxides of iron.

October 20.—My curiosity was excited to see by daylight how my camp was disposed and what sort of place we were in. It was quite certain the broad, level valley we had been traveling the last few miles was narrowing rapidly, by the intrusion of high precipices; and the proximity of great mountains in confused masses indicated some remarkable change in the face of the country. We were, in truth, but a few miles from the Gila, which I was no less desirous of seeing than the Del Norte.

The general sent word to the Apaches he would not start till 9 or 10. This gave them time to come in, headed by their chief, Red Sleeve. They swore eternal friendship to the whites, and everlasting hatred to the Mexicans. The Indians said that one, two or three white men might now pass in safety through their country; that if they were hungry, they would feed them; or, if on foot, mount them. The road was open to the American now and forever. Carson, with a twinkle of his keen hazel eye, observed to me, "I would not trust one of them."

The whole camp was now busily engaged in attempting to trade. The Indians had mules, ropes, whips and mezcal. We wished to get a refit in all save the mezcal, offering to give in exchange red shirts, blankets, knives, needles, thread, handkerchiefs, &c., &c.; but these people had such extravagant notions of our wealth, it was impossible to make any progress. At length the call of "boots and saddles" sounded. The order, quickness and quietude of our movements seemed to impress them. One of the chiefs, after eyeing the general with great apparent admiration, broke out in a vehement manner: "You have taken New Mexico, and will soon take California; go, then, and take Chihuahua, Durango and Sonora. We will help you. You fight for land; we care nothing for land; we fight for the laws of Montezuma and for food. The Mexicans are rascals; we hate and will kill them all." There burst out the smothered fire of three hundred years! Finding we were more indifferent than they supposed to trade, and that the column was in motion, they became at once eager for traffic.

They had seen some trumpery about my camp which pleased them, and many of them collected there. My packs were made. One of my gentlest mules at that moment took fright, and went off like a rocket on the back trail, scattering to the right and left all who opposed him. A large, elegant looking woman, mounted a straddle, more valiant than the rest, faced the brute and charged upon him at full speed. This turned his course back to the camp; and I rewarded her by half a dozen biscuit, and through her intervention, succeeded in trading two broken down mules for two.

good ones, giving two yards of scarlet cloth in the bargain. By this time a large number of Indians had collected about us, all differently dressed, and some in the most fantastical style. The Mexican dress and saddles predominated, showing where they had chiefly made up their wardrobe. One had a jacket made of a Henry Clay flag, which aroused unpleasant sensations, for the acquisition, no doubt, cost one of our countrymen his life. Several wore beautiful helmets, decked with black feathers, which, with the short shirt, waist belt, bare legs and buskins gave them the look of pictures of antique Grecian warriors. Most were furnished with the Mexican cartridge box, which consists of a strap round the waist, with cylinders inserted for the cartridges.

These men have no fixed homes. Their houses are of twigs, made easily, and deserted with indifference. They hover around the beautiful hills that overhang the Del Norte between the 31st and 32d parallels of latitude, and look down upon the States of Chihuahua and Sonora; and woe to the luckless company that ventures out unguarded by a strong force. Their hills are covered with luxuriant grama, which enables them to keep their horses in fine order, so that they can always pursue with rapidity and retreat with safety. The light and graceful manner in which they mounted and dismounted, always upon the right side, was the admiration of all. The children are on horseback from infancy. There was amongst them a poor deformed woman, with legs and arms no longer than an infant's. I could not learn her history, but she had a melancholy cast of countenance. She was well mounted, and the gallant manner in which some of the plumed Apaches waited on her, for she was perfectly helpless when dismounted, made it hard for me to believe the tales of blood and vice told of these people. She asked for water, and one or two were at her side; one handed it to her in a tin wash basin, which, from its size, was the favorite drinking cup.

We wended our way through the narrow valley of Night creek. On each side were huge stone buttes shooting up into the skies.

At one place we were compelled to mount one of these spurs almost perpendicular. This gave us an opportunity of seeing what a mule could do. My conclusion was, from what I saw, that they could climb nearly as steep a wall as a cat. A pack slipped from a mule, and, though not shaped favorably for the purpose, rolled entirely to the base of the hill, over which the mules had climbed.

A good road was subsequently found turning the spur and following the creek, until it debouched into the Gila, which was only a mile distant.

Some hundred yards before reaching this river the roar of its waters made us understand that we were to see something different from the Del Norte. Its section, where we struck it, (see the map,) 4,347 feet above the sea, was 50 feet wide and an average of two feet deep. Clear and swift, it came bouncing from the great mountains which appeared to the north about 60 miles distant. We crossed the river, its large round pebbles and swift current causing the mules to tread wearily.

We followed its course, and encamped under a high range of symmetrically formed hills overhanging the river. Our camp resembled very much the centre of a yard of huge stacks.

We heard the fish playing in the water, and soon those who were disengaged were after them. At first it was supposed they were the mountain trout, but, being comparatively fresh from the hills of Maine, I soon saw the difference. The shape, general appearance, and the color are the same; at a little distance, you will imagine the fish covered with delicate scales, but on a closer examination you will find that they are only the impression of scales. The meat is soft, something between the trout and the cat-fish, but more like the latter. They are in great abundance.

We saw here also, in great numbers, the blue quail. The bottom of the river is narrow, covered with large round pebbles. The growth of trees and weeds was very luxuriant; the trees chiefly cotton-wood, a new sycamore, mezquite, pala, (the tallow tree of our hunters,) a few cedars, and one or two larch. There were some grape and hop vines.

16 circum-meridian observations beta aquarii, and 9 of polaris, give the latitude of this camp 32° 50′ 08″. Its approximate longitude is 108° 45′ 00″.

October 21.—After going a few miles, crossing and recrossing the river a dozen times, it was necessary to leave its bed to avoid a cañon. This led us over a very broken country, traversed by huge dykes of trap and walls of basalt. The ground was literally covered with the angular fragments of these hard rocks.

From one of these peaks we had an extended view of the country in all directions. The mountains run from northwest to southeast, and rise abruptly from the plains in long narrow ridges, resembling trap dykes on a great scale. These chains seem to terminate at a certain distance to the south, leaving a level road, from the Del Norte about the 32d parallel of latitude, westward to the Gila. These observations, though not conclusive, agree with the reports of the guides, who say Colonel Cooke will have no difficulty with his wagons.

The mountains were of volcanic rock of various colors, feldspathic granite, and red sand stone, with a dip to the northwest, huge hills of a conglomerate of angular and rounded fragments of quartz, basalt, and trap cemented by a substance that agrees well with the description I have read of the puzzolana of Rome.

The earth in the river bed, where it was not paved with the fragments of rocks, was loose, resembling volcanic dust, making it unsafe to ride out of the beaten track. A mule would sometimes sink to his knee; but the soil was easily packed, and three or four mules in advance made a good firm trail.

This was a hard day on the animals, the steep ascents and descents shifting the packs, and cutting them dreadfully.

The howitzers did not reach camp at all.

A few pounds of powder would blast the projections of rock from the cañon, and make it passable for packs, and possibly for wagons also. The route upon which the wagons are to follow is,

however, to the south of this. Under this date, in the catalogue of plants will be found many differing from those heretofore observed; amongst them the zanschneria Californica, also a new shrub with an edible nut, a grass allied to the grama, Adam's needle, artemisia cana, and many varieties of mezquite.

October 22.—The howitzers came up about nine o'clock, having, in the previous day's work, their shafts broken, and, indeed, everything that was possible to break about them. We again left the river to avoid a cañon, which I examined in several places, and saw no obstacles to a good road. The cañon was formed by a seam of basalt, overlaying limestone and sand-stone in regular strata. Through these the river cuts its way.

Many deep arroyos have paid tribute to the Gila, but in none have we yet found water. Following the bed of one of these, to examine the eccentric geological formation it displayed, I found unknown characters written on a rock, copies of which were made, but their antiquity is questionable.

We were now fast approaching the ground where rumor and the maps of the day place the ruins of the so called Aztec towns. This gave the characters alluded to additional interest; they were indented on a calcareous sandstone rock, chrome colored on the outside, presenting a perfectly white fracture. This made them very conspicuous, and easily seen from a distance. The coloring matter of the external face of the rock may proceed from water, as there was above the characters a distinct water-line, and every appearance that this gorge had more than once been the scene of overflows and devastation.

We encamped on a bluff high above the river, in view of a rock which we named, from its general appearance, Steeple rock.

Latitude of our camp to-night, by 17 circum-meridian altitudes of beta aquarii, 32° 38′ 13″. Longitude 109° 07′ 30″.

October 23.—Last night the heavens became overcast, the air damp, and we expected for the first time since leaving Santa Fé, (a month to-morrow,) to have a sprinkle of rain; but, at 9 this morning, the clouds had all been chased away, and the sun careered up in undisputed possession of all above the horizon. The atmosphere resumed its dryness and elasticity, and at night the stars looked brighter, and the depth of the spaces between greater, than ever.

The changes of temperature are very great, owing to the distance from the influence of large masses of water, and, if they were accompanied by corresponding changes in humidity, they would be insupportable. Last night we went to bed with the thermometer at 70° Fahrenheit, and awakened this morning shivering, the thermometer marking 25°; yet, notwithstanding, our blankets were as dry as though we had slept in a house.

The table land, 150 feet above the river, was covered so thick with large paving pebbles, as to make it difficult to get a smooth place to lie upon.

The growth of to-day and yesterday, on the hills and in the valleys, very much resembles that on the Del Norte, the only exceptions being a few new and beautiful varieties of the cactus. After

leaving our last night's camp, for a mile, the general appearance, width of the valley, and soil, much resemble the most fertile parts of that river. This, so far, has decidedly the best soil, and the fall of the river being greater, makes it more easy to irrigate.

To-day we passed one of the long sought ruins. I examined it minutely, and the only evidences of handicraft remaining, were immense quantities of broken pottery, extending for two miles along the river. There were a great many stones, rounded by attrition of the water, scattered about; and, if they had not occasionally been disposed in lines forming rectangles with each other, the supposition would be, that they had been deposited there by natural causes.

October 24.—To-day we laid by to recruit. Although the moon was not in a favorable position, I availed myself of the opportunity to get a few lunar distances. 18 circum-meridian altitude of beta aquarii, and 12 altitudes of polaris, give for the latitude of the place 32° 44′ 52″, and 8 distances between ¢ and Fomalhaut give for the longitude 109° 22′ 00″. We feasted to-day on the blue quail and teal, and at night Stanly came in with a goose. "Signs" of beaver and deer were very distinct; these, with the wolf, constitute the only animals yet traced on the river.

October 25.—The general character of the country is much the same as before represented; but towards camp, it broke into irregular and fantastic looking mountains. A rose-colored tint was imparted to the whole landscape, by the predominance of red feldspar. The road became broken and difficult as it wound its way around two short cañons.

We were now in the regions made famous in olden times by the fables of Friar Marcos, and eagerly did we ascend every mound, expecting to see in the distance what I fear is but the fabulous "Casa Montezuma." Once, as we turned a sharp hill, the bold outline of a castle presented itself, with the tops of the walls horizontal, the corners vertical, and apparently one front bastioned. My companion agreed with me that we at last beheld this famed building; on we spurred our unwilling brutes; restless for the show, I drew out my telescope, when to my disappointment a clay butte, with regular horizontal seams, stood in the place of our castle; but to the naked eye the delusion was complete. It is not impossible that this very butte, which stands on an imposing height in the centre of a vast amphitheatre of turreted hills, has been taken by the trappers, willing to see, and more especially to report marvellous things, for the "Casa Montezuma." The Indians here do not know the name Aztec. Montezuma is the outward point in their chronology; and as he is supposed to have lived and reigned for all time preceding his disappearance, so do they speak of every event preceding the Spanish conquest as of the days of Montezuma.

The name, at this moment, is as familiar to every Indian, Puebla, Apache, and Navajoe, as that of our Saviour or Washington is to us. In the person of Montezuma, they unite both qualities of divinity and patriot.

We passed to-day the ruins of two more villages similar to those of yesterday. The foundation of the largest house seen yesterday was 60 by 20 feet; to-day, 40 by 30. About none did we find any vestiges of the mechanical arts, except the pottery; the stone forming the supposed foundation was round and unhewn, and some cedar logs were also found about the houses, much decayed, bearing no mark of an edged tool. Except these ruins, of which not one stone remained upon another, no marks of human hands or foot-step have been visible for many days, until to-day we came upon a place where there had been an extensive fire. Following the course of this fire, as it bared the ground of the shrubbery, and exposed the soil, &c., to view, I found what was to us a very great vegetable curiosity, a cactus, 18 inches high, and 18 inches in its greatest diameter, containing 20 vertical volutes, armed with strong spines. When the traveller is parched with thirst, one of these, split open, will give sufficient liquid to afford relief. Several of these cacti were found nearly torn from the earth, and lying in the dry bed of a stream.

These and the mezquite, acacia, prosopis odorata, and prosopis glandulosa, now form the principal growth. Under the name mezquite, the voyageur comprises all the acacia and prosopis family.

Last night, about nine o'clock, I heard the yell of a wolf, resembling that of a four months' old pup. In a few minutes there was a noise like distant thunder. "Stampede!" shouted a fellow, and in an instant every man was amongst the mules. With one rush they had broken every rope; and this morning, when we started, one of our mules was missing, which gave us infinite annoyance. Our party is so economically provided that we could not afford to lose even a mule, and I left four men to look it up, who did not rejoin us till night.

A question arose involving a serious point of mountain law, which differs somewhat from prairie law. One of my party captured a beautiful dun colored mule, which was claimed by another party; the one claiming the prize for having first seen the animal and then catching it with the lazo. The other pleaded ownership of the rope, used as a lazo, as its title. It was settled to the satisfaction of the first.

The mule was one which Carson had left on his way out, and on being asked *why he did not claim it, he said it was too young* to be useful in packing, and as we now had plenty of beef, it would not be required for food, and he did not care about it.

October 26.—Soon after leaving camp, the banks of the river became gullied on each side by deep and impassable arroyos. This drove us insensibly to the mountains, until at length we found ourselves some thousand feet above the river, and it was not until we had made sixteen miles that we again descended to it. This distance occupied eight and a half hours of incessant toil to the men, and misery to our best mules. Some did not reach camp at all, and when the day dawned one or two, who had lost their way, were seen on the side of the mountain, within a few steps of a high precipice, from which it required some skill to extricate them. The men named this pass "the Devil's turnpike," and I see no reason to

change it. The whole way was a succession of steep ascents and descents, paved with sharp, angular fragments of basalt and trap. The metallic clink of spurs, and the rattling of the mule shoes, the high black peaks, the deep dark ravines, and the unearthly looking cactus, which stuck out from the rocks like the ears of Mephistopheles, all favored the idea that we were now treading on the verge of the regions below. Occasionally a mule gave up the ghost, and was left as a propitiatory tribute to the place. This day's journey cost us some twelve or fifteen mules; one of mine fell headlong down a precipice, and, to the surprise of all, survived the fall.

The barometric height was taken several times to-day. Long and anxious was my study of these mountains, to ascertain something of their general direction and form. Those on the north side swept in something like a regular curve from our camp of last night to the mouth of the San Carlos, deeply indented in two places by the ingress into the Gila of the Prierte (Black) and Azul (Blue) rivers. Those on the south, where we passed, were a confused mass of basalt and trap, and I could give no direction to the axis of maximum elevation. They seemed to drift off to the southeast. Wherever the eye wandered, huge mountains were seen of black, volcanic appearance, of very compact argillaceous limestone, tinged at times with scarlet from the quantities of red feldspar. Through these the Gila (now swift) has cut its narrow way with infinite labor, assisted by the influx of the Prierte, the Azul and San Carlos rivers. As the story goes, the Prierte flows down from the mountains, freighted with gold. Its sands are said to be full of this precious metal. A few adventurers, who ascended this river hunting beaver, washed the sands at night when they halted, and were richly rewarded for their trouble. Tempted by their success, they made a second trip, and were attacked and most of them killed by the Indians. My authority for this statement is Londeau, who, though an illiterate man, is truthful.

October 27.—After yesterday's work we were obliged to lay by to-day. The howitzers came up late in the afternoon. They are small, mounted on wheels ten feet in circumference, which stand apart about three feet, and with the assistance of men on foot, are able to go in almost any place a mule can go.

I strolled a mile or two up the San Carlos, and found the whole distance, it has its way in a narrow cañon, worn from the solid basalt. On either side, in the limestone under the basalt were immense cavities, which must have been at times the abodes of Indians and the dens of beasts. The remains of fire and the bones of animals attested this. Near its mouth we found the foundation of a rectangular house, and on a mound adjacent that of a circular building, a few feet in diameter. The ruin was probably that of a shepherd's house, with a circular building adjoining as a look-out, as there was no ground in the neighborhood which was suited for irrigation. Both these ruins were of round unhewn stones, and the first was surrounded by pieces of broken pottery. Digging a few feet brought us to a solid mass which was most likely a dirt floor, such as is now used by the Spaniards.

In my walk I encountered a settlement of tarantulas; as I approached, four or five rushed to the front of their little caves in an

attitude of defence. I threw a pebble at them, and it would be hard to imagine, concentrated in so small a space, so much expression of defiance, rage, and ability to do mischief, as the tarantula presents.

Our camp was near an old Apache camp. The carcasses of cattle in every direction betokened it to have been the scene of a festival after one of their forays into the Spanish territory.

The Gila at this place is much swollen by the affluence of the three streams just mentioned, and its cross section here is about 70 feet by 4. The waters change their color, and are slightly tainted with salt; indeed, just below our camp there came from the side of an impending mountain, a spring so highly charged with salt as to be altogether unpalatable. Several exquisite ferns were plucked at the spring, and a new green-barked acacia, covering the plains above the river bed, but vegetation generally was very scarce; this is the first camp since leaving the Del Norte, in which we have not had good grass.

At 8*h*. 40*m*., a meteor of surpassing splendor started under constellation lyra, about 20 degrees above the horizon, and went off towards the south, projected against a black cloud.

The clouds interfered with my observations; but such as they were, 12 altitudes of polaris, 9 of alpha andromedæ, and 9 of alpha lyræ, and 16 distances between the ☽ and alpha pegasi, gave the latitude of the camp 32° 53′ 16″, and the longitude 109° 31′ 34″.

October 28.—One or two miles' ride, and we were clear of the Black mountains, and again in the valley of the Gila, which widened out gradually to the base of Mount Graham, abreast of which we encamped. Almost for the whole distance, twenty miles, were found at intervals the remains of houses like those before described. Just before reaching the base of Mount Graham, a wide valley, smooth and level, comes in from the south-east. Up this valley are trails leading to San Bernadino, Fronteras and Tucsoon. Here also the trail by the Ojo Cavallo comes in turning the southern abutments of the Black mountains, along which Capt. Cook is to come with his wagons.

At the junction of this valley with the Gila are the ruins of a large settlement. I found traces of a circular wall 270 feet in circumference. Here also was one circular enclosure of 400 yards. This must have been for defence. In one segment was a triangular shaped indenture, which we supposed to be a well. Large mezquite now grow in it, attesting its antiquity. Most of the houses are rectangular, varying from 20 to 100 feet front; many were of the form of the present Spanish houses, thus:

Red cedar posts were found in many places, which seemed to detract from their antiquity, but for the peculiarity of this climate, where vegetable matter seems never to decay. In vain did we search for some remnant which would enable us to connect the inhabitants of these long deserted buildings with other races. No mark of an edge tool could be found, and no remnant of any household or family utensils, except the fragments of pottery which were every where strewed on the plain, and the rude corn grinder still used by the Indians. So great was the quantity of this pottery, and the extent of ground covered by it, that I have formed the idea it must have been used for pipes to convey water. There were about the ruins quantities of the fragments of agate and obsidian, the stone described by Prescott as that used by the Aztecs to cut out the hearts of their victims. This valley was evidently once the abode of busy, hard-working, people. Who were they? And where have they gone? Tradition among the Indians and Spaniards does not reach them.

I do not think it improbable that these ruins may be those of comparatively modern Indians,* for Venegas says: "The father Jacob Sedelmayer, in October, 1744, set out from his mission, (Tubutuma,) and, after travelling 80 leagues, reached the Gila, where he found six thousand Papagos, and near the same number of Pimos and Coco Maricopas;" and the map which he gives of this country, although very incorrect, represents many Indian settlements and missions on this river. His observations, however, were confined to that part of the Gila river near its mouth.

Great quantities of green-barked acacia on the table lands, and also the chamiza, wild sage and mezquite; close to the river, cotton wood and willow. We found, too, amongst many other plants, the eriodictyon Californicum, several new grasses, and a sedge, very few of which have been seen on our journey.

We saw the trail of cannon up the valley very distinct; that of an expedition from Sonora against the Indians, which was made a few years since, without achieving any results.

Wherever the river made incisions, was discoverable a metamorphic, close grained, laminated sandstone, and in many places were seen buttes of vitrified quartz, (semi-opal.)

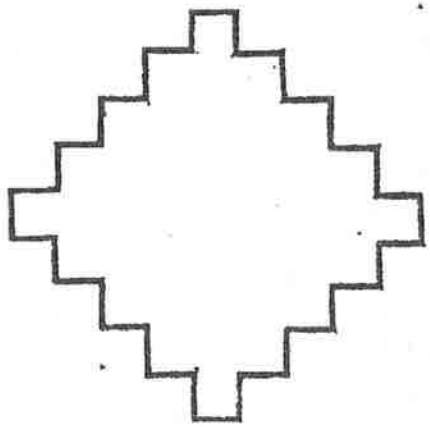
October 29.—The dust was knee deep in the rear of our trail; the soil appeared good, but, for whole acres, not the sign of vegetation was to be seen. Grass was at long intervals, and, when found, burned to cinder. A subterraneous stream flowed at the foot of Mount Graham, and fringed its base with evergreen. Every where there were marks of flowing water, yet vegetation was so scarce and crisp that it would be difficult to imagine a drop of water had fallen since last winter. The whole plain, from 3 to 6 miles wide, is within the level of the waters of the Gila, and might easily be irrigated, as it no doubt was by the former tenants of these ruined houses.

* Since these notes were written, a very interesting letter was received from the venerable Mr. Gallatin connected with the history of these ruins. The letter, with my reply, will be found in the Appendix.

The crimson tinted Sierra Carlos skirted the river on the north side the whole day, and its changing profiles formed subjects of study and amusement. Sometimes we could trace a Gothic steeple; then a horse; now an old woman's face; and, again, a veritable steamboat; but this required the assistance of a light smoky cloud, drifting to the east, over what represented the chimney stack. Wherever the river abraded its banks, was seen, in horizontal strata, a yellowish argillaceous limestone.

October 30.—Mount Turnbull, terminating in a sharp cone, had been in view down the valley of the river for three days. To-day about three o'clock, p. m., we turned its base forming the northern terminus of the same chain, in which is Mt. Graham.

Half a mile from our camp of last night was another very large ruin which appeared, as well as I could judge, (my view being obstructed by the thick growth of mezquite,) to have been the abode of five or ten thousand souls. The outline of the buildings and the pottery presented no essential difference from those already described. But about eleven miles from the camp, on a knoll, overlooked in a measure by a tongue of land, I found the trace of a solitary house, somewhat resembling that of a field work *en cremallière*. The enclosure was complete, and the faces varied from ten to thirty feet. The accompanying cut will give a more accurate idea than words.



Clouds had been seen hovering over the head of Mount Turnbull; and as we passed, the beds of the arroyos leading from it were found to be damp, showing the marks of recent running water.

Last evening about dusk, one of my men discovered a drove of wild hogs, and this morning we started on their trail, but horse flesh had now become so precious that we could not afford to follow any distance from our direction, and although anxious to get a genuine specimen of this animal, we gave up the chase and dropped in the rear of the column. The average weight of these animals is about 100 pounds, and their color invariably light pepper and salt. Their flesh is said to be palatable, if the musk which lies near the back part of the spine is carefully removed.

Many "fresh signs" of Indians were seen, but, as on previous days, we could not catch a glimpse of them. They carefully avoided us. This evening, however, as Robideaux unarmed was riding in advance, he emerged suddenly from a cavity in the ground, thickly masqued by mezquite. He had discovered two Indians on horse back within twenty yards of him. The interview was awkward to both parties, but Robideaux was soon relieved by the arrival of the head of our column. The Indians were thrown into the greatest consternation; they were tolerably mounted, but escape was hopeless. Two more miserable looking objects I never beheld; their legs, (unlike the Apaches we left behind) were large and muscular, but their faces and bodies (for they were naked,) were one mass of wrinkles, almost approaching to scales. They were armed with bows and arrows, and one with a quiver of fresh cut reeds. Neither could speak Spanish, and the communication was by signs. They were directed to go with us to camp, where they would receive food and clothing; but they resolutely refused, evidently thinking certain death awaited them, and that it would be preferable to meet it then than suffer suspense. The chief person talked all the time in a tongue resembling more the bark of a mastiff, than the words of a human being. Our anxiety to communicate to the tribe our friendly feeling, and more especially our desire to purchase mules, was very great; but they were firm in their purpose not to follow, and much to their surprise, (they seemed incapable of expressing joy,) we left them and their horses untouched.

They were supposed by some to be the Cayotes, a branch of the Apaches, but Londeau thought they belonged to the tribe of Tremblers, who acquired their name from their emotions at meeting the whites.

Observed to-night 12 altitudes of polaris for latitude, and measured 9 lunar distances for longitude.

Lat. 33° 12′ 10″. Long. 110° 20′ 46″.

October 31.—To-day we were doomed to another sad disappointment. Reaching the San Francisco about noon, we unsaddled to refresh our horses and allow time to look up a trail by which we could pass the formidable range of mountains through which the Gila cut its way, making a deep cañon impassable for the howitzers. A yell on the top of a distant hill announced the presence of three well mounted Indians, and persons were sent out to bring them in. Our mules were now fast failing, and the road before us unknown. These Indians, if willing, could supply us with mules and show us the road. Our anxiety to see the result of the interview was, consequently, very great. It was amusing, and at the same time very provoking. They would allow but one of our party to approach. Long was the talk by signs and gestures; at length they consented to come into camp, and moved forward about a hundred yards, when a new apprehension seemed to seize them, and they stopped. They said, as well as could be understood, that the two old men we met yesterday had informed their chief of our presence, and wish to obtain mules; that he was on his way with some, and had sent *them* ahead to sound a parley. They were better

looking, and infinitely better conditioned, than those we met yesterday, resembling strongly the Apaches of the copper mines, and like them decked in the plundered garb of the Mexicans.

The day passed, but no Indians came; treacherous themselves, they expect treachery in others. At everlasting war with the rest of mankind, they kill at sight all who fall in their power. The conduct of the Mexicans to them is equally bad, for they decoy and kill the Apaches whenever they can. The former Governor of Sonora employed a bold and intrepid Irishman, named Kirker, to hunt the Apaches He had in his employment whites and Delaware Indians, and was allowed, besides a per diem, $100 per scalp, and $25 for a prisoner. A story is also told of one Johnson, an Englishman, an Apache trader, who, allured by the reward, induced a number of these people to come to his camp, and placed a barrel of flour for them to help themselves; when the crowd was thickest of men, women, and children, he fired a six pounder amongst them from a concealed place and killed great numbers.

13 circum-meridian altitudes of beta aquarii, and 10 altitudes of polaris give the latitude of this camp 33° 14′ 29″. The longitude by 12 lunar distances E. and W. is 110° 30′ 24″.

November 1.—No alternative seemed to offer but to pursue Carson's old trail sixty miles over a rough country, without water, and two, if not three days' journey. Under this, in their shattered condition, our mules must sink. We followed the Gila river six or seven miles, when it became necessary to leave it, how long was uncertain. Giving our animals a bite of the luxurious grama on the river banks, we filled every vessel capable of holding water, and commenced the jornada. The ascent was very rapid, the hills steep, and the footing insecure. After travelling five or six miles, ascending all the way, we found trails from various directions converging in front of us, evidently leading to a village or a spring; it proved to be the last. The spring consisted of a few deep holes, filled with delicious water, overgrown with cotton wood; and, although the grass was not good, we determined to halt for the night, as the howitzers were not yet up, and it was doubtful when we should meet with water again. I took advantage of the early halt to ascend, with the barometer, a very high peak overhanging the camp, which I took to be the loftiest in the Piñon Lano range on the north side of the Gila.

Its approximate height was only 5,724 feet above the sea. The view was very extensive; rugged mountains bounded the entire horizon. Very far to the northeast was a chain of mountains covered with snow, but I could not decide whether it was the range on the east side of the Del Norte or the Sierras Mimbres. Near the top of this peak the mezcal grew in abundance, and with the stalk of one 25 feet long we erected a flag-staff. Here too we found huge masses of the conglomerate before described, apparently as if it had been arrested in rolling from an impending height, but there was no point higher than this for many miles, and the intervening ravines were deep. Lower down we found a large mass of many thousand tons of the finer conglomerate, the shape of a trun-

A Doctor Comes to California

The Diary of John S. Griffin,
Assistant Surgeon with Kearny's Dragoons,
1846-1847

WITH AN INTRODUCTION AND NOTES
BY GEORGE WALCOTT AMES, JR.
AND A FOREWORD
BY GEORGE D. LYMAN, M. D.

SAN FRANCISCO
CALIFORNIA HISTORICAL SOCIETY
MCMXLIII
9. 43

tility against the Mexicans, they seem to think that the Mexicans are great rascals and that they have a right to kill them whenever they can. Many of them had Mexican saddles, cartridge boxes, and different parts of the Mexican dress, all of which had no doubt been plundered from some poor devil who they had killed. We followed down a branch of the Gila [Night Creek] to day, and about 3 oclock came to that stream, it is a fine bold, beautiful mountain stream but with no land about it that can be cultivated, cotton wood timber, fine fish, plenty caught this evening. No game, though I found plenty of deer sign. *We have marched in the last two days forty five miles.*

Along the Gila to the Colorado

Oct. 21st This has been a long and fatiguing days journey. When we left camp this morning we had two difficulties presented to us—the one a most steep and rugged mountain, the other a cañon of the river, we took the latter as the lesser evil, followed down the Gila some five or six miles and finally turned the steepest point of the mountain, in following the course of the river, we were obliged to cross it every half mile or so, the mountain jutting down to the very edge of the stream, making a very picturesque affair of it—but damn bad roads—the fact is we have so much of the grand, & sublime scenery that I am tired of it. After turning the flank of the mountain we ascended it, and found it bad enough even at that. Carson said this was a turnpike road in comparison to the other route. We struck the river about 3 or 4 oclock in the evening and found the country quite open. More fish have been caught this evening I tried my hand but could not get even a nibble—plenty of deer & turkey sign to day—none seen. I had to take a *pleasant* ride of some miles on the back trail to see a sick man—this made me late in getting into camp Our march to day some 18 miles by my computation. The Howitzers have not come up yet, and it is now 8 P M—poor Davidson[31] he has a sweet time of it—these are the only wheeled vehicles we have along, and they are about as much trouble as all the packs put together Our pack animals begin to suffer dreadfully from sore backs, and the beef cattle are becoming so tender footed that the[y] are driven along with the greatest difficulty. Some Indians came up shortly after we started this morning—We have seen nothing of them since, the rascals are loafing along after us to steal some mules, I suppose.

Oct. 22d. We arrived late in camp this evening as usual having marched 18 or 20 miles—the country is better than that passed over yesterday. Kept the river bottom for a few miles, but was again headed off by another cañon —we then had a rough country, the Howitzers broke down another set of mules yesterday these devlish things cost us more in the shape of mules than a Company of Dragoons. Captain Johnston lost one of his mules[32]—

with the pack—he has gone back after it. We are to march ten miles a day till he overtakes us—

Oct. 23d. This morning we left camp about 9 oclock, crossed the River, and marched down the bottom on the north side of the stream, the road was quite level, but ye gods the dust. I never suffered or saw men suffer more from any trifling annoyance in my life. The grass & weeds indicated quite strong soil, and might be cultivated by proper irrigation. We saw one or two wild geese & two or three flocks of ducks—the advanced guard saw the black quail & the common quail of the United States No other game was seen, the fact is Carson says he never knew a party on the Gila, that did not leave it starving, this I am fearful will be our case before we leave—Marched about 16 or 17 miles.

Oct. 24 The Genl determined to remain quiet to day. We have been fishing & caught nothing. Capt Johnston got up about 12 M. he caught his mule and found most of his pack. ruins of ancient buildings seen yesterday and broken crockery.[33] No fish caught, and only one wild goose killed.

25th. We left camp early this morning continued to travel along the River Gila, had a hard and rugged days march. Encamped on a high hill or rather mountain, near the river, had to pack wood & water up the hill for more than ¼ of a mile, good grass.

27. On the 26th we left camp early revallie having been sounded at 4 A.M. Orders were issued the night before that we should have every thing prepared to start so soon as there was light sufficient to see this was represented as being a hard day—and it was not belied, it was one succession of mountains so covered with sharp stones that I do not believe our mules touched the ground once in five miles. A mule without shoes stood no chance, many could not be driven, and many from exhaustion fell by the wayside, and no effort on the part of the men could get them any farther. Some ten or twelve utterly give up—the men were coming in last night till one oclock, and five or six had to lay out in the mountains, one poor fellow lost the way and following a ravine our camp fires being in sight, tumbled over a bluff thirty feet high—but fortunately did not get hurt much. There is a mule now on the mountain opposite to us that can be driven neither up or down. The Howitzers did not get in Water had to be sent back to the men—the River from our last camp to this runs through a cañon, the water is inaccessible for any thing but a bird—therefore we were obliged to do without it all day —the men and animals suffered very much.

There was some rain last night, and it is now raining. A few days wet weather will use up the remainder of our animals, and we shall be obliged to foot it from here to California. The Genl. determined to stay still this morning until 12 M, when we start to look for grass. Our animals had but little last night.

28th—After 12 M yesterday, the Genl. concluded to remain in camp the

balance of the day. Men were coming in camp all day with broken down mules, and cattle. The Howitzers got in about 1 P M—plenty of fish caught, and two turkeys killed by Mr. Stanly, the artist. This morning we are all up bright and early preparing for a start. When my cavalry were driven up I found one of them my poor old pony so used up that I was obliged to abandon him—he will I think do well and perhaps be the sire of a new race of horses in the mountains. Several mules were left also. After travelling a few miles over rough broken country, we got into the river bottom, and have come on finely all day. No hills or stone, but deep sand and plenty of dust. The River tolerably well wooded with cotton wood—some thickets of a species of wood that I do not know—the bottom was better to day than I have yet seen it on the Gila, and might be cultivated by irrigation—passed the ruins of several buildings in some places the cedar posts were standing. The buildings were evidently quite large—and pieces of crockery were scattered about in great profusion—we have found these ever since we got on the Gila. Some pieces are plane, some painted black & white, & red & black.[34] Who could have done this—there is no record nor tradition that I have heard of, of the Mexicans having lived in this country, and the present race of Indians evidently never either built so extensively or made the crockery—that they may have smashed it is quite likely as they seem to have a genius that way, in common with all the red skin rascals I have ever seen yet. The River at this point is some 60 yds broad and very rapid and quite deep it is cloudy, and has been raining in the mountains to our left all day—No game seen—yet every day we see plenty of deer & turky tracks. great numbers of the patridge of the country must rise along the river as we constantly see their tracks and occasionally a covey of birds very few water fowl.

29 Oct. This morning it had cleared off beautifully—but a few drops of rain fell last night. This evening however it has clouded up again. We have made a fine march to day, had good roads, we struck the main Indian trace used by the red rascals for going into Sonora, where they plunder the Mexicans to their hearts content, of mules, Horses, women & children[35]—This latter two articles they make slaves of. We are now in the Quietero (I believe so they are called—though I do not know how to spell the word) country.[36] They are represented by our guide as being great rascals and thieves—they will steal our mules if possible—therefore we keep pretty good guard for them—none have been seen to day, though some were seen at a distance yesterday. Saw plenty of broken crockery, but no ruins of buildings. Some of our party maintain that the buildings were erected by the Aztecs, but I do think if it were so we would hardly find cedar posts standing—though it is a wood that lasts a long time. It is said that on the Salt River a branch of the Gila, that large villages are found, & dikes &c. showing that the earth had been cultivated—the bottom of the river quite large &

might be cultivated by irrigation—the river seems to be high at times overflowing the country to a considerable extent. The Engineer party I believe named a large mountain to the west of us, Mount Dallas, after the Vice president.[87] This grass is not good—long but tough and wiry.

30th Oct. To day has been pretty much the same as yesterday, only the road a little rougher—hills, &c—no game except patridges, centipedes, tarantulas & rattlesnakes, musquite bushes & cotton wood. Two Indians seen and caught to day—could not make them understand any thing, they were most infernally frightened—a few presents made to them—

31st Oct. Cloudy this morning, a few drops of rain last night. considerable rain fell near us yesterday but we caught none of it—this evening clear. Left camp ¼ to 8 oclock—marched down the River—pretty much the same as yesterday—except the country rougher and more broken. After marching some ten miles encamped, on a branch of the Gila—called I believe the San Francisco. We came thus early to a halt—about 12 M—because the great Cañon of this River commences here, and we will in all probability not be able to get water again for two days. Some Indians came and hailed us—a white flag sent out and a talk held with them, but I believe they could not be induced to come into camp. The mules are breaking down fast and our beef cattle are giving out fast. We usually kill the most foot sore, and it often happens that the poor beast cannot be made to get up—so as to be killed decently—and it is devlish poor & tough beef at that. The trail that we are now travelling is strewn with the carcasses of cattle these have been driven from Sonora by the Indians—they steal constantly from the Mexicans. This is muster day, & the rolls have been made out.

1st Nov. The guide warned us this morning that we would march but six or seven miles before we should leave the River—we would be headed off by a cañon—and it might be three days before we should see water again—this was rather a gloomy prospect—We therefore filled everything that was portable and would hold water—with that fluid—coffee pots, gourds, canteens, and some had their gum elastic cloaks made up in the shape of bags, and filled with water. We started out on an Indian trail, up the mountain. Carson had never travelled this trail, and did not know any thing of country on it but from its course he thought it best for us to follow it. We followed on up the trail & up the mountain—sometimes a very good road, then again rough. Saw many of the most beautiful amygdaloid stones—The mountains covered with fine grass, and the most enormous cactus. They were fully thirty feet high—and from 18 inches to 2½ feet in diameter. We found a nut also of very agreeable flavour. About 4 P M—we saw cotton wood to our great surprise and joy in a ravine. We at once made search, and found water, not in any great quantity yet sufficient to keep us from suffering—I had walked nearly all day—as we were constantly ascending—had büt one drink of water all day. A man may easily imagine our joy when the water was

JOURNAL

OF

CAPTAIN A. R. JOHNSTON,

FIRST DRAGOONS.

forks also head. Our camp was well supplied with a fine fish from the river resembling a little the black bass; its flesh was not firm but very delicate. The California quail abounds in the bottoms. A new sort of sycamore tree made its appearance here; it has a bark precisely like our own sycamore tree, or button-wood, and a leaf resembling the maple; the leaves are now yellow with the frost, as they are of the most deciduous plants. Found some of the fruit of the black walnut of this country; it is about half the size of our black walnut, and not rough on the outside as ours, but shows the veins of the seams of the outer bark. The roses, the hops, musquitoes, and poison oak looked familiar, and some other plants known in the United States, names unknown. Just as we were leaving camp to-day, an old Apache chief came in and harangued the general thus: "You have taken Santa Fé, let us go on and take Chihuahua and Sonora; we will go with you. You fight for the soil, we fight for plunder; so we will agree perfectly. Their people are bad Christians; let us give them a good thrashing, &c." Marched seven and a half miles, and encamped at the upper end of a cañon, through which we could not travel to-night; grass good.

October 21.—Marched at half-past seven, and, going down the river a few miles, we commenced climbing a rugged mountain of basaltic rock, where our mountain howitzers will find trouble in climbing; for seven miles our track lay over the mountain, up and down steep declivities. At one point we had a magnificent view down the Gila, which lay before us, running southwest. At a long distance south, the horizon was limited by mountain peaks between us and them, and to the limits of the horizon until we came to the Sierra Del Buro, southeast there was a vast plain of diluvion covered with grama grass. This plain connects with that of the Del Norte, so that one can ride south of the Sierra Del Buro from the Del Norte to the Gila without crossing a single mountain. In passing the mountains to-day we encountered the usual basaltic rocks, then sienite, then basalt, then feldspathic granite, then red sandstone, (small specimen;) this was standing northwest to southeast, vertical across our route, and a cliff overhung us, probably of the same rocks, with a dip to the northwest, dipping from the Sierra Del Buro; then to feldspathic granite again like that of the Wishita salt, very easily disintegrated. The live cedar and a tree resembling oak on the hills, but scattered; grama and other grasses quite abundant; saw one deer and one flock of partridges; saw a dwarf species of mulberry on the hills; the miseltoe abounds; also, the sweet cotton-wood and willow thinly scattered along the river; very little brush in our way. The poison oak must be for some wise use, for it grows here too. A sort of wild squash, which grows from Bent's fort to Red river, is also found here. Our mules begin to show symptoms of failing. We passed to-day very little land that would bear cultivation even by irrigation; the upland is gravel and sand, the bottoms a sort of volcanic dust, made very loose by the undermining of myriads of rats and mice of new varieties. Caught two new kinds of fish in the clear waters of the Gila, baiting with grasshoppers. Our howitzers did not get up this night,

Lt. Davidson being in charge of them, lay out at the base of the mountains; after dark, one of his howitzers and a mule rolled down a steep declivity and disappeared in the dark in a ravine, where he had some difficulty in finding them; it was, however, uninjured. Camp on plenty of grama grass; distance 18 miles.

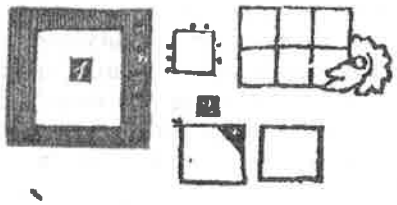
October 22.—The howitzer arrived, and we marched at 10, crossing the Gila several times, as we move down it for four miles; we then crossed it, and made a circuit of 14 miles to the south side, to get around a cañon through which the river flows; our road was bad, from the number of gutters cut deep through the diluvion, of which the whole country, except the mountain peaks, is composed; it forms the substance of the plains of the Del Norte and the Gila; and, from its general level, no doubt, was deposited in the bed of an ocean. We passed a number of smaller mountains or hills, apparently composed of black basalt; and the cañon of the Gila here is caused by a seam of it crossing the course of the river, through which the water has cut a way; under this seam of basalt, there lies a succession of white sandstone rocks, with a dip to the north, and incurved east and west. The character of these rocks is the same as that which occurs on the Del Norte at our camp on the 11th October; and in general the formation of the country, so far, on this river, is similar to that on the Del Norte. The vegetation, to-day, is more of a tropical character: the large prickly pear, with a tree-trunk six or seven feet high, made its appearance; a new shrub made its appearance; it appeared to be without leaves, and looked like large bunches of the green thorn which defend the trunks of the young honey-locusts in Ohio; it bore a smell like blackberry; there were two new varieties of cactus on the road, and the Spanish bayonets grew in great abundance; encamped on the bluffs, 180 feet above the water, the grass being scarce in the bottom. Distance, 18 miles.

October 23.—I went back after my mule, which old Rob had let get away from him; found it by travelling where we left the Gila yesterday; discovered that the diluvion is formed into stone on the banks of the Gila above the cañon, forming perpendicular walls, upon which, for 30 feet above the level of the stream, the action of water was plainly visible; returned to the old camp, and slept; the troops moved at 9, and continued down the river, on a good road, coming into a plain with the salt grass upon it; the road side was strewed with pieces of broken pottery, which led to examination, and the evidence of a large village was plain; one foundation was found, 80 feet by 40; a *fleur de terre;* and there were piles of round stones, which had been used in former buildings; the place must have been occupied for a long time, as the quantity of broken pottery was very great; the fragments were apparently just like those in the daily use of the present New Mexicans; I followed here to overtake the troops, and did not have time to make any searches who it was that occupied these places. Was it Spanish or the Aztecs, *quien sabe?* The buildings of adobe do not remain long as ruins; perhaps they were Spaniards, who worked mines in the neighborhood, and were subsequently driven out by the Indians, as they

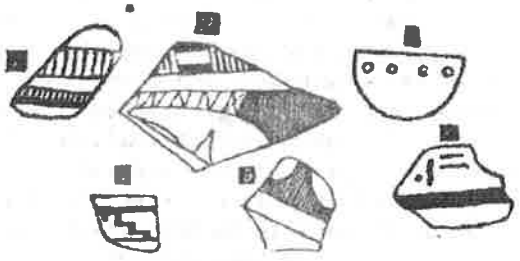
were from a silver mine west of Santa Fé. The country is not much frequented by Indians now just along here, as Carson left some horses and mules, and found them here.

October 24.—Laid by in camp, the salt grass purged our horses, and gave some of them the cholic.

October 25.—Marched early, and made about 25 miles, over a very rough country approaching the third cañon of the Gila and San Pedro mountains; the black hills of basalt rise on each side, and deep cuts in the diluvion makes the country very rough; some vallies on the Gila are capable of cultivation, and at them found the ruins of a number of habitations. No 1 represents a ground



plan of the most northern, six miles out from camp. The outlines of the foundations were visible, as round stones had been used for that purpose. The houses, probably made of adobe, were long since washed a *fleur de terre*. The longer house was shaped like those of New Mexico in present use; the smaller ones had the appearance of some of the assemblages of houses occupied by the Pueblos of New Mexico. In the longer house were some cedar pieces of posts and joists, very much decayed. How long cedar would last in this dry atmosphere, I cannot tell; but presume if even exposed to the weather, it might lay like a stone for ages. Pieces of broken pottery strewed the ground in every direction, and fragments of black crystal, which no doubt were left from the manufacture of arrow points. The pottery seemed like that in present use among the New Mexicans. I raked the dirt in various



Pottery.

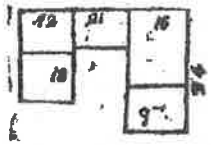
directions, in vain, to find some relic which might indicate the antiquity of the ruins; a number of broken stones to pound corn upon, showed that the people were agricultural. In the bottom was the ruins of a small house, probably used for guarding the fields. No. 2 represents a place two miles further down the river;

here there were fragments of broken pottery more ancient looking; one square room, with another house attached, with a hole in the ground within the foundation, about 20 feet square and now about eight feet deep; its only present inhabitant was a strange looking yellowish grey rat, which retreated to his hole; could I have followed him through his burrowings, I might have found some clue to the mystery of the former inhabitants. We soon after commenced approaching the third cañon of the Gila, and climbed mountains over paths which once had been used by this people. We diverged from the river again, and, after much rough travelling over broken volcanic rocks, we found a camp of grama grass about 400 feet above the river on a towering hill, with rough descent to the water: distance travelled about 20 miles. A horse which Carson had left here a week or two before, as he came from California, took fright at our approach and fled to the hills at the top of his speed, baffling all effort to retake him.

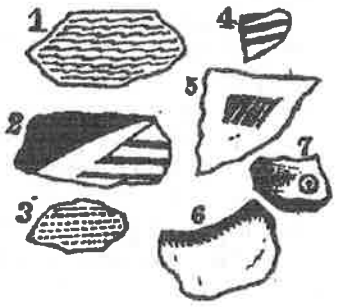
October 26.—Started at a quarter to 7; as we are warned of a troublesome march, it commenced as we descended to the river, and continued for about 14 miles, up and down steep declivities covered thick with fragments of black basalt, with scarcely a place where an animal could step without putting his foot on a loose stone, many of them angular and sharp. This terrible journey we had to take to get around the third cañon, which is impassable. As the van toiled along, rising hill upon hill, the rear fell behind, until, finally, they were lost to view; the head of the column reached the river about 3 o'clock, and at midnight the cattle and howitzer party came, Lt. Davidson reporting that his men and mules had given out, and had left the howizers 5 miles back; some of the men did not come in until morning. At daylight (27th) we saw one of the dragoons perched on a cliff, with his kit on his back, just abandoning his mule, which he had led down towards our fire the night before, and found himself cut off by a precipice, he laid down and spent the night; and the next morning, not being able to get his mule back, he took off his saddle and retraced his steps with all his effects upon his back; the general had a party sent and rescued the animal from its perilous heighth. This journey can no doubt be avoided by leaving the Gila higher up, and taking more to the south around these basaltic peaks. The action of the water on the diluvion drift was plain for 500 or 600 feet, the pebbles for 400 feet, or thereabouts, being of varieties from a distance mixed with those of the locality; higher up, the stones, rounded by attrition, were wholly those of the locality. The hills were of conical form, piled upon each other; one of them with a cap of trap; all seemed to be solid basalt thrust up from beneath; a very few cedars and other shrubs; several large kinds of caste and grass tuft between the rocks was all the vegetation, the grass growing finest on the north side of the hill. Having passed this rocky barrier, we find the grass scarce; the hills are green with the creosote bush; and, from this on to California, we may count upon but scanty picking for our poor animals. It is not improbable that in the volcanic convulsions which

gave this country a form, some mephistic substance was produced in quantities to poison the soil for vegetation. This creosote plant shows something; and a shower of rain which fell upon us, although very slight, made the atmosphere smell of some vile gas. Opposite our journey, the Black and Blue rivers come on the northeastwardly; the Black courses south, with a branch in the mountains called Bonita; the course of the Blue southeast: they head in the mountains north of the Gila, and may be 60 miles long; they come into the Gila about six and a half miles apart. Near our camp a small stream called the St. Charles comes in; all three of these streams flow through cañons. The diluvion here is very thick, and of a rocky nature, which, with the basalt, make the walls of the cañon vertical. Near our camp are old horse signs and trails,

and old Indian wigwams of willows about 5 feet high, and covered with willows and grass. Near where we left the Gila to-day was the ruins of two ancient houses, shown only by the foundation stones and the pieces of pottery. If I only had one of the young ones that had been boxed on the ears for some of the breakages!



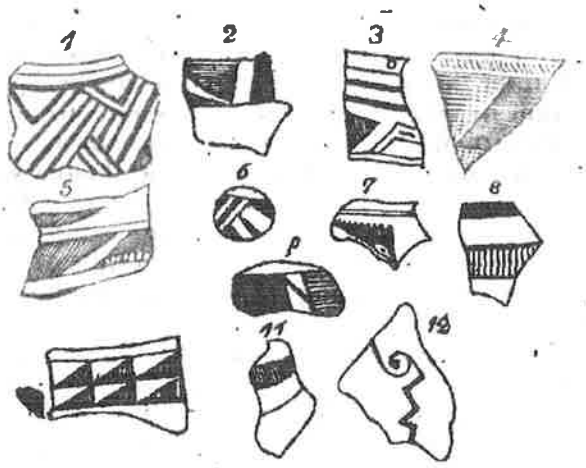
October 27.—Laid in camp on account of the fatigue of yesterday to the animals, and to get up the howitzers; near camp is an old ruin; the foundation of the building is as those given above; some



quantities of broken pieces of pottery were lying about it; I got two men and some spades, and dug about it, in hopes of finding something, but found nothing but pottery; it appeared to be very ancient.

October 28.—Marched at a quarter before 8; after coming two or three miles, we found the remains of an old settlement, the foundations of the houses covering a larger space than those before seen, but the plan of the houses only to be discovered by the rows of round stones; abundance of pottery; the place was overgrown with mesquite and chimezo; the rooms from 12 to 20 feet in dimensions; about 6 miles from camp, were other houses, the rooms of which—

ome of them—appeared to have been round; a little further, and here was a circle of stones 90 paces in diameter, with an opening o the east, with the remains of a house near the centre, and some oundations outside; there were no remains of wood; a mile further, nd remains of very extensive buildings were to be seen; the ooms—some of them—appeared to have been 40 by 50 feet; and, rom the greater quantity of rubbish, the houses must have been auch larger; the pottery abundant; pieces marked thus. Further

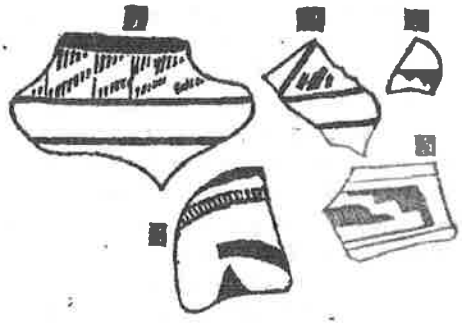


on, we came to a large plain at the junction of a creek which comes rom the southeast; and here was found the remains of the most extensive settlement; the most of the houses had cedar posts in a state of decay, standing in the ground; a rampart had been raised n a circle of over 300 yards, and on parts of it, houses had been made; in the middle was a hole with three entrances or slopes down o the bottom of it; probably an old well filled up, as the surface was probably not over 15 feet above the level of the river; pottery very abundant; our road lay along the course of the Gila, which we crossed several times; the road was very dusty, so that our mules dug great holes as they stepped along, one after the other; the tracks of a Mexican cannon were plain to be seen on the trail we were following; some expedition last spring, probably against the Apaches, to the southeast; we can see a level country passing south of the Devil's turnpike; the creek coming from that direction can probably afford water; south of southwest of our camp is a high mountain, about five miles off, the top covered with trees; around the southeast base of this is a broad trail leading towards Sonora, where the Apaches go to steal; it leads across to the head of San Pedro. Our route showed the action of fire in the bottoms, which, in many places, had swept the growth of vegetation off, for years of what the earth had attempted to clothe herself with; the soil is so light, that fire kills the roots, as well as the tops of the trees; mesquite is abundant on the bottoms; and here it is a large tree, two feet in diameter, but not lofty; grass was scarce on our path, so that we had no place to camp except here; the grass coarse, and of

the salt kind; several Indian trails crossing our path showed the presence of the Apaches. The Gila is getting to be much larger—still not deep fording. Distance, 21 miles.

October 29.—Marched at 10 minutes of 8; kept on the south side of the Gila all day; about eight miles out, we passed the mouth of a stream seen on our left yesterday; it was dry, but at times it contains a good deal of water; its course is marked by cotton-woods; at only two or three places could a camp have been found; all salt grass; about twelve miles, there is a level plot of salt grass running down to the river—enough for thousands of animals. All the country seemed to be perishing for want of rain. About five miles from camp, we fell upon the great stealing road of the Apaches; it was hard beaten, and in places many yards wide, filled with horse, mules' and cattle tracks, the latter all going one way—from Sonora: the bottom on the south side of the river is about two miles wide: along here, for 40 miles, it could all be irrigated. There is a large quantity of cotton-wood along the Gila; the mountain peaks stand along the river on each side, with long intervals of comparatively low land between them; looking back to the southeast, a vast plain is seen south of the turnpike, through which we might have evaded that horrible journey. A wild mule paid the column a transient visit, but eluded pursuit, and fled to the hills with the swiftness of the deer. We have had the best road to-day of any since we left Santa Fé. Pottery in abundance; but all the houses were gone: probably they used no stones in the foundations. Distance 21¼ miles.

October 30.—Marched at a quarter before 8, and continued on the Kiataro trail down the Gila; at 10 miles, we halted to noon on the south side (left bank) of the Gila, at a good grass plat. On a hill of the usual diluvion, of 50 feet above the level of the river, with a steep ascent, was the ruins of an ancient dwelling; the rooms marked by the foundation stones of round volcanic rocks, from one to two feet in diameter. I found a shell in the ruins, which had been perforated, and worn as an ornament, besides many pieces of pottery; the rooms were square, of the usual size of 12 or 15 feet; near the house, a stone was found, about two inches by an inch and a half, which had been painted red; it may have been used as the foot of an idol. The pottery was marked. We continued our



march, after our usual halt of an hour; and after crossing the Gila five or six miles, we came suddenly upon two Indians, old fellows,

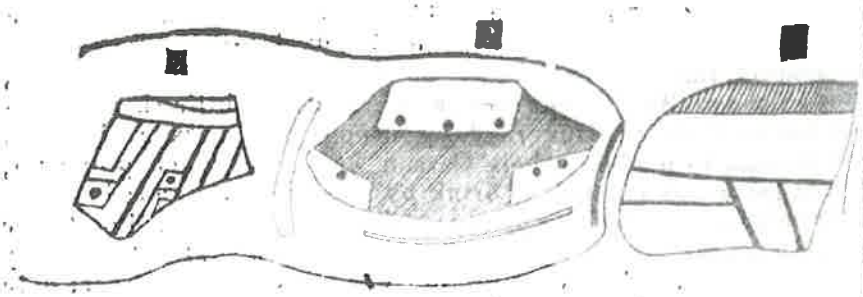
rivelled up and purblind; they had three horses pretty well cked with something, and a quantity of material for arrows; they ere fairly caught by surprise, and were very much frightened; we ve them tobacco, and tried to get them to come to camp with us, t the old fellows made a very eloquent speech, which we could t understand, and pointed earnestly for us to go on, and let them their way; we left them, and got to camp about three o'clock; stance, 22½ miles, thinking they would pass along our column to e rear; but they marched themselves instantly; they are of the ilend's Gila Indians, or Kiataws, (prairie wolves,) as they are cknamed; from them the river takes its name. The valley is nar- wer to-day, but no doubt once supported a large population; mp good on the left bank; signs of rain in the dry creek.

October 31.—Marched at a quarter to 8, having sent Carson off 7, with four dragoons, to explore ahead the route. As he, on his ute from California, made 60 miles to a point 8 miles up the San rancisco without water, we take an Indian road nearer the Gila, id hope to shorten the distance without water. After marching) miles, we halted on the San Francisco, right bank, where we ually encamped. Carson reports that we can make seven miles ore on the river, and must then bear off, to avoid the cañon No. ; after we had concluded to camp, some Gilands made their ap- earance on a distant hill, and made signals; we called them, and ent messengers to them; waived a white flag; our messengers, Captain Moore and Carson, shook hands with them, but they would ot be induced to come to camp; they have been dealt with by mericans in the employment of Chihuahua, who have hunted them t $50 a scalp, as we would hunt wolves; and one American de- oyed a large number of their brethren in rear of a wagon to rade, and fired a field-piece among them; it is no wonder, then, hat two parties of God's creatures, who never knew each other be- ore, should meet in a desert, and not approach near enough to hake hands. It would be well for us to get them to us, as we night buy some mules; ours are flagging; and we might get water- uides in the 60 miles in front of us. Remains of pottery at camp; eaver dams in great numbers in the San Francisco; flags and wil- ows along the borders very thick; some larger cotton-wood; the

tap-root of the pumpkin of the plains, three feet by six inches; perennial, apparently.

November 1.—First day of winter; it came with a freeze, making ice half an inch thick, and reminded us of our giving up the route by Albuquerque, in consequence of fear of snow on the Washitah mountains; marched at the usual hour, quarter to 8, and crossed over to the Gila again, eight miles to upper end of the cañon; here we halted to water and refresh before taking the jour- ney which Carson found to be 60 miles, without water; near this point, there was evidence of a former settlement, but nothing but pottery; their pieces of pottery are very ancient in appearance;

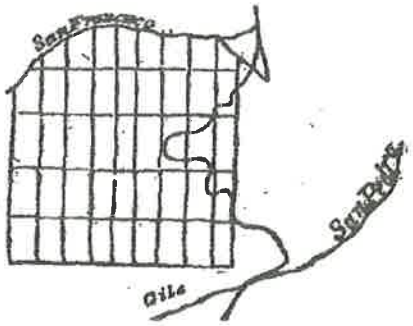
followed down the Gila through the cañon for four miles, crossing the river repeatedly; the high water mark was frequently above our heads on the rocks. There was very little grass in the cañon, a little cane. The road left the Gila on the left bank, and led up a dry ravine east of south for five miles further, it then brought us by the Saddle mountain, in sight of the San Pedro; course northwest. We then marched on and encamped on the left bank about one mile above its mouth, on the border of the low hills where we found plenty of grass; four miles further, the rocks on the Gila were diluvial as we started, thence blue, grey, and various colored basalt; in one place coarse amygdaloid, all with an appearance vertical seam; the rocks generally very compact, with many cracks and rugged surface; a few of them soft and pulverized. On the hill four miles from the San Pedro was a bed of greyish white limestone, then commenced the diluvion again. On the top of the ridge stood the Saddle mountain, capped with some rock—probably the limestone—but it may be the basalt. The bottom of the San Pedro is one mile broad, and of the character of those on the Gila above, dusty dry soil, grown in places with cotton-woods and willow, in others with grass, and again mesquite, chapparal, other places bare. It bears the usual signs of habitations of former times—abundance of fragments of pottery; I also found the fragment of a cerulian sea-shell. The vegetation of to-day was the



same, much as yesterday; saw some deer, abundance of quail, some ducks, and a pole-cat, and a number of geese and grey rabbits, like those of the United States, but apparently small, and the large grey hare, with black tail and ears.

November 6.—Remained in camp, awaiting the arrival of the howitzers; obtained some seed of the pitahaya, which were contained in a dried fruit pod two inches large; the hills of diluvion are cut into an infinite number of hollows, on them the cactus and the various kinds of acacia grow in a scattered way, covering one-tenth, perhaps, of the surface, the rest is bare gravel, except one-tenth more, which is taken up with the scattered bunches of grama-grass; under the base of these hills the mesquite grows thick for a hundred yards, some of it being trees of two feet in diameter, but low in altitude. Then comes the bottom of the river covered with coarse grass, which abounds on the bottoms of the Del Norte; then comes the willows a few yards, which stand thick along the

water in many places, but not more than 12 feet high; the cotton-woods are generally a foot or more in diameter, in irregular groves, not more than 100 yards wide along down the river; the higher hills in the back ground on each side look half green with the bushes of the creosote plant, and the mountains here are apparently almost bare; the peaks visible from here are not very high. Our route for the last few days has been very crooked, so that had we a straight route, we could have come through the cañon in two days, or one and a half instead of four. The chain of mountains continue along on the right bank of the Pedro, so that there would be rough hills to cross from this point to the gap between the Mount Dallas and Mount Dick.



November 7.—Marched at 8; kept down the left bank of the San Pedro, and crossed the Gila three miles from camp; near the mouth of the San Pedro is a good patch of grass. We kept down the right bank of the Gila until we entered the fifth cañon, where we crossed it frequently, and encamped on its right bank, with scanty grass. About six miles below the San Pedro we passed a good camp under some diluvial cliff; here, we are told, is about our last grass from this to California. The river is slightly larger here than where we first saw it, although we were told otherwise; it has about 18 inches water on the shoals here, and canoes might pass down it very readily, and good sized boats, if it was not for the round rocks in its bed. The San Pedro, an active man could jump across. Our course was a little north of west; distance 18 miles. The mountains in peaks, composed mostly of basalt, came near to the river; the diluvial beds, indurated into rocks, are torn and broken in every direction, indicating great violence and irregularity in their displacement. There appears to be a subsequent bed of diluvion along here not yet displaced; the bottoms of the river are composed of the usual clay, in a state of powder or dust, and which is undermined in every direction by animals of the rat kind, so that it is unpleasant to man or mule to ride off the beaten track. Along the very edge of the water of the river the grass and other verdure grew luxuriantly; on all else the vegetation was as usual, the mesquite and its kindred plants, and the creosote covering the mountains to their tops; no trees visible on the mountains. Signs of the wild hog, and the deer, and the turkey were numerous; the

"With a resolution to seek a more quiet mode of life . . . with my wife and children . . . I again left them, following my destiny."

—FROM JOURNAL ENTRY OF NOVEMBER 30, 1846.

The Original Journals of Henry Smith Turner

With Stephen Watts Kearny to New Mexico and California 1846–1847

Edited and with an Introduction by

Dwight L. Clarke

UNIVERSITY OF OKLAHOMA PRESS : NORMAN

Knight, who it is said made much money in selling copper to the inhabitants of Chihuahua and Sonora, these mines have been abandoned in consequence of disturbance from the Indians. They appear to have yielded much copper, and to have had much work done in them. The ruins of some 50 houses are still on the ground. 305 miles.

October 19, Monday.—Set out in the morning expecting to march about 12 miles to a spring, where it was expected we would meet the Apaches, with whom the General was anxious to have a conversation. On arriving at the spring and finding the Apaches had reached there, also that the grass was not good enough for a camp, we marched on having been informed by our Mexican guide that in 9 miles we would find water and good grass in great abundance, the guide however, was much mistaken, and we had to march 18 miles and did not arrive at the place until 8 at night. A few Apaches came up at night and reported that Red Sleeves with 30 of his men were coming on and would be in camp early in the morning. We crossed today the dividing ridge between the waters that flow into the Atlantic and those that flow into the Pacific. There was nothing remarkable about the spot; the view from it was remarkably fine, but there were much higher points in the vicinity. We are tonight encamped on a small tributary of the Rio Gila, which stream is but a short distance from us. The country continues extremely broken, although more practicable routes are obtained through, and indeed a good wagon road may be found along the route we have come from the copper mines. The grass everywhere is abundant, and of the finest kind—water also in sufficient abundance. We marched 30 miles today. It has been showery about us but no rain where we were. The weather continues fine, and most propitious for our progress. 335 miles.

October 20, Tuesday.—Made a later start about 12 M. in consequence of getting late into camp last night. Some 30 Apaches came into our camp just before we left. A few good mules were obtained from them, with much difficulty—they exhibit much more shrewdness in trade than we expected, and have the same provok-

ing way of asking more when you offer what is first demanded.—We followed down the stream on which we were encamped, passing through a narrow passage for the distance of 5 miles, and came on the left bank of the Rio Gila, a large tributary of the Rio Colorado, emptying into the latter about 100 miles from its entrance into the Gulf of California. The Gila is a beautiful stream—perfectly clear water, and about 30 steps across, timbered with cotton wood principally—there is a tree on this river, not abundant, the bark of which resembles the [illegible] and the leaves the maple. The Gila abounds in fish—though not much of a fisherman, was out about 30 minutes and brought in 10 or 11 fish from 6 to 10 inches long—it appears to be a fine fish, not seen before by any of us—shall eat at supper tonight. Marched 7 miles today—are encamped on the right bank of the Gila, which in this part of its course, passes through narrow gorges of the high mountains towering about us. Grass tolerably good. 342 miles.

October 21, Wednesday.—Started a half hour earlier than usual, having been informed by Mr. Carson the guide, that we should march a rough road, and would be all day in accomplishing it—descended the Gila about 5 miles, and coming to an impassable canyon or gorge, left the river and climbing up the side of a mountain to the right, by an obscure trail, and taking up a course a little north of west and for the distance of 10 or 12 miles, wound our way over the most broken, stony, and precipitous road I have ever traveled over—up and down steep mountains, over points and ravines jagged with sharp rocks, making it most laborious, and almost dangerous for our mules. At last we came to the bluff overlooking the river, the sides of which seemed more precipitous if possible than our ascent in leaving the river but we descended in safety 5 or 6 miles further, are again encamped on the Gila, where as yesterday, we have caught an abundance of fine fish, and find the grass tolerably good. In consequence of the bad road today, the howitzers have not come up, and it is feared they will not be able to overtake us tonight. Partridges and turkeys are abundant on the bottom of the river, also deer and bear and beaver in great

quantity. The soil in the valley of the Gila is singularly porous, resembling cold ashes more than earth—in marching along, our animals sink to the depth of 10 or 12 inches, causing a cloud of dust to rise. The surface seems undermined almost everywhere by small animals—what they are we have not yet been able to discover. We are still accompanied by most charming weather—a little cool at night, but not cold enough to require tents—we lie in the open air every night. Marched about 19 miles today. 361 miles.

October 22, Thursday.—The howitzers did not get in until this morning at 9 our starting was therefore deterred until 10:00, and an excessively rough day's march we have had—not quite so bad as yesterday, but most fatiguing and laborious for our animals. The grass continues good and our animals in consequence look pretty well—in 10 or 12 days the grass will become scarce, when it is feared animals will give out by tens and dozens at a time. We got into camp late—in consequence, no fish will be caught this morning. We are encamped on the bluff some 150 or 200 feet above the level of the river. We have seen but little of the river in the course of our day's march—left it about noon, and did not see it again until getting into camp—left to the right of us, keeping at the distance of from 2 to 4 miles from it. It is necessary to leave the river in this way because of the impracticability of marching along its bank—it passes frequently through "Kinyins" or gorges which do not admit of a man on foot passing through them. Our guide Kit Carson who passed over this route about two weeks ago, left 2 mules which had given out—they were found today, well rested, and in condition to commence the return march to California. Capt. Johnston met with bad luck today in losing his pack mule, with his bedding, and some other effects. Would to God I could know at this moment how my beloved family are doing—ignorance with respect to their condition, keep me restless and discontented. Could I hear from them occasionally, I should keep on my weary march with contentment—could I take just a peep at my dear little family, see my children gathered around their beloved mother, and all well and happy—God grant they are

more cheerful than I am. The view before me is beautiful bey description—would that my little wife could be seated near for a few moments—what infinite enjoyment we would derive f gazing at scenery about me—but far, yes, far is she away from and in her absence I enjoy—

"I only know that without thee
the sun himself is dark to me."

Marched about 18 miles—the weather is delightful—a little h resembling our Indian summer, with a fresh breeze from the so east. My wife and my children have scarcely been absent f my mind throughout the day. 379 miles.

October 23, Friday.—Capt. Johnston started back early morning in pursuit of his lost baggage and mule—will not over us until tomorrow evening. Marched 17 miles today—having scended into the bottom of the river a few minutes after lea camp—continued on the bottom throughout the day—found route excessively dusty, but better in every respect for our ani than any day since leaving the Rio Del Norte. Passed founda ruins of an old settlement, whether of Indians, Mexicans, or S iards, or of the old Aztec race could not determine—found 3 k of pottery not manufactured or used by any Indians that freq this part of the country at the present day, from which we i that these are the ruins of habitations constructed and used a people who inhabited the country at a very remote perio can scarcely be believed that this sterile region was ever inhab by a people differing much from the savage race now found h the country does not afford resources for a civilized popula The soil is sterile beyond conception, producing the cactus in e variety, and in great abundance, but nothing else save a sp growth of grass, which though scarce, is of an excellent quali as a stock raising country it might have been settled at one t and maybe settled again, but nothing else I feel assured. It is posed by some that the United States will place a high valu this country, as affording a highway from the United State New Mexico to California: but it is my opinion that a road

is the last purpose to which this country will ever be applied. It is with difficulty a mule can make its way through it—as for wagons, if they ever reach California it must be by a route entirely different from the one we have traveled over. The country is healthy to a degree far surpassing in this respect all parts of the United States and perhaps all other parts of the world—there never was a purer atmosphere than I am breathing at this moment, but having said this there is nothing more to be said in favor of the country. Invalids may live here when they might die in any other part of the world, but really the country is so unattractive and forbidding, that one would scarcely be willing to secure a long life at the cost of living in it. 396 miles.

October 24, Saturday.—Stay encamped today that our poor animals might have a little rest, of which they stand greatly in need. Captain Johnston got into camp about noon having found his lost mule and baggage. Last night was cooler than we have yet had it.

October 25, Sunday.—We have marched today about 20 miles —greater part of the time on the bottom of the river, then taking the hills marched several miles over precipitous hills and deep ravines, and are encamped on a high hill which enables us to see the course of the river for miles. Our guide promises us a rough road tomorrow, and judging from the prospect now before us, we shall not be disappointed, for never did the eye rest upon a more broken surface than that lying about. It resembles nothing so much as the ocean after a storm, the hill tops take the shape of the caps of waves, and the whole country around presents the appearance of the ocean when greatly agitated. This is the Sabbath of our Lord, and oh! how I wish I could say at this its close, that I had passed it as becomes a Christian. Had I confined my thoughts to pure and holy subjects, I should feel I had spent it properly, but I find it difficult in riding along to control my thoughts—they fly from one subject to another, without restraint, and are as irregular in their course as my mule Betsey in her efforts to get over this broken surface. My mind is generally bent upon my beloved wife and children, picturing to myself their whereabouts, and the circumstances that

attends them. Not infrequently, I fancy myself about returnir home, just in sight of all the world holds dear to me, and to embra them, and to lavish caresses and affection upon them, but I awal too soon from these agreeable reveries; my poor old jaded mu makes a stumble, and I am roused up to find myself in the verie wilderness in the world, and then the sad thought comes over m that I am far away from my little family, and that each day wide the distance, but may I not be with my precious wife and childr in less than one year? God grant it, but I may not! Saw today horse and mule which had been left by our guide a few weeks a —they had become well rested, and were so wild, they could n be caught. Capt. Johnston has not yet come into camp, having go in pursuit of the horse. We have seen today innumerable partridg more covies, and more in a covey than I ever saw in the same spa in any part of the U. States. The valley of the Rio Gila is full these partridges—their plummage [*sic*] is different and more beau ful than our common partridge—its note is also different—the flav of the bird is precisely the same. 416 miles.

October 26, Monday.—I shall not attempt to describe the rou we have passed over today. I have no language to convey ever faint idea of it. Could we have foreseen so much difficulty it wou have been better to have retraced our steps 20 miles, to have tak another and more practicable route. From the moment of starti until we dismounted at our present camp, our poor animals w stepping over and among rocks of great size—some fixed, but m of them loose, and then the steep hills and deep gullies were v frequent. We were in the saddle about 8½ hours, and marcl we supposed about 16 miles. The Rio Gila in this part of its cou runs through a narrow gorge or kanyon [*sic*] for many miles is impracticable to get through this kanyon—it was to get arou it that we were compelled to make the march we did today. much better route could doubtless have been found by cross to the south side of the Gila at the point where we crossed it y terday, about 10 miles above the upper entrance of this kany and taking a course due west until striking the Gila again—by

route, the broken country over which we have passed today, would be but some distance to the right. I will communicate this fact to any poor devils who like ourselves, I may find en route to California by this route. The country is basaltic every where—the whole surface of the bottom of the river is covered with a basaltic substance resembling lava—it is lava without doubt, and the whole country, from New Mexico to California must have been at a very remote period visited everywhere and continually with volcanic eruptions. What a curious sight to persons, who like ourselves, have been accustomed to the beautiful green prairies of our Eastern plains and cultivated fields. But for the climate of this desolate region, which is certainly unparalleled, 'twere better for it to be blotted out from the face of the earth. 432 miles.

October 27, Tuesday.—The howitzers not having come in last night, we remain in camp today that they may be brought up. Many animals were left on the road, some 8 or 10—given out from fatigue. Such another day as yesterday would dismount half the company. We are encamped just below the mouth of the Rio St. Carlos [St. Charles] which runs into the Gila on the north side. The Black and the Blue rivers enter the Gila on the north side, the mouth of which we could see from our route yesterday—also the gorge they made thro' the mountain on the opposite side of the river.[29] The grass at our present camp is decidedly bad, and in consequence staying here today will not benefit much our jaded animals. Had a few drops of rain last night—the first since leaving Santa Fe. A black cloud passed to the right of us in which there was thunder and lightening. As we were lying without tents, were fearful of getting a soaking. I must here acknowledge that I have no taste for this mode of life—it contains not a single charm for me.

[29] Both Turner and Emory are confusing here. Their Rio San Carlos is the modern Bonita Creek. In both his text and map Emory gives the names Prieto and Azul to Turner's Black and Blue, while on modern maps the Prieto is the San Francisco River, and the Azul is Eagle Creek. To deepen the confusion, there *is* a San Carlos River today which flows into San Carlos Lake behind Coolidge Dam and is the Rio San Francisco of Emory's map! See Ross Calvin (ed.), *Emory's Reports* (a reprint of Emory's *Notes*) (Albuquerque, University of New Mexico Press, 1951), 108 and notes 74, 76, and 86; 202–203.

There is nothing in the wild scenery about me to interest me for one moment. It is *labor*, *labor* from morning till night, up hill and down, over rocks and gullies. Sometimes clambering over precipitous cliffs, at other times descending a plain with a slope of 45° —rarely moving over a smooth surface. Is there anything in such employment to interest one, who has agreeable ties elsewhere? I think not! As for myself, I move along listlessly from morning till night, with my eyes generally fixed on the ground and my mind generally fixed on home, and its fond endearments. I sink into deep and pleasing reveries, imagine my wife and my children around me, and in momentary forgetfulness of, and blindness to the dreary reality, I am happy, but alas! I am too soon awakened. Some obstacle will present itself, such as a deep ravine or steep hill: the command must dismount and walk over, or my old mule will get into a cactus bush and founder awhile, or some mule will get its pack upset and come dashing towards the head of the column, waking up my old mule, who like myself, was perhaps dreaming, and so we go from day to day. Night comes on, we eat supper, smoke pipe, go to bed in the open air, sleep sound, get up at early dawn, take breakfast, and off again to repeat the day's work, and so on from day to day. I am fatigued, I am tired of this business. I wish it was over, and I restored to the bosom of my beloved Julia, who is doubtless bewailing my absence as much I am hers. How long shall I find it necessary to remain in the army is a subject that frequently presents itself to my mind. I do not determine on a satisfactory answer to it. Should I leave it once, I have apprehensions with respect to the practicability of obtaining a comfortable support for my little family. My predilections now are all for a retired and quiet life. I desire to be comfortably established: I desire to have the means of furnishing all the comforts of life to these dear creatures, whom nature, and nature's God, make dependent upon me. But beyond this I have no longings. As for elegance or style in living, if I know myself at all, such a state of things would be irksome, and how admirably are my wife and myself adapted to each other in this respect. May God in his infinite goodness and wisdom, so permit us to manage and arrange our

affairs, that on my return home, we may be able to select a mode of life more suitable to our tastes, than the one we now pursue. The above was written this morning: this dreary day, thank God, is near its close. Would I could say as much for this dreary campaign. The howitzers have been brought in, having been since 7:00 A.M. yesterday until now, getting over 16 miles: what a country and to what purpose can it ever be applied. I wish there was a railroad through it, and at the rate of 60 miles an hour was passing over it, but let patience and perseverance do their work, they accomplish wonders. I wish I had more of these virtues–just as much as my mule Betsey, who does her work thro' this rugged country just as cheerfully as though she had a daily breakfast and supper of hay and corn: poor Betsey, will you ever taste of these again! I fear not: they tell me you too must give out, and be left to die before we reach California. Not if I can help it. You have been faithful to me, and I will do my utmost to save you from such a fate. If I have omitted to mention it before, I say now for the information of no one but my dear little wife, that centipedes and tarantulas abound in this region. We have seen several of the former, and many of the latter–a tarantula was found today large enough to cover the palm of one's hand. I sent it to Lt. Emory, Topographical Engineers. A strange man this Lt. Emory, beset with one mania, a greediness after immortality–in other respects a clever enough sort of man. I am disappointed in not finding him an agreeable person to be associated with–his assistant Lt. Warner is just the reverse–good natured and sociable.

October 28, Wednesday.–Marched today about 21 miles, all the time on the bottom of the Rio Gila, which in consequence of the accession it has received from the tributaries mentioned in our last day's travel has become a much more rapid and deep stream–the water is not so clear as when we first struck it–must have been colored by the Black and Blue rivers. A portion of our route today abounded with the partridges peculiar to this country–never were partridges so numerous as in this–in the distance of half a mile we must have seen today from 800 to 1,000. Since our

arrival on the Gila we have occasionally seen the foundations of habitations which may have existed several centuries ago, but the evidences were so imperfect until today, as to admit of some of us being incredulous as to the fact, whether or not they were the remains of human habitation. Today not one of us can entertain a doubt on the subject: the square and oblong shape of the buildings are distinctly marked, and the stones placed with a precision and regularity which exhibit an architectural taste and improvement far superior to anything found at the present day among the savage race of this country, or east of the mountains. The valley through which we marched was much the widest we have seen on the Rio Gila, and from the ruins we have seen it may have accommodated a population not less than 12,000. Pieces of pottery were extremely abundant about these ruins and indeed might have been picked up in all parts of the valley. At one place we found many cedar posts still standing, which must have been standing at least 3 centuries–the most remarkable example I have ever heard of, of the durability of cedar. To the left of our course today a very high mountain range lay some 10 or 15 miles from us–throughout the day it has been covered or rather capped, with clouds, and it appears to have been raining incessantly. This is the highest mountain we have yet seen.[30] Large trails have crossed our route today, leading towards Sonora from the Indian country, lying north of the Gila–on some of these trails fresh tracks of horses and mules were visible, as if Indians may have passed over them a few hours before. It would be great good luck to meet a few Indians just now, as they might be induced to guide us thro' a district of country which we shall pass in a few days, and in which we expect great difficulty in finding water without guides, besides we might procure fresh animals from them. 453 miles.

October 29, Thursday.–Marched about 22 miles, and encamped on the bottom of the river. We have had a good road today–better than any day since leaving Santa Fe. Grass is becoming bad–only at intervals, and then of an inferior quality. After marching about

[30] Probably either Mount Graham or Mount Turnbull.

8 miles this morning we fell into a large trail leading from the direction of Sonora, diagonally across the river to the range of mountains, which cover its north side. This trail appears to have been much traveled, and is doubtless the main route by which the Kiataro Indians,[31] who live in that range of mountains, take the horses, mules and cattle which they steal from the inhabitants of Sonora. We are informed that great numbers are stolen every year by them, and to such an extent have their depradations been committed for some years past, that the Mexicans on the frontier of Sonora have become comparatively destitute, and in many instances have abandoned large ranchos, which were contiguous to the Indian country. These Indians, like the Apaches, of which nation they are said to be a part have been at war with the inhabitants of the Dept. of Sonora for some years, since which time they have improved in condition in the same ratio that the Mexicans have declined—and as the Indians are doubtless fully sensible of the source from which they derived their present prosperity, it is not probable they will cease committing these depredations until a more enterprising and energetic population gets possession of Sonora, who will chastise them properly for their aggressions. It is not probable they will permit us to get a sight of them during the time we will be passing through their country. The valley of the river continues wide, and the soil of the same light porous character: in riding thro' it our animals sink at almost every step to their knees, causing great fatigue and great impediment to their progress: to the depth of 6 inches under the surface, the earth is everywhere perforated with holes, undermined by innumerable small animals which resemble the ground rat, and is doubtless the ground rat of this country. Saw a mule today which had doubtless made its escape from the Indians, having been alone for some time it had become extremely wild, too much so to be caught. Oh this country of cactus, mesquite bush and wild sage, remarkable for sterility and its broken mountainous surface, where it scarcely ever rains and where no verdure is visible except in the branches of cotton wood trees. When, oh,

[31] Turner's spelling is one of several variants used to describe the Coyoteros Apaches who at that time lived in this part of Arizona.

when shall I say goodbye to you—would that the time had arrived; of one thing I feel assured that no *earthly* power can ever induce me to return to it. I would rather be way down with poverty in the U. S. than to live in the greatest luxury and wealth in this country, and when I say this country I mean the whole country lying between our beautiful verdant prairie and the coast of the Pacific. No early inducement could ever cause me to bring my wife and children to such a country, and without them even the fairest portion of the earth's surface would not be agreeable to me, but of such a place is this Rio Gila, it is scarcely fit to be the abode of the savages, who live near its banks. 475 miles.

October 30, Friday.—Made today about 21 miles over a good road, a large trail, the same we marched on yesterday, generally on the bottom of the river, occasionally crossing points of hills which make in close to the river. A cloudy, cool day, most propitious for making progress: just before getting into camp, met suddenly in turning the point of a hill two Indians, both old men, perhaps with defective sight, for they were evidently surprised and in finding themselves in our power, exhibited much alarm and uneasiness. We endeavored to prevail on them to come into camp with us, hoping that we might be able to allay their fears, and induce them to seek their people, with whom we might trade for fresh animals, but they persisted in refusing to come into camp with us, and appeared as stupid, on the whole, and so difficult to communicate with, that the General determined to lose no time with them, but to have them go their own way and continue our route. These were the most meagre, poor, scrawny, abject, starved looking creatures I had ever seen in human shape, and unless they are the very refuse of their tribe, the Indians who inhabit this country are greatly inferior in appearance to those who roam over our prairies, but how can it be otherwise when it is remembered that their only subsistence is obtained by stealing from the frontier inhabitants [Mexicans, themselves half-starved] of the Dept. of Sonora. Oh! human nature in what strange figures are you sometimes represented! We have had a high peak on our left all day, distance from us about

10 to 12 miles—the country around preserves its broken and barren aspect. My good and faithful mule Betsey, this has been a day of rest for you, that is, you have been permitted to follow us loose—the first day since leaving Santa Fe that you have not been rode. Betsey's water works are a little out of order [illegible] this strange indulgence, maybe she will be restored in a day or two and then away we go again. Betsey and I are inseparable companions. 496 miles.

October 31, Saturday.—Marched 9 miles, and are encamped on the San Francisco a small tributary of the Rio Gila, on its right bank. Propose to take a long stretch without water at this point. Our guide in passing along a few weeks ago found no water for 60 miles; by taking a route somewhat different, we hope to find water at convenient distances. Just after getting into camp today, two Indians made their appearance on a hill a mile from us. Capt. Moore and several others went out to prevail on them to come into camp, but were unsuccessful: they were afraid that we had some evil designs on them. These Indians on a former occasion were treated treacherously by a party of Americans, many of them having been most inhumanly killed[32]—since then, they have been suspicious, and to this, must be ascribed their unwillingness to come with us at this time: this is a great disappointment to us for the reason mentioned a few pages back in my journal. We are at an excellent camp for grass, and surrounded by the same broken wild country, through which we have been winding our weary way since leaving the Rio Del Norte. My wife, oh my sweet wife! how has my mind dwelled upon thee, and our dear little ones this day: could I only gaze at you all for a few short moments, to see that you are well and cheerful, and that all is passing well with you, with what cheerfulness would I recommence this monotonous march tomorrow, but I have confidence in God's goodness to us all—He has preserved us thus far—is it expecting too much to hope that he will

[32] This was the treacherous massacre of a number of Apaches, including the chief Juan José, in the spring of 1837 by a gang of Americans led by James Johnson. Details are given in Josiah Gregg, *Commerce of the Prairies* (Norman, University of Oklahoma Press, 1954), 205–206.

continue his blessings to us. I know my unworthiness, but yet I pray to become a more worthy recipient of God's providence. My prayer will be heard, I feel assured that it will be, and that I shall yet live to be a good Christian and exemplary Catholic. My first desire is to be a conscientious member of the same church with my beloved wife—that we may offer up our prayers together at the same altar. 505 miles.

November 1, Sunday.—We have marched today about 17 miles—the first 6 miles we returned on the Rio Gila, struck some 5 or 6 miles above the point at which we left it yesterday—the animals were watered, canteens filled, and arrangements made for a long march without water. We struck at once into the hills almost at right angle to the river, for the purpose of avoiding an impassable kanyon through which the river flows a short distance below where we left it. After leaving the river we wandered through dry ravines and up and along the stony sides of precipitous hills—after wandering about 10 or 12 miles came to a ravine where there was water enough for a camp—this place has been much resorted to by the Indians—marks of their having been there recently—remains of a rudely constructed steam bath. We are encamped a half a mile from this water, having been compelled to leave it this far, in order to get grass. The cactus in our march today has assumed a new and very strange character. It grows in a straight shaft to the height of 30 feet with a diameter of 2 and 3 feet—branches occasionally spring out midway up this shaft, all at the same elevation, presenting at a distance the appearance of a drop candle stick inverted. The Sabbath has again come round, and I am ashamed to say it had not occurred to me until I opened my journal. Ah! how little is there in this wilderness to remind one of this holy day. We wend our weary way on Sunday as on any other day. I feel happy, and it is a source of great satisfaction to me that my wife and children are within the sound of the church going bell, a sweet sound which these rocks and valleys never heard, nor do they smile that a Sabbath appears. 522 miles.

November 2, Monday.—The Howitzers did not reach camp last

ATTACHMENT D

Journal of Two 49ers Travelling along the Upper Gila River

FROM LEWISBURG TO CALIFORNIA IN 1849

Notes from the Diary of William H. Chamberlin

(continued)

Edited by Lansing B. Bloom

CHAPTER VIII

Wednesday, June 13.—We are within six miles of the old Santa Fe gold placer; some of our men visited it; found some emigrants encamped there; they took a small basin with them, and in one washing procured at least fifty cents worth of pure gold.[40] Time passes very tediously when lying in camp in such a desolate country as this.

Thursday, June 14.—Green, Howard and myself returned to Santa Fe to-day, for the purpose of purchasing a few articles we had forgotten, and procuring additional information regarding our route. A large company that had started on the Spanish trail have returned, finding it impossible to cross the streams, which are very much swollen. They lost a great deal of baggage and provisions in their unsuccessful attempts; they are preparing to go the southern route.

Friday, June 15.—Lodged during the night at the U. S. hotel. Had a cot but no bedding. The fleas which abound here, annoyed me very much, and I passed a restless night. Indulged in a glass of what they call ice cream (it deserved no such name), and paid 50 cents for it. Left town about 12 o'clock to-day, and reached camp about sundown, a distance of 30 miles. Met some very heavy trading teams, on their way to town from Chihuahua.[41]

Saturday, June 16.—Had a slight shower last night, which is the first rain that has fallen upon us for months. The rainy season is about setting in here, which lasts until some time in August. Everything here appears to be suffering from drought. Find employment in fitting up our packs, and arranging to start on the morrow. Our packs do not average more than 150 pounds to each animal. The

40. On the placers, see note 34 *supra*. The best description of them comes from Wislizenus, quoted by Twitchell, *Leading Facts of N. Mex. History*, II, 180-2, note 123.

41. Evidently the road east through Tijeras Cañon and north through the mountains to Santa Fé was then more in favor than the older road which continued north from Albuquerque and then reached the higher level by way either of the Rio de Galisteo or the Rio de Santa Fé.

was of utmost importance to us. They are very avaricious and have little regard for their word of honor when self-interest is at stake. They care nothing about money and prefer a new brass button to a half eagle. They had a little money among them, but did not know the value of it. We had one display of "etiquette" worthy of imitation by a more civilized race of people. While the old chief was holding his talk with our captain, the Mexican guide ventured to say something on the subject, when the chief ordered him to "hold his tongue," saying that it was enough for one man to speak at once. Aware of their reported treachery, and not putting much confidence in their protestations of friendship, we doubled our night guard, but were not molested. In the morning we found a few small articles had been stolen while trading with them; but upon the whole, our falling in with this band of savages was the most fortunate circumstance that happened to us on the whole route. Distance, 24 miles; 1224 miles out from Fort Smith.

Sunday, July 8.—Started at eight o'clock and moved off in fine spirits, well satisfied with the results of yesterday's "fair." I suppose more than 200 Indians had visited our camp during the afternoon. Our course west, over a very rough, broken country; then ascended and crossed a high mountain, which is the dividing ridge that separates the waters which empty into the Atlantic and Pacific oceans. We then descended a long ravine and encamped about 1 o'clock on a small, pure stream, and had pretty good grass for our animals. The surrounding hills are covered with trees of a stunted growth, shrubbery and gramma. The main stalk of the beargrass grows to a great heighth. This the Indians use for lance handles, which are from 10 to 15 feet long, and very firm when dry. Mr. Hart, an old California gold miner, thinks that the earth indicates an abundance of gold in this region. We found specimens of copper and iron ore. Distance, 15 miles—1239.

Monday, July 9.—Our guide led us in a winding course through ravines and across difficult hills, until we found ourselves traveling down the bed of an arroyo, which gradually widened and deepened, until we suddenly emerged and bivonaced upon the bank of the Rio Gila (Hela). In the bed of the arroyo we saw a great variety of cactus or prickly pear, loaded with ripe fruit; also several varieties of trees, walnut, elder, oak, etc. There is little doubt but the country we pass over to-day will at no distant period prove an immense gold placere. The hills are composed of a sand rock and red clay, intermixed with sand and small

flint stones; in the ravines we saw the slate rock cropping out, made bare by the action of the water, and large quantities of quartz, which is said always to accompany a deposit of gold. We did not "prospect" any, for the want of water, and very likely we should not have known how to examine for the precious metal. Indeed, we think but little about gold or gold digging, it being a subject rarely introduced for "camp gossip." Traveling has become as natural as doing "day labor;" it is indeed very laborious, and when we reach camp we are very much fatigued and think of nothing else than rest. Our stock of provisions is disappearing rapidly, and unless we are fortunate enough to obtain a supply of the Pjona [Pima] Indians, we shall certainly suffer, and we are beginning to think this a much more important consideration than the gold of California. The banks of the Gila, like all other rivers we have seen since leaving the Ohio, are fringed with cottonwood. At this point it is about 12 yards wide and 18 inches deep, and runs upon the first rock and gravel bed we have seen since leaving Pennsylvania. It is a swift flowing stream of clear, pure water, and abounds in trout, some of which are of a very large size. As soon as we encamp a number of our men prepared themselves with rod and line and went to "try their luck" amongst these strangers of the finny tribe. They soon returned and reported favorably, having caught enough to supply "all hands" for both supper and breakfast. Hill Dixon caught one that measured four inches between the eyes and weighed about 30 pounds. The country is very mountainous on both sides of the river, and but little flat land along its banks, which at this point is covered with a luxuriant growth of weeds, indicating a good soil. This is the encamping ground of the Mexicans who come out to trade with the Apaches. We can find no grass and we fear our animals will suffer while traveling down the river. Here our guide, Joseph Jarvis, leaves us to return home, having fulfilled his contract faithfully, and we are left to "go it blind" the rest of the way. Distance, 23 miles—1260 *(sic)*.

Tuesday, July 10.—After giving Jarvis a letter of recommendation signed by each member of the company, and furnishing him with enough crackers and bacon to last him to the Rio Grande, he started home and we continued our journey. Crossed the river and continued down the bank, through underbrush and weeds, for several miles, then re-crossed and ascended a high, difficult bluff and kept upon the high lands, crossed several deep arroyos and again

encamped on the river bottom, opposite Steeple Rock.[65] The highlands or plains are entirely destitute of timber, but are covered with a sparse growth of gramma. If this first day's march on the Gila be a "sample" of "what is to come," we will "see sights" before we reach the "other end." Distance, 30 miles—1290.

Wednesday, July 11.—The trail laid along the north side of the river and was a comparatively good road. This flat is from one to two miles wide and probably 20 miles long. Passed through some patches of good grass, but the greatest portion of the valley is a barren waste. Judging from the great number of ruins we discovered, this place was, at some remote period, densely populated. We saw the stone foundations of walls, that once enclosed large towns. Some of the houses, which were no doubt built of adobes, had stone foundations. Save these marks, and the immense quantities of broken pottery strewed around, there is no trace or vestage of the country ever having been inhabited. The buildings are all level with the earth.[66] I believe there is no satisfactory accounts of these once extensive settlements on historical record. Probably these were colonies established in the early days of Mexico, and when in successful operation, were overpowered and driven off, or totally destroyed by savage Indians, and their improvements demolished and laid waste. It may be that gold mining was extensively carried on in this region of country, and the ore packed to the City of Mexico, to decorate the halls of the Montezumas, their churches, etc. It certainly would be interesting to know what ever induced people to settle in this isolated portion of the world—in a place where the earth would not produce enough to supply a small population. At present there are only a few deserted Indian wigwams along the river bank. About 3 o'clock we turned in to water, and found 40 men of the Knickerbocker company encamped.[67] They had attempted to explore a more southern route, but after suffering severely for want of water, losing one man and a number of stock, they concluded to shape their course due north for Gila, which they reached a few miles below our last night's camp. Good grass. Distance, 28 miles—1318.

Thursday, July 12.—Our course is down the valley of

65. "Steeple Rock" had been so named when the Army of the West passed this way. It was recognized by Chamberlin from the description which he had in Emory's *Notes*, p. 63.

66. Chamberlin seems to have anticipated seeing such evidences of prehistoric life from his reading of Emory's *Notes*, pp. 64-65.

67. See pages 86, 89 *supra*.

the river, occasionally leaving it for a short time to cross the bluffs that extend into the bank. We crossed the river three times to-day and encamped on the south side. Passed a company of 25 New Yorkers and Virginians encamped on the bank of the stream. Passed a great number of ruins described yesterday. The extensive ranges of mountains on both sides of the river present a variety of shapes and picturesque appearance. We are encamped at the point where we leave the river to cross the rough and trying part of the road called the "Devil's Turnpike."[68] Here the mountains close in upon the river, which has cut a channel through solid rock, in places more than 100 feet high. Through these cañons its restless waters rush, making it impossible to continue our course down the river. We drove our stock to the top of the mountain to feed upon gramma, where those of us not on guard were prevented from sleeping and completely drenched by a very violent thunder storm, which lasted several hours. Distance, 20 miles—1338.

CHAPTER XI

Friday, July 13.—We started at 9 o'clock this morning, and immediately ascended a high mountain. Our course was over mountains and through ravines, down the rocky beds of which we frequently traveled for miles. Our mules scrambled along the sides of mountains and precipices where I thought it would be impossible for man or beast to venture; but they are a sure-footed animal and we did not meet with a single accident during the day. The trail for the whole distance is covered with a sharp, angular-shaped black rock and small sharp stones, which severely lacerated the hoofs of our animals, and they could have been tracked for miles by the blood upon the stones; but we all arrived safely in camp without losing a single mule. Gen. Kearney lost 15 in the same march 3 years ago. In some of those deep, dark chasms, through which we passed, it would (with the aid of a little fire and brimstone) require but a slight stretch of the imagination, to think one's self on the brink of the infernal regions. We descended into a deep, gloomy ravine, the bed of which was but a few feet in width, and the sides towered perpendicularly to the clouds. Night came on while we were thus imbedded in the "bowels of the earth," but we finally groped our way to

68. Under date of Oct. 26, 1846, Emory wrote: "The men named this pass 'the Devil's turnpike,' and I see no reason to change it." *Op. cit.*, p. 65.

the river, whither it led us, crossed over and encamped, having traveled 10 hours without intermission and made but 16 miles. The "Devil's Turnpike" is a very appropriate name for to-day's route; it is not "graded" but well "set" with sharp rocks. This has indeed been a difficult and trying day's march, on both man and beast. We walked all day and were almost worn out on reaching camp. We stopped on a sand bar, without a spear of grass for our weary and hungry stock, and their incessant cries during the night for something to eat were truly painful. We did not see a single living animal today; indeed, we have met but little game since leaving the buffalo region, on the plains of the Canadian river. Since leaving the Rio Grande we have seen an occasional antelope, hare, or a flock of quails. Of the reptile kind we have seen rattle snakes, horned toads, lizards, tarantulas, and scorpions in abundance. To-day we had some extensive views of this wild region of country. Nothing could be seen as far as the eye could reach but mountain upon mountain, apparently barren, which gives this desolate waste a most forbidding appearance. From the amount of drift and other indications, the Gila rises to a great height during the wet season. Distance, 16 miles; 1354 miles out from Fort Smith.

Saturday, July 14.—This morning we find ourselves encamped on a small sand bar, with impassable cañons above and below us, and enclosed on either side by tremendous mountains. We have been following the trail of a company a few days in advance of us, which has brought us into the difficulty. The suffering condition of our animals compels us to make our way out of this "trap" as soon as possible. Several of us started in search of a trail leading out, but found none. Our only resort was to ascend a high and rugged mountain, the summit of which we at last gained, after incredible toil on the part of our mules and selves. We continued along the dividing rise in a southern course, in hopes of getting out of this "turnpike" region in a short time. Our tender-footed beasts hobbled along as best they could, but all the mules that had been shod at Santa Fe lost their shoes during yesterday and to-day's march. After traveling several miles in this way we intersected a good trail, which led us directly to the river. We suppose this to be General Kearney's old route, he having left the river further to the north. After a long but pretty gradual descent we again reached the waters of the Gila and traveled down the stream crossing it nine times, when we emerged upon a flat, which widened out, and is covered with mezquite and other bushes, but not a spear of grass.

Here again we found a great number of those ruins, formerly spoken of, large quantities of broken pottery, etc. It is impossible to judge the shape of the vessels of which these fragments form a part; very likely, however, these buildings were roofed with this material. It resembles the common red crockery now in use in the States, being ornamented and striped in a variety of styles. Not a piece was to be found of a larger size than a man's hand. We encamped on a small patch of green grass about a mile from the river. It is a fortunate circumstance we found this, it being the first we have met with for several days. The base of Mount Graham is about 10 miles distant, on the south side of the river.[69] The waters of the Gila have been increased by the addition of the Prieto and Don Carlos rivers;[70] the latter stream is strongly impregnated with salt. Saw an abundance of blue quail and a great many turtle doves; the latter bird we have met with in every part of the country since leaving the States. Distance, 20 miles—1374.

Sunday, July 15.—The Virginians lost a mule yesterday, and Capt. Dixon found a good one running loose. The bank of the river is so beset with underbrush and drift that we cannot get a supply of water without extreme difficulty. Remained in camp to-day to rest and graze our animals. Some of our men tried to catch some fish, but met with poor success. I preferred gunning and killed a few quails, doves, etc., saw a great many long-eared hares, but they were very wild. I spent several hours in wandering over the site of these ancient settlements, but could find nothing but the pottery and foundations of buildings, denoting the existence of a once numerous people. The weather for some days has been excessively warm, and the indifferent shade of a mezquite bush is the only protection we have from the scorching rays of the run. We would prefer traveling, if we could do so in justice to our animals.

Monday, July 16.—Trail continues down the valley of the river, which is from one to three miles wide. Passed more ruins, which were in a greater state of preservation than any we had yet seen—broken portions of walls and posts are yet standing. We also saw some large stones, hollowed out in the shape of a mortar; these were no doubt used for grinding grain. The valley of this river was once inhabited by thousands—perhaps millions of human beings,

69. There would be no difficulty in recognizing Mount Graham from the illustration in Emory's *Notes*, p. 67.

70. This observation is similar to that made by Emory, *op. cit.*, 66. "Don Carlos" is a slip for San Carlos.

now wholly extinct. They cultivated the soil, which required irrigation, and some of their ditches can be seen to this day. The sand and dust in our trail is very deep, and so heated by the rays of the sun that an egg could be roasted in a few minutes. The barrels of our guns became so hot that we could scarcely touch them, and our bridle reins almost blistered our hands. We passed along between the base of Mt. Graham and the river. The top of the mountain is immersed in clouds and showers are falling around its summit, while it is perfectly clear in the valley. The water which falls around the mountain flows down the ravines, in which there appears to be some verdure, and at the base there is said to flow a subterranean creek. Encamped on the river bank, had some grass, but the water of the Gila is very warm and blackish. Distance, 30 miles—1404.

Tuesday, July 17.—Meeker and Bornean[71] abandoned their worn-out riding horses yesterday. Our course is down the river, the trail pretty solid. In the afternoon we crossed a rocky point extending into the river and encamped a few miles below, directly opposite or north of Mount Turnbull.[72] This afternoon we intersected a large trail, which we suppose is that traveled by Sonora traders to barter with the Indians.[73] Saw the "frames" of a number of cattle and horses lying along the route. Today we again passed the Knickerbocker company, many of whom are on foot, two or three of them packing one horse, and that probably on its "last legs." We had a cool breeze today and got along very comfortably. Distance, 30 miles—1434.

Wednesday, July 18.—Kept down the river with a good road until 12 o'clock, when the river cañoned and we were "brought to a stand." We, however, found a small trail leading south, around the western side of Mt. Turnbull, and started on it, but unfortunately, neglected to water our animals and fill our canteens, expecting to strike the river again in a few miles. In this we were disappointed. We continued traveling south, leaving the river behind us, and

71. At page 40 *supra*, this name appears as "Bornan."

72. Emory, *op. cit.*, p. 69, wrote under date of Oct. 30: "Mount Turnbull, terminating in a sharp cone, had been in view down the valley of the river for three days. Today about three o'clock p.m., we turned its base, forming the northern terminus of the same chain in which is Mount Graham."

73. Again we quote Emory (p. 76): "The dry creek by which we crossed to the San Pedro river was the great highway leading from the mountain fastnesses into the plains of Santa Cruz, Santa Anna, and Tucsoon, frontier towns of Sonora. Along this valley was distinctly marked the same fresh trail, noted yesterday, of horses, cattle, and mules."

FROM LEWISBURG TO CALIFORNIA IN 1849

(Notes from the Diary of William H. Chamberlin)

(Continued)

Edited by LANSING B. BLOOM

CHAPTER XV

Monday, Aug. 6.—Found an abundance of beans for our stock this morning, and concluded to remain for the day. Indeed, ourselves as well as animals require a day for resting and recruiting; but some of the mules took it in their heads to stray, and kept us running all day in search of them. A mule completely jaded and unfit for service, will frequently wander miles from camp during a night. Had bean soup for all hands to-day, which luxury we cannot afford more than once in two weeks. Franklin came up to-day with a company of emigrants; he had lain on the mountain without water, expecting to die. We knew this company would be along to-day, or we should have gone back after him.

Tuesday, Aug. 7.—Started at 12½ o'clock this morning, purposing to stop at daylight to feed and breakfast. While we were packing, another pack company came up, and took possession of our deserted camp. Did not find a blade of grass, or bean, until 4 o'clock p. m., when we came across a little grass, growing upon a sand bar in the river. We stopped and unpacked twice during the day, to rest the weary animals, and intended encamping several times, without feed, but fortunately did not. Distance, 35 miles—1835.

Wednesday, Aug. 8.—Remained in camp until dark this evening, when we packed up and started. Instead of rest to-day, which we so much need, we were kept on the look-out and in search of our animals all the while, which seem determined to leave us at every opportunity, and seek better fare or better masters. Thus far, however, we have been fortunate, having lost but the one, carelessly left behind, several hundred miles back. The channel of the river has become very wide, more than a mile in many places, but at present is at its lowest stage, although it increases gradually as we near its mouth. The growth of cotton wood and other timber, has continued about the same,

throughout its course. But nothing can exceed the barren, godforsaken appearance of the country, on the north and south side as far as the eye can reach; one sterile hill rises after another, and mountain after mountain, the desolation of the scene unbroken by a single tree or living object. The heat of the day being so intense, we are now compelled to travel at night; the sand in the road is very deep, which makes travelling very laborious, and it is hot enough to scald the legs of the animals. What would seem strange, although so near the river, we frequently suffer for want of water; the underbrush and weeds prevent our getting to it. For the last two or three weeks, we have seldom encamped within less than a mile of the Gila, and it was often with a great deal of difficulty that we could get at it, besides carrying the water that distance.

Thursday, Aug. 9.—We unpacked about 1 o'clock this morning and rested until daybreak, when we repacked and continued our journey. At 10 o'clock a. m. we halted to prepare breakfast, which occupied an hour's time. Here we found a bush shelter from the sun, which had been put up by some advance company. The day is excessively hot. After breakfast (if such it can be called) we started. Passing over several low, barren sand hills we emerged upon a sand plain, stretching off to the south and west as far as the eye could reach. Never will I forget the sensations that come over me when I first gazed upon this scene. The crossing of the Colorado, and the desert beyond, had long been the subject of speculation and dread. From the information we had, we had every reason to expect many difficulties and troubles in passing this important point in our journey, but nothing could exceed our anxiety to realize it, for we imagined that once beyond the jornada, the greatest obstacle in the route would be overcome and we would soon reach the settlements of California. Well, on our right we could see the course of the Gila river, flowing westward, marked by the line of cotton wood on its banks, and the mesquite timber stretching for some distance over the plain. On the south we had the broad, barren, sandy plain, which we know to be the valley of the Rio Colorado, although we could not distinguish the river or its course; and on the west, nothing but a high and apparently desolate waste, bounded the horizon. A hazy atmosphere hung over the scene, on fire, as it were, by the intense heat of the sun, the rays of which are reflected upward by this immense mirror of sand; all combined to form a picture at once grand, gloomy, and fore-

boding. Our road kept within the range of the mesquite timber, and we had traveled but a few miles when we found some beans. The condition of our animals obliged us to stop and unpack, which we did about 1 o'clock, and two hours were spent in gathering the beans for the mules. Towards evening we found a suitable encamping place in a grove of mezquite; had an abundance of beans and some coarse grass on the border of a lagoon, which connected with the Gila. Here we found a small company encamped who informed us that we were within two miles of the junction of the Gila and Colorado rivers. This was joyful news to us for we could turn our backs upon the Gila now, with as much pleasure as we first beheld, drank and bathed in its cool and limpid waters, which have since gradually changed into a broad, heated, turbid and brackish stream. In the course of our journey along the river we have forded it upwards of one hundred times, and many times the apparently impassable mountains which bound its course seemed to bid defiance to the efforts of our weary animals and selves. The Yumas Indians had stolen several mules from these men, which is an irreparable loss to them. There is a village of them on the north side of the river, directly opposite, but not in sight. We had scarcely reached camp before we were visited by a number of them. We exchanged one or two animals with them, but did not better ourselves much. Distance, 40 miles—1875.

Friday, Aug. 10.—Howard and myself walked down to the upper crossing about a mile below the junction. The majority of the emigrants have crossed at this point, while some have gone down a few miles to Gen. Kearney crossing. We found some fifteen or twenty men here, busily engaged in ferrying over their baggage, and employing Indians to swim over with the mules. They had a wagon body which they had managed to make water-tight, and answered the purpose tolerably well, although it is a slender boat in this "torrent of waters." The Colorado is here about 350 yards wide, deep enough to float a "man o' war," and a very swift current. In crossing the boat is carried down half a mile by the stream, in spite of all the force that can be put upon her. The banks of the river are pretty high, and covered to the edge by a thick growth of cotton wood and underbrush, so that it is impossible to land on either side but at the present places of embark and debarkation. After crossing with a load they are obliged to tow the boat up stream by hand, with a great deal of labor, crawling along the bank over roots,

wading or swimming for the distance of a mile, to make sure of the point on this side. There are about fifty Indians standing about, watching for every opportunity to plunder. They have heretofore carried the packs of emigrants over upon small rafts, made by lashing together several bundles of reeds; in this way they supplied themselves with clothing, blankets, tobacco, etc. This interference with their business has somewhat enraged them, and they have already given the emigrants a great deal of trouble, stealing their animals and robbing them of their baggage, provisions, money, etc., and in some instances attacking and killing several. They are the most expert swimmers I have seen and remarkably strong in the water. They frequently carry a bundle of clothes upon their heads—to keep it dry—with the lariats of three mules in their hands, which they manage with most surprising dexterity in the swift stream. Their usual plan of stealing is while crossing with the baggage on their rafts or swimming over with animals, when they reach the middle of the stream they turn down, and the current in a few minutes carries them far beyond the reach of the loser, when they land and hide their plunder in the thicket, until the emigrants have left the river. Property to the amount of thousands of dollars have been taken from the emigrants in this way. In endeavoring to get into the bank of the river about a mile below this crossing, in an almost impenetrable thicket, I accidentally discovered one of their pens for hiding animals, etc., but it was empty. The Yumas are a fine looking tribe, with well formed bodies and regular and rather handsome features. They have a great deal of money amongst them, and I saw as high as $30 in gold coin paid for a single blanket. They wear no clothing but the breech cloth except the few articles of dress they have procured of travelers, in which they attire themselves rather awkwardly. What would one of our eastern ladies think if waited upon by one of these "lords of creation," with but a shirt and a coat to cover his nakedness, yet looking as dignified and vain as an enlightened gentleman who has nothing but a good suit of broadcloth to recommend him to their notice! A foreign dress has a surprising effect upon the character of the Indian, at once arousing his vanity and self-esteem. After seeing "how things were to be done" at the crossing, and engaging the "boat," we returned to camp. About 10 o'clock we packed up and started down. The boat was still in use and we could do nothing but cross our mules. We hired some Indians to swim over with them, one, two and three

at a time, for which we gave them blankets, tobacco, etc. We were cautious, however, to first station a man on each side of the river with our best shooting rifles, some distance below the ferry, to kill the redskins should they make an attempt to steal the animals. Part of our company crossed over to receive the mules, while the rest of us remained to start them in and watch our baggage. A small mule belonging to Franklin became entangled in the lariat and was drowned. The Indian brought it on shore and in a short time every part of it was carried away. The first butcher cut out the entrails and lugged them off, as the most delicate part, and the last took the head of the ill-fated animal upon his shoulders and trudged away, well satisfied with his share. Although we came very near losing three fine mules, this was the only actual bad luck that happened to our company. When night set we had all the animals safely over, but our baggage yet remained behind; we were obliged to divide camp and keep a guard on each side.

Saturday, Aug. 11.—The moon arose about 2 o'clock, when we commenced crossing our baggage, and by 12M, we had all our "traps" safely landed on the western bank of the Colorado, after ten hours of the most fatiguing labor. We immediately packed up and went out a short distance from the river, where we found a pond of water, an abundance of beans and some grass.

Sunday, Aug. 12.—Visited by the Indians. They had nothing to trade except jerked mule meat, which we purchased, glad to get it. The few squaws we saw were remarkably tall, and heavy in proportion. They might well be classed with the race of giants. At this point we expect to leave all water and strike out upon our journey across the desert. Accordingly, we filled all our water vessels—gourd, canteens, haversacks, etc. My air pillow, which had done good service in the purpose for which it was made, and was used as a life preserver in swimming the Colorado, now served as a canteen in which we packed four or five gallons of water, and altogether, we must have had about 20 gallons. We also packed a lot of mezquite beans. Everything being in readiness, we started about 4 p. m. We traveled west, across the river flat, until we reached the high ground; then south, crossing a number of high rough ridges, putting it towards the river. The country began to change in appearance, and we soon found ourselves "up to our eyes" in sand; the surface rolling and perfectly bare of vegetation except a small species

ON THE ARKANSAS ROUTE TO CALIFORNIA IN 1849

THE JOURNAL OF ROBERT B. GREEN OF LEWISBURG, PENNSYLVANIA

Edited by
J. ORIN OLIPHANT
Professor of History, Bucknell University

BUCKNELL UNIVERSITY PRESS
Lewisburg, Pennsylvania
1955

equal in appearance to Sand's celebrated May Fly, & I saw that they looked up to him as a superior among them, the boy evidently had much white blood in him & I think entirely white but ingin in evry action except that of constantly smiling They stoped us and tryed to persuade us that we should find water & better grass in another direction than that which our guide was takeing, saying that it was a long way to water, the rout we were bent on, however we went on and found it within a ½ mile of where they stopped the main com where went into camp, the whole croud of ingins following & more comeing on. then our camp presented a busy scene all of us trying to trade our broken down stock to them for fresh ones giving them clothing brass rings vermilion &c to boot we suceeded in getting clear of all our broken stock. I gave Daves pony that we had left back, & "our old Sall" with 2 shirts for a very fine mule, got from them in company 5 very fine mules, & 6 ponys for stock that we could have taken no farther. *This boy* was consulted in all the trades, from the description given by Mr Emory in his account[19] of this [*sic*] of a boy, a kind of God among them I had no doubt he was the same. I akes [*sic*] the cheif his name. he answered Dent which convinced me my supposition was right, these creatures are fine thieves. Meritt went to sleep putting his pistol under his head in the midst of camp, when he waked his pistol was gone several other things disappeared in the same mysterious manner their squaws are good looking for ingins al[l] ride astride,

I neglected to mention that day before yesterday we caught some of the trout in the Mimbrese spoken of by Emory although fresh from Maine he dont know trout[20]

8th Leave camp at 8, travel through the mountains 15 miles rout rather rough we see no liveing thing on todays journey, except our own company camp in another small valey entirely surrounded by mountains. this grass although it looks badly is very nourishing and our stock is improving on it water good.

9th leave camp at 8, through a narrow defile to the northeast & wind round over a very rough country for the distance of 8 or 10 miles when we strike down a ravine which evidently has been the bed of a stream in the rainy season is yet it widens out considerably toward the Gila, which comes in sight after traveling 12 or 15 miles, showing itself by the gro[w]th of cotton meszquite &c. at 3 oclock, we strike the river, it is really a beautiful stream, flowing clear & rapidly it is about the size of our White deer creek,[21] our boys are now out catching

some very fine fish, which we expect to make a breakfast of. saw no ingins today. cactus of evry variety as usual, grass very scarce about this camp. Kearneys trail on the opposite side of Gila a considerable number of emigran[ts] have passed within a few days road looks gloomy ahead very rough & Emory gives a dismal account of what is ahead of us look out now again for the red skins, H[ill] Dixon has just come into camp with a fish weighing about 30 lbs al[l] the rest have fine mess's all the same kind look very much like a salmon, but have no teeth and very small scales & eyes

NOTES TO CHAPTER III

1. There were gold mines situated about half-way between Santa Fé and Albuquerque. See the map in Gregg, *op. cit.*, I, following p. 58.

2. Walter Winston, a Virginian.

3. Dr. Winston also was a Virginian.

4. "Albuquerque contains about 300 inhabitants and is the most cleanly, respectable looking Mexican village we have yet seen. There is a detachment of U. S. soldiers quartered here." Diary of William H. Chamberlin, June 20, in the *Lewisburgh Saturday News*, September 27, 1902.

5. On the identity of these men, see the note by Lansing B. Bloom in the *New Mexico Historical Review* (April, 1945), XX, 147.

6. Manuel Armijo had been governor of New Mexico three times. For a brief summary of his rather shady career, see the note in Gregg, *op. cit.*, I, 79.

7. James H. Dixon. *Cf.* the diary of William H. Chamberlin, June 21, in the *Lewisburgh Saturday News*, September 6, 1902.

8. The crossing was made at Sabino. See Introduction, note 50, *supra*. During the latter part of June, 1849, the Little Rock Company and the Clarksville Company built a flatboat near Albuquerque for the purpose of crossing the Rio Grande at this place. Little Rock *Arkansas State Democrat*, September 29, 1849.

9. That is, the town of Socorro. *Cf.* the diary of William H. Chamberlin, June 27, in the *Lewisburgh Saturday News*, September 27, 1902.

10. Apparently this is a reference to the Mexican employed by the company when it was in Santa Fé. He was skilled in the art of packing, and for his services he was to be paid at the rate of $12 a month. Diary of William H. Chamberlin, June 8, in the *Lewisburgh Saturday News*, September 20, 1902.

11. San Antonio, a town which should not be confused with another town of this name on the east side of the river near Albuquerque. *Cf.* Introduction, note 49, *supra*. Unlike Chamberlin, Green does not say that the guide here employed was a Spaniard.

12. Chamberlin says in his diary that these articles were burned on July 4. *Lewisburgh Saturday News*, October 4, 1902.

3. The Little Rock Company, together with the Clarksville Company and Helena Company, held a glorious celebration near Socorro on July 4. After ning to the reading of the Declaration of Independence and to an oration, they ted and drank. In the evening they held a fandango, to which "quite a crowd ir Seignoritas" came. According to the report that was sent home, these wom- waltz 'devinly,' and their dancing is 'dem foine.' " Little Rock *Arkansas State ocrat*, October 5, 1849.

4. Emory, *op. cit.*, p. 57.

5. A "mountain of peculiar symmetry" was named "the Dome" by Emory, *cit.*, p. 58.

6. Mescal.

7. "D." is David ("Deacon") Howard, a member of the Lewisburg party.

8. This appears to be Green's understanding of the Spanish word *bueno*, ning good.

9. There is an account of this boy in Emory, *op. cit.*, pp. 73-74.

0. The passage to which Green here refers is in Emory, *op. cit.*, p. 62.

1. White Deer Creek, a tributary of the West Branch of the Susquehanna er, is in the northern part of Union County, Pa.

CHAPTER FOUR

Down the Gila to the Colorado River

10TH We eat the fish for breakfast find them very bony & quite soft, are now setting off with[out] the guide & making preperation to pursue our journey on our own hook. leave camp at 9 oclock cross the river & travel down the north side about 2 hours, when we recross & take almost immediately to the hills, which are very steep & hard to climb. we travel over one ravine after another for about 6½ hours, & if this part of our march was not the Devils turnpike[1] spoken of by Emory it is at least a Devil of a bad road we all agree on our stock did very well today. the heat of the sun was excessive, saw many carcasses of horses or mules, look as if thay had lain about 3 years the Steeple rock[2] is just opposite our camp, it is very well described by E, altogether the country has a very strange appearance and to one of very strong immagination the mountains would seem to resemble any thing he wished to see from a very large rough looking old wooman to a magnificent castle & admitting all this I think Mr. E must be endowed with a superlatively brilliant immagination about our camp the sand is ½ knee deep to the stock & but little grass to be found for them gro[w]th of wood cotton of cource some of the boys are fishing others batheing & I am laying on my buffaloe robe resting being very tired from a hard days walk & haveing slept but 2 hours last night in consequence of being on guard Capt Dixon just shot a wolf & says "Green I shot the wolf but by God I could not get the deer," game is very scarce no ingins today but lots of mockasin tracks

11th Start from camp at 8 after Fox threatning to shoot a nigger because he could not get him to fight about a lie with regard to watching the stock. we travel along the river bottom all day overhaul a part of the Knickerbocker company under command of Capt Ebbot [John A. N. Ebbetts]. the[y] have suffered very much from an impurity in the atmosphere, their description is truly appalling, but they experimented on routs a little too far that time in their trouble they lost 11 horses & 1 man. we encamped on the river again and are now convinced that there is no musquittoes on this river which is a particular

God send to travlers no fish in camp today a very fine shower & a prospect of more rain tonight

12 It rained some in the night pretty smartly but not enough to keep us awake long left camp at ½ past 7, have traveled over a very rough country we all walked more than ½ of today come into camp down right tired & encamp again on the river and know that we have the "*Devils turnpike*["] to try tomorrow, how we will succeed I[']ll let you know if I live through it I saw old Maj Lewis today when I last saw him 500 miles from here he weighed 285 lbs. now I think from the set of his clothes & his appearance he wont weigh more than I do which is 182, all that we have seen look very hard worn out and as if they "wish they hadent did it" a woeful ½ starved on foot croud most of them, disappointed in not seeing ingins today boys out fishing my gum bed goes today without a regret as it was made useless some time back, to prepare me for the event, for I was afraid I could not bone it, as the nigger said to his master

13th had a night of hard rain but most of us managed to keep one side dry. I think the most terific thunder storm I ever witnessed, the whole heavens appeared to be illuminated to witness the training of its artillery & they drilled well for it was one continued peal after another for the space of 2 hours. As it is wet we leave camp about ½ past 9 to start on his Satanic Majesties turnpike. we start upon it by crossing the river and commence assending from it at once to the tops of the adjacent mountains all on foot, the ground being too heavy to admit of our rideing we travel up for about 3 hours & then go down again almost in the same direction that we had ascended into the deepest ravine we had ever seen and the track looked as though it would be impossible for man or four footed beast to de[s]cend but we got down in safety to a dark & forbidden looking gorge in the hills. we then go up the other side which is more difficult than any we have yet passed after passing this we get into another of the dreary infernal looking passes, which we travel toward the river in for about 3 miles all buoyant wi[th] the hope that it will bring us to better ground for travling as we then had travelled 8 hours. the mules of the Va's are very much worn and stop to drink at the little holes of water that [have] been deposited by last nights rain. At this time we all discover that we must leave the ravine by seeing our advance guard on the to[p] of a hill beyond, and are impatient at being detained our Capt rushes his mules by the Va's and in getting around he comes to a perpendicular fall in the rock of 8

feet nothing daunted he forces them on as the[y] bound down & light on their feet proceed on their way after they get over he sings out "*Cat like all on their feet* by god." After leaving this for about 2 hours we strike into the mother of all ravines, the wall[s] of this gloomy looking rock paived arroyo are in many places at least 300 ft high and not more than 100 wide nothing that we have ever seen before presenting itself to relieve the gloom that has possesed all since entering the shade, the only things in the way of growth are the pricley reedy bear grass the thorny mesquite & the unearthly looking cacti night is growing fast upon us & we are not yet to the river with many of our mules so foot sore that they can scarcely walk but water now has got to be the cry from one end of our line to the other all suffering more or less for the want of it at 9 oclock reach the river cross it & encamp on a sand bar without a spear of grass for our mules after travling 12 hours over the worst track ever traversed by living creatures

14th Leave camp by crossing the river & takeing immediately to the mountain where we go up it is very steep & at least 500 feet high after raising it the road is more smoothe, but we are compelled to keep to the hills for 3½ hours, when we again descend to the river & at the same time strike on to Kearneys trail we travel immediately down the river 5 hours during which time we cross it 9 times find no vegetation but cotton infernal mezquite & cacti when we strike a beautiful patch of green luxuriant grass where we stop our way worn mules & our weary miserable bodies. the Virginians left a mule, gave out, weather very warm we lay by here tomorrow to recruit our stock & selves. We are all getting cross & fretful from the difficulties that we encounter. our camp now is in a continual stew & wrangle. last night I made my bed which consists of my overcoat & saddle blanket, on an ant hill they did not admire my company much & made a general war on me so tired as I was I could not sleep more than ½ the night This happens to some of our men almost nightly for it is almost impossible to find a spot large enough to lay down on that is not already inhabited by ants bugs or some other troublesome affair. the river Don Carlos[a] comes in just above our camp. there is the ruins of many old mud houses & lots of pottery laying about this bottom. Tomorrow we rest which means washing day & bean soup.

15th Our stock is all loose being drove to water when I wake up having had a delightful & refresshing nights sleep which I very much needed the boys knowing this let me sleep until breakfast, after which

I set to work finish the water proof flour sacks & Mr Howard & myself start for the river with ten shirts two pr of drawers & 2 pr socks a pretty big wash for 2 such inexperienced hands as we, but after about 3 hours hard rubbing we got their colour changed a little but they were by no means clean. Armstrong has just returned with 2 fish each weighing at least 25 lbs The country here as all along this river presents entirely a volcanic appearance, all the rocks appear to have once been burned no vegetation lots of lava, The distressed New York company[4] has just passed our camp instead of going off to the mountains above they kept the river all the way saved 10 miles of distance & crossed the river 54 times They look in better heart than when we last saw them. We suffer very much today from the heat Many of the mules of the Vas are allmost give out & our capt says he will lay by only on Sunday so I think they wont be able to keep up with us, for we are determined to go on as long as we can & then take it afoot & carry our provision[s] on our backs for go we will or die on the road, & with the front croud. I had a dream of Pa which I wont forget soon it was a pleasant one I was on my road to Niagra &c

16th Leave camp it all in a hubbub about one of the guard refuseing to stand. at 8 ocl starting off at a very brisk pace which we keep for 3 or 4 hours travling in the river bottom all the way the dust being from 4 to 6 inches deep and chokeing us up completely We passed the ruins of very many houses, all built rectangularly cedar posts still standing. the heat of today is so excessive that a man in the company behind had his hand shot off, his gun going off on account of becoming so hot from the effects of the sun, a pretty hard story to be told in a cold country but I firmly believe it, as my own is so hot evry day that I cannot bear my hand on it at all This afternoon we travel more slowly still in the bottom along the base of Mount Graham[5] We have had a great deal of fun with our Pole, Genl Buonaparte or Dr John Franklin[6] it is admitted by all that Capt Jennifer is the biggest fool in the party, & our Fred the most disagreeable & lazy one, today we were much amused at him, so would any person who knew him. why can you think it? he has really become quite literary. sits on his long eared brother & reads or pretends to, for (some of us doubt his ability) all day & as he gets along he tears leaf after leaf from the book & strews them on his "*solitude way,*" the poor fellow "*perished* more with the heat today than ever *before previous to the present day*" by the time we get him through Musser wants to make a preacher out of him for

we all think it wont do to put his light under a ½ bushel Camped on the river made about 30 miles. there is more vegetation today than we have seen all the way on the river.

17th Leave camp at ½ past 7 & have the best road today we have passed since leaving the Rio Grande we travel on at a smart pace nothing happening of any interest today. the country has not so much a volcanic appearance some cotton wood & siccamore with very good grass. camp opposite saddle back mountain.[7] tomorrow we expect to start on the 5 days of rough mountain road of Kearney, with great difficulty on account [of] water &c

18th leave camp at 7, travel down the river about 15 miles when we determine to take off on the south side into the mountains on our own hook & very foolishly start without watering our stock, or filling our canteens, and expecting to find no water for 30 miles we travel almost directly west from the river, for about 12 miles leaving the mouth of San francisco behind us, but as John Musser says the Lord is on our side yet for next to the hi[gh]est mountain we find a beautiful stream of water & lots of fine grass in the roughest place we have seen yet. the Virginians camp before reaching our present camp, we send back for them, they refuse to come on haveing determined to go back to the river. we are going on to make the big cut off. how we will succeed God only knows but we are pretty well resigned let it come as it will, we are now used to hardships and light packed, but to me walking goes hard over these hills but "I reckon" I can go it. Our company now numbers 17 men & are in the worst ingin country according to Emory's report that we have passed. saw the Appachee watch towers today. I am very sorry Dr Winston did not accompany us he is the only one of the party left behind

19th Today we expect to be a very interesting travel as we have no guid[e] & scarcely any trail, with a mountain to go up immediately at camp that took us just one hour to climb we then start off directly west over one mountain after another and convinced us fully that pack mules can go any where that a man can climb ([marginal note]: top of a very high look out I am in a hollow) We travel on 6 hours, crossing all sort[s] of mountains, some of the highest I ever saw, one we were very close to, whose top was entirely enveloped in a cloud so that we could not see the top at all. the scenery is more grand & rocky than any we have seen yet. We come to a hault at the top of one [of] these mountains, & hold a debate with regard to our cource I am strongly in favor

fails very fast under me, noon at a fine patch of grass but no water after crossing the hottest ridge we have seen yet. the hot wind blew scorching our hair, & crisping evrything up. hear we meet some indians Armstrong trades horses with them. I loose my gourd as one of our mishaps today, return some distance & find it. Musser & myself then start on the road after the company. we follow along the road about 2 miles when I discover the company have not gone on here. John thinks they have we go on a short distance, then strike for the river, hollowing for our party but cant get an answer for some time when Chamber[lin] & A. answer us. we come out to them. I propose going to water our stock, & encamp for the night at the first bean tree we find, but our boys complain that they are afraid of getting hungry and are anxious to go on we p[r]oceed a while when I prevail on them to water, which we do, go out & encamp under a tree, then I enjoy myself listening to John & C. bitter wailing for their supper, the hardships they endure. C had never done without his supper before &c, &c. it was really fun for me, as I felt shure we would find them soon in the morning. had a very comfortable nights rest rose early 5th Aug hunted a fresh place to feed & wait til[l] our company come up. the company gets along at about 9 oclock give us a bite, go on, today we made 2 stops travel 30 miles loose the Polander cross a jornada, camp late at night without water, & poor Warsaw behind give out. All uneasy about him I am anxious that we should lay by for him but some hoot at the ideah

6th By accident we find a large grove of bean timber & with some talk all with the exception of Chamberlin agree to lay & wait for Emperor Nicholas.[20] But selfish Bill, a man that has no feeling for living things but himself & most of that feeling for his belly in my opinion he cares for [*sic*] not for father mother family for nothing but his own dear self. we overrule him & remain when we are rejoiced to hear from old quarreling Lewis that Warsaw is back but about 2 miles when up he comes.[21] now boys for a day of feasting on doves partridges, & bean soup "oh weel fatten today" John & C can make up for the meal they lost the other night

7th Left camp at 1 oclock A. M. after some trouble at the start with the stock we get along finely by moon light, travling until 8 oclock in the morning without haul then stop about 2 hours then start for grass or beans, dont find them until evening. where we encamp on

the river, finding an abundance of beans. turn mules loose, & camp down very tired haveing made 38 mile[s] in the night & day

8th Lay in today bean soup & doves a full belly & better dispositions, find our mules late today tie them up, and pick beans out of the thorny mesquite tearing our arms & hands mightily. We leave camp at 7 tonight & have no difficulty in getting along all night

9th Find no grass or beans all day, continuing travling until evening when we turn into a bean grove which we are fortunate enough to find them in abundance & to our joy we are within a very short distance of the Colerada, which has been our great scare since leaving Santa Fe.

NOTES TO CHAPTER IV

1. A part of the route so named by Kearny's men, and Emory saw "no reason to change it." Emory, *op. cit.*, pp. 65-66.

2. So named "from its general appearance." Emory, *op. cit.*, p. 63.

3. San Carlos. Emory, *op. cit.*, p. 66.

4. That is, the Knickerbocker Company of New York.

5. See the description in Emory, *op. cit.*, p. 67.

6. John Franklin, a Polander by birth, joined the company on June 21. Diary of William H. Chamberlin, in the *Lewisburgh Saturday News*, September 27, 1902.

7. This mountain was so named "from its resemblance to the outline of a saddle." Emory, *op. cit.*, p. 75.

8. The San Pedro, wrote Emory, is "an insignificant stream a few yards wide, and only a foot deep." Emory, *op. cit.*, p. 75.

9. Of this incident W. H. Chamberlin subsequently wrote: "We lost one fine mule, pack and all, in the Apache count[r]y. It carried all our best and most necessary clothing and small articles. I lost my gold watch, chain, pen &c. on it, altogether about $175 in value, and the loss to the company was about $400; but this we consider trifling." W. H. Chamberlin to his father, dated at "Fremont's Diggings" on October 3, 1849, and published in the *Lewisburg Chronicle* of January 23, 1850.

10. On the subject of the Pima Indians, see Frederick W. Hodge, *Handbook of American Indians North of Mexico* (Washington, 1912), Pt. II, 251-253.

11. That is, a thousand different shapes.

12. Juan Antonio Llunas was the chief of the Pimas. General Kearny "gave a letter to Governor Llunas, stating that he was a good man, and directing all United States troops that might pass in his rear, to respect his excellency, his people, and their property." Emory, *op. cit.*, p. 84.

13. That is, a Pima village.

14. "To us it was a rare sight to be thrown in the midst of a large nation of what is termed wild Indians, surpassing many of the christian nations in agriculture, little behind them in the useful arts, and immeasurably before them in honesty and virtue. During the whole of yesterday [November 11, 1846], our camp was full of men, women, and children, who sauntered amongst our packs, unwatched, and not a single instance of theft was reported." Emory, *op. cit.*, pp. 84-85.

15. Green means that the Indians, not "the flyes," are the ones who "do their heads up in mud."

16. The Maricopa Indians, although of Yuman stock, had for many years lived with the Pimas. "Don Jose Messio," wrote Emory, "is their governor, and, like the governor of the Pimos, holds his office by the appointment of the Mexican governor of California. The people have no choice in the selection. Both these Indians are respectable looking old men, and seem to be really worthy of the trust reposed in them." Emory, *op. cit.*, p. 87; Hodge, *op. cit.*, Pt. II, 252.

17. See Emory, *op. cit.*, pp. 86-87.

18. This incident is also recorded in the diary of William H. Chamberlin, August 1, in the *Lewisburgh Saturday News*, November 1, 1902.

* One word is indecipherable.

19. The word *jornada*, as used in Mexico and in the southwestern part of the United States, means not a day's journey, but "a long stretch of desert region."

20. A reference to John Franklin. See Note 6, *supra*.

21. Of this affair Chamberlin wrote: "Franklin came up to-day with a company of emigrants; he had lain on the mountain without water, expecting to die. We knew this company would be along to-day, or we should have gone back after him." Diary of William H. Chamberlin, August 6, in the *Lewisburgh Saturday News*, November 15, 1902.

CHAPTER FIVE

The Colorado to Los Angeles

10TH Lots of Yumas indians in camp some tradeing on hand these ingins are very stout athletic men mean looking more dangerous in appearance than any we have seen, and very thievish.[1] Deacon & Chamberlin go down to the river to examine the crossing & report. they return stating that we can get all the stock to the west side today & ferry our things over by 9 or 10 in the morning we gear up & start for the river reach it talk a while when Musser Fred & myself plunge in to swim over we reach the opposite side just about 1 mile below where we start in, the current running like a mill tail when getting over we were very much exhausted being weak on account of liveing on bread & coffee alone. then the fun commences the rest of the company sending the mules over 2 at a time with the indians & we watching both shores with guns to prevent them from getting them out of our reach at dark in this way we have them all over, but one little poor yellow one, & he lays on the opposite shore drowned.[2] Evry other company has had mules stolen owin[g] to a want of dilligence in their watch, or to their being afraid in our case we would just level our rifles and swear if they did not do thus & so we would shoot & would have *certain*, but they like white men dont like a cocked rifle pointed at them, it will make them do what is right, one of the mules they took a mile & ½ below the landing but one of us was there and by luck only got it

11th I lay last night with my clothes wet from swimming on the be[a]ch of the west shore of *Colorow* until 2 oclock without supper when H. D.[,] D. H. & myself start with waggon bed[3] up the shore wadeing in many places up to our arms in water towing it along in other places climbing over drift & crawling on the perpendicular bank supporting ourselves by reeds until we had got about ½ mile above the boys on the opposite side when into the box we get starting with paddles for our traps, with 15 minutes very hard work we land 300 yds below them tow up the boat load & start off we are fortunate enough to get all our packs loaded at 2 loads & cross by 7 oclock, myself & Fred swimming the last time so that all can be taken in, which was a hard

NOTES TO CHAPTER V

1. Other forty-niners reported unfavorably of the Yuma Indians. Foreman, *op. cit.*, pp. 297, 311, 313.

2. "A small mule belonging to Franklin became entangled in the lariat and was drowned. The Indian brought it on shore and in a short time every part of it was carried away. The first butcher cut out the entrails and lugged them off, as the most delicate part, and the last took the head of the ill-fated animal upon his shoulders and trudged away, well satisfied with his share." Diary of William H. Chamberlin, August 10, in the *Lewisburgh Saturday News*, November 15, 1902.

3. A water-tight wagon bed was used as a boat for crossing the Colorado. Diary of William H. Chamberlin, August 10, in the *Lewisburgh Saturday News*, November 15, 1902.

4. See the references in the Introduction, note 56, *supra.*

5. To "see the elephant" meant to see everything that was to be seen. See the passages in B. A. Botkin, ed., *A Treasury of American Folklore* (New York, *c.* 1944), p. 309.

6. *Cf.* the diary of William H. Chamberlin, August 14, in the *Lewisburgh Saturday News*, November 22, 1902.

7. The Mexican word *sacate* means grass or hay.

8. See Introduction, note 56, *supra.*

* One word is indecipherable. Perhaps Green was trying to write the Spanish word *almud*. If so, he gave this word a heavy beating.

9. See Introduction, note 57, *supra.*

10. William Jenkins Worth (1794-1849).

11. See Introduction, note 58, *supra.*

CHAPTER SIX

Los Angeles to the Mines

31st Leave camp at 7, make 25 miles through a very pret valey lay encamped at an ingin ranch grapes in abundance, fi that we have passed the turn off to San Francisco 5 miles.[1]

1st [September] Haul out for the Mountain San Fernandes[2] loo more like a prison than a missionary station. I am very unwell & ca examite [*sic*] the building much as I would like to have this afterno come to some very steep mountains cross them & camp in them u der some magnifficent oaks.

2d Travel today through the mountains seeing some few bear a steep hills nothing occurring of interest today

3d Same as yesterday. Musser and C shot at three bears but a matter of cource did not get them camped tonight in a beautiful lit valey by the side of a spring this spot I think the most lovely place a camp meeting, I ever beheld, very large oaks just far enough ap to look like a yard, without a particle of schrubbery under.

4th Travel down this valey some 7 or 8 miles on a clear & beauti little stream of water until we come out onto the planes of the Tular lakes the bottoms are of very strange soil dry & dusty by getting the trail our mules would bog down to their bellies in dust see sc antelope, reach the lake at 3 oclo[ck] at an ingin town—all the creatu are sick & the shore is the most sickly God forsaken looking place have yet seen we are afraid to stay long about, and therefore start travling until night stop without wood, thinking a few hours sl will do us some good, but we are thoroughly convinced of the truth the saying that ["]there is no rest for the wicked" for this night w tired almost to being worn out we were attacked without an[y] tice & after a spirited contest of about 2 hours we flew to our m mounted and left the field to the conquerors.[3] none of our comp was killed but all wounded, travel until one oclock unpack our m lay down on the sand up at 2 starting them for water and grass w we find very scarce along this lake

5th Leave camp in the evening and by mistake travel on a horse trail that leads us near our direction but takes us out to the m

ATTACHMENT E

Hydraulic Rating Curves for USGS Gaging Stations along the Upper Gila River

FIGURE E-1. GILA RIVER DEPTH VS DISCHARGE NEAR VIRDEN, NM (1931-33)

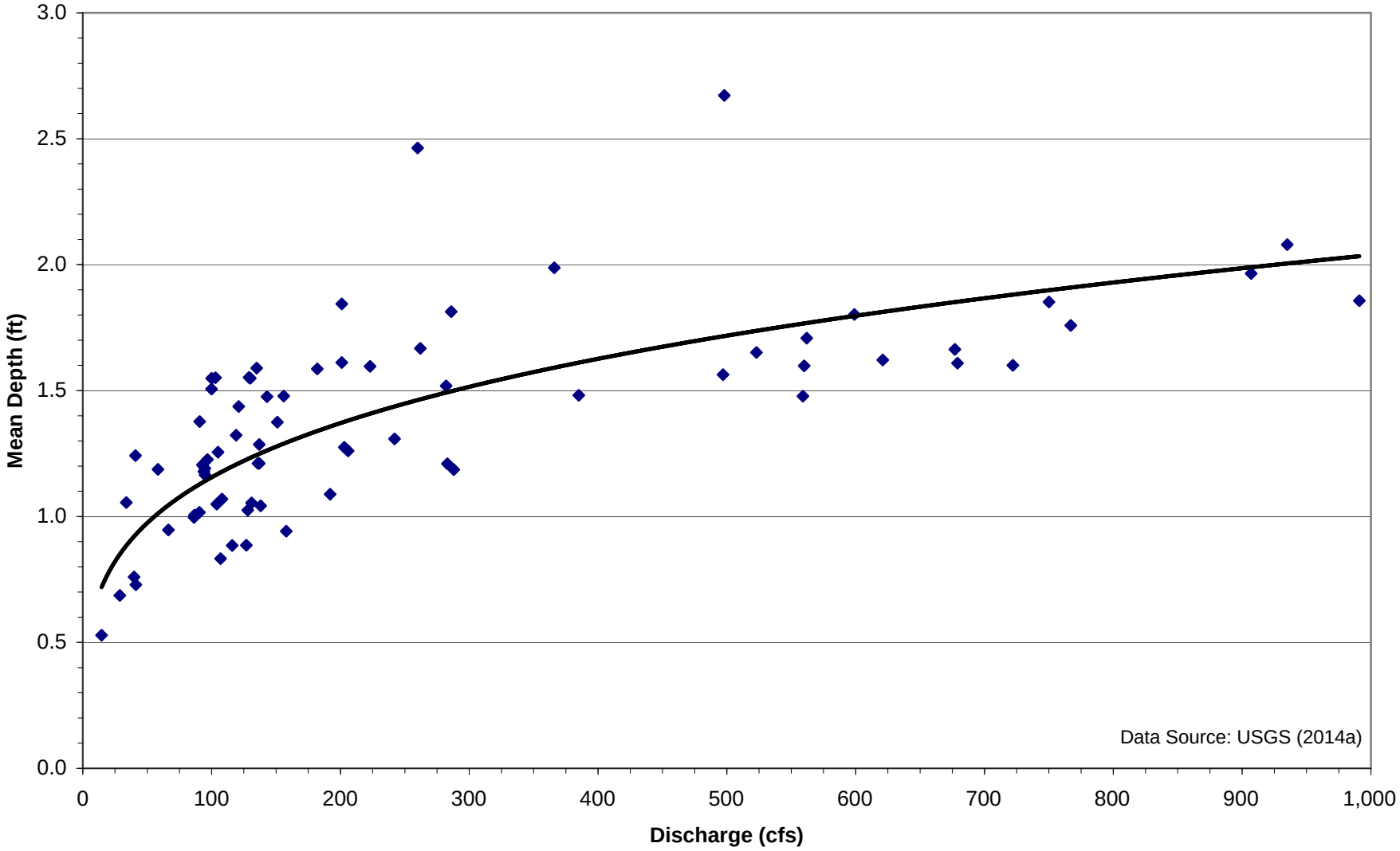


FIGURE E-2. GILA RIVER VELOCITY VS DISCHARGE NEAR VIRDEN, NM (1931-33)

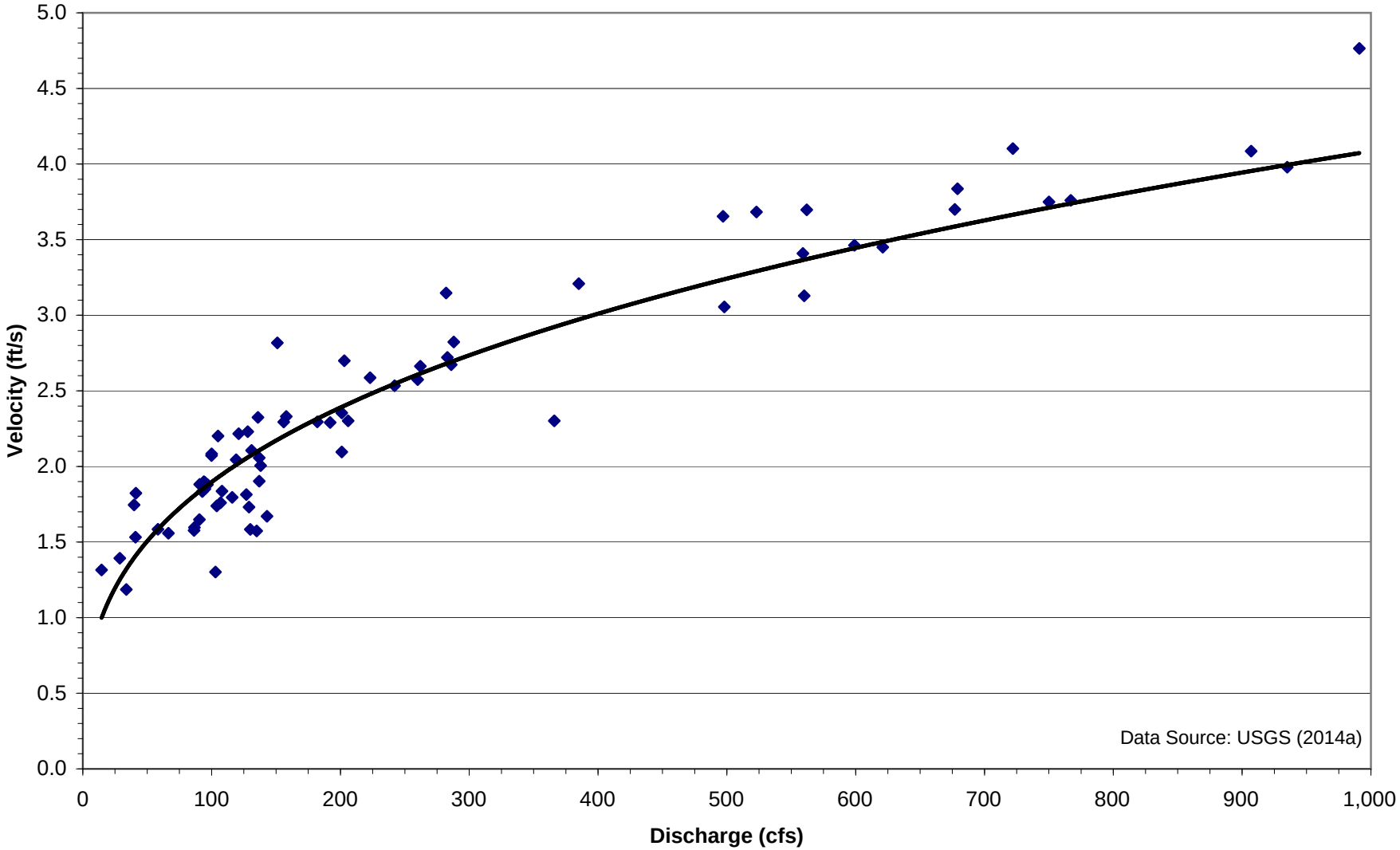


FIGURE E-2a. GILA RIVER WIDTH VS DISCHARGE NEAR VIRDEN, NM (1931-33)

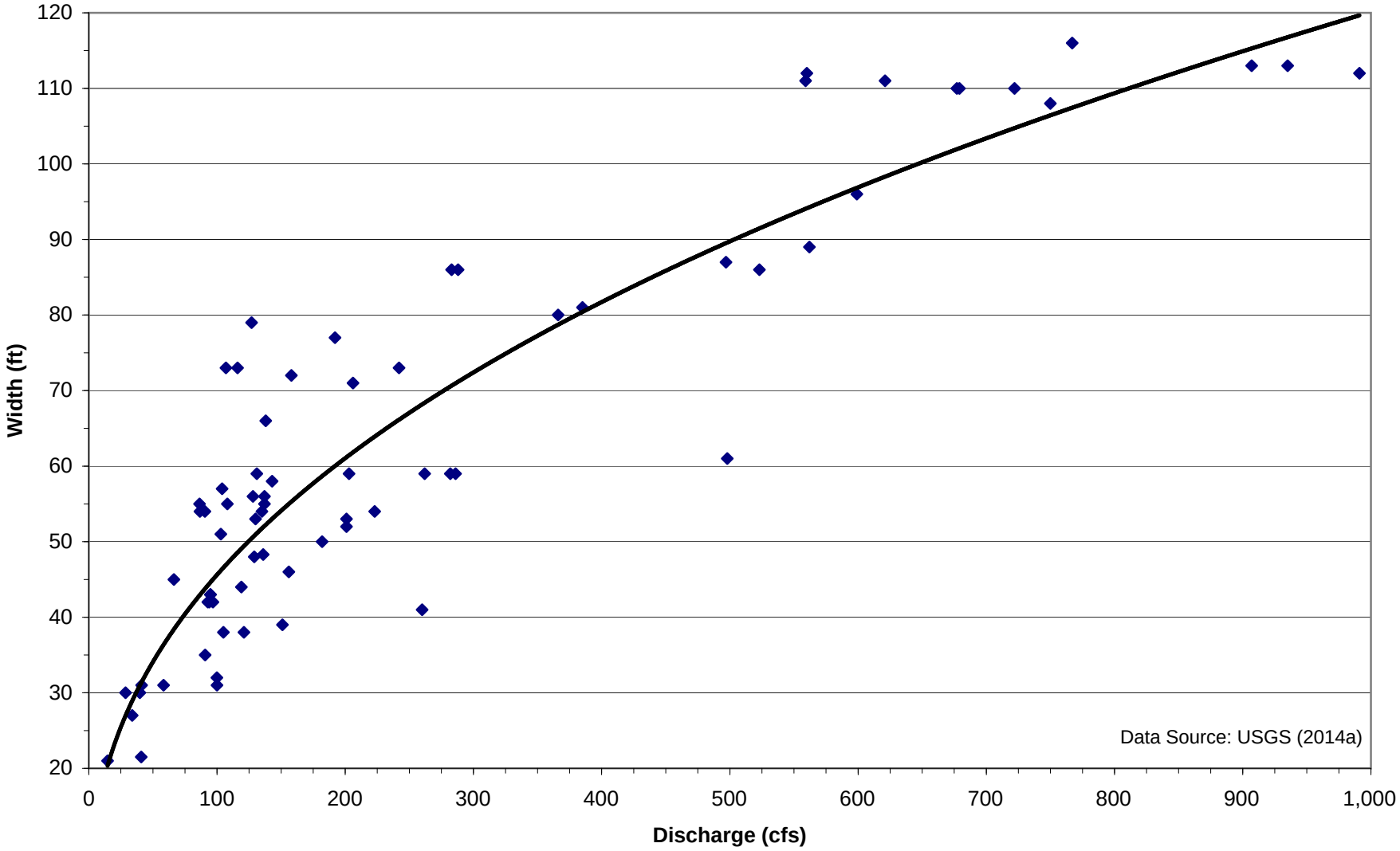


FIGURE E-3. GILA RIVER DEPTH VS DISCHARGE AT YORK, AZ (1924,26-31)

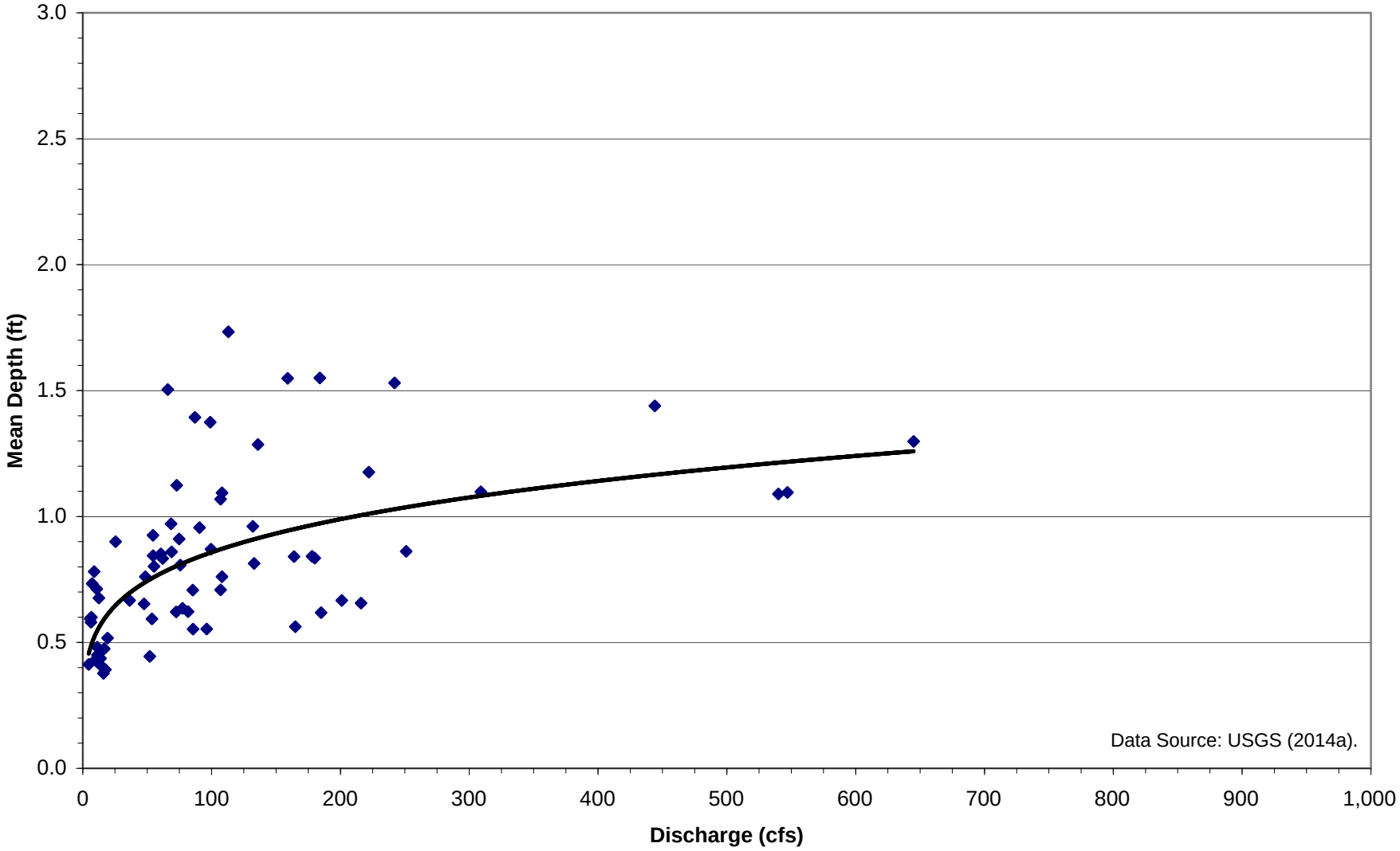


FIGURE E-4. GILA RIVER VELOCITY VS DISCHARGE AT YORK, AZ (1924,26-31)

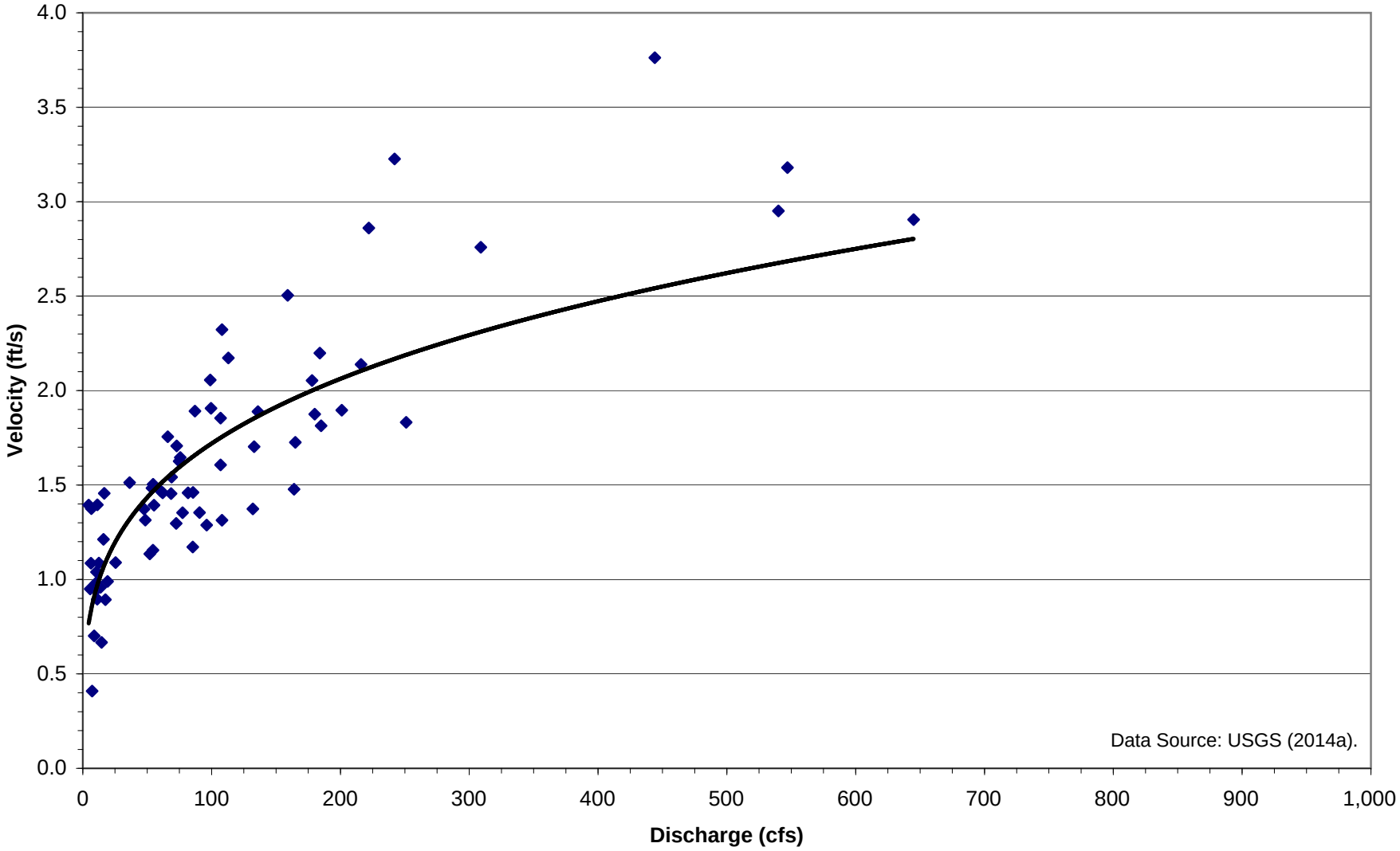


FIGURE E-4a. GILA RIVER WIDTH VS DISCHARGE AT YORK, AZ (1924,26-31)

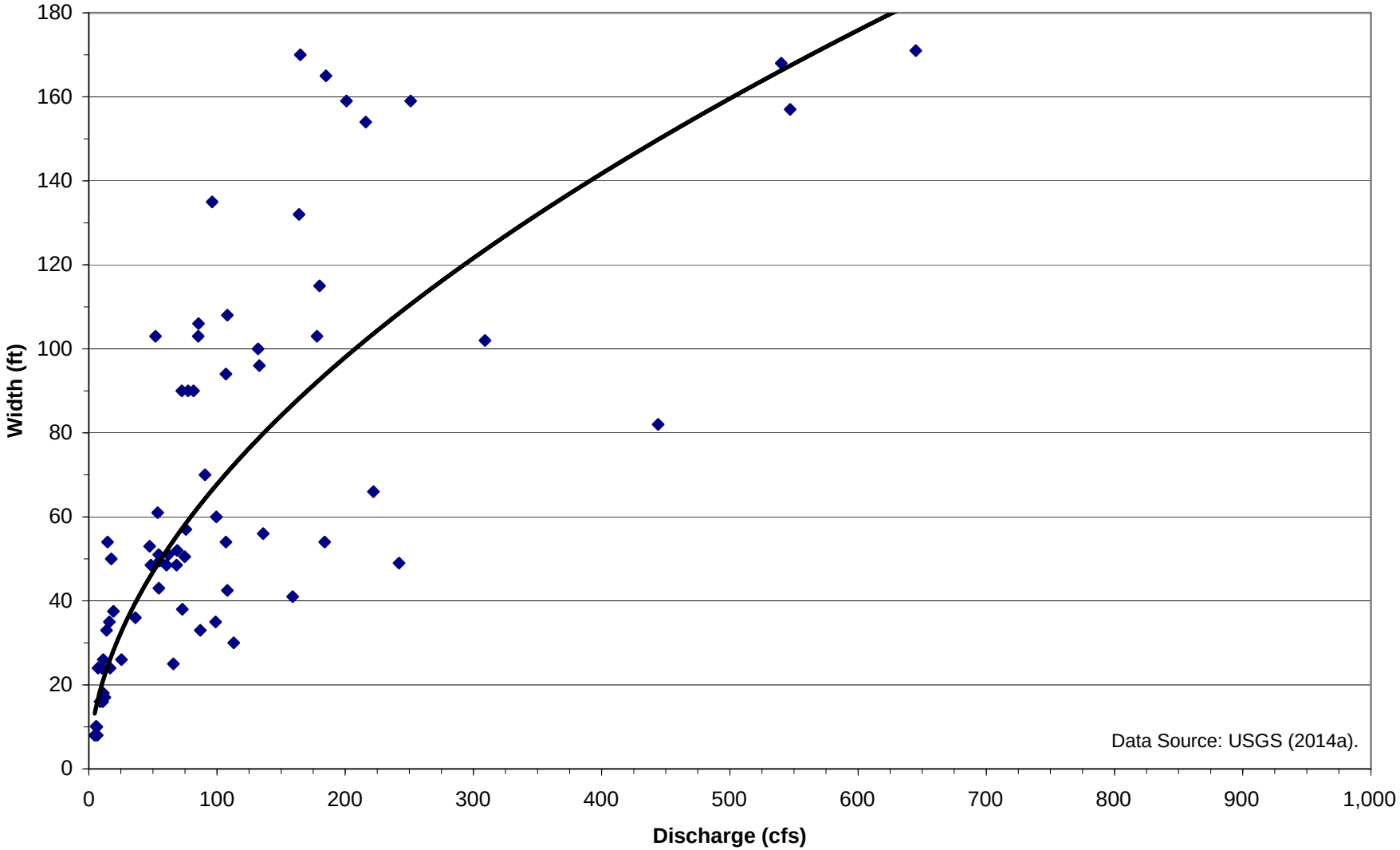


FIGURE E-5. GILA RIVER DEPTH VS DISCHARGE NEAR CLIFTON, AZ (1928,30-33)

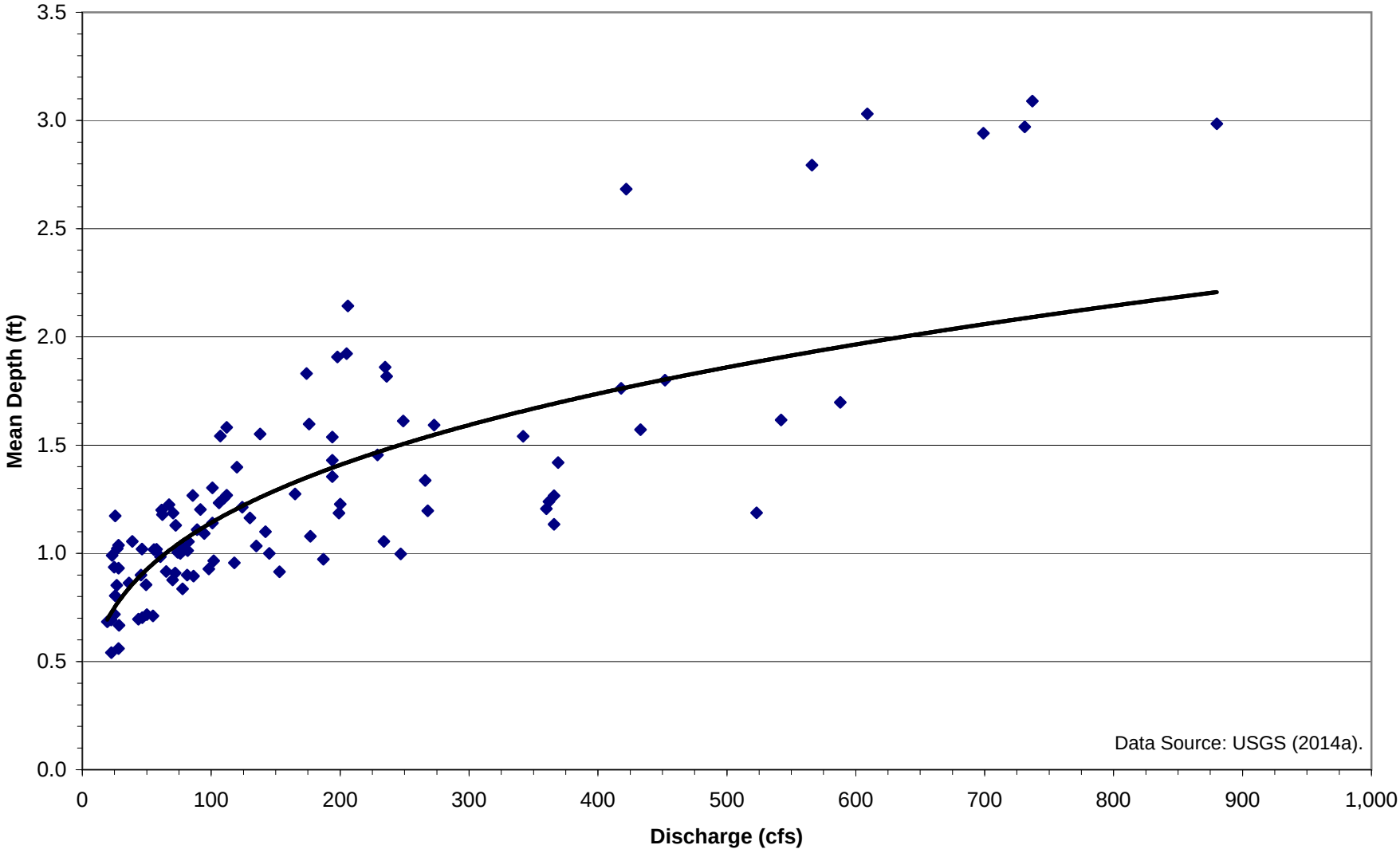


FIGURE E-6. GILA RIVER VELOCITY VS DISCHARGE NEAR CLIFTON, AZ (1928,30-33)

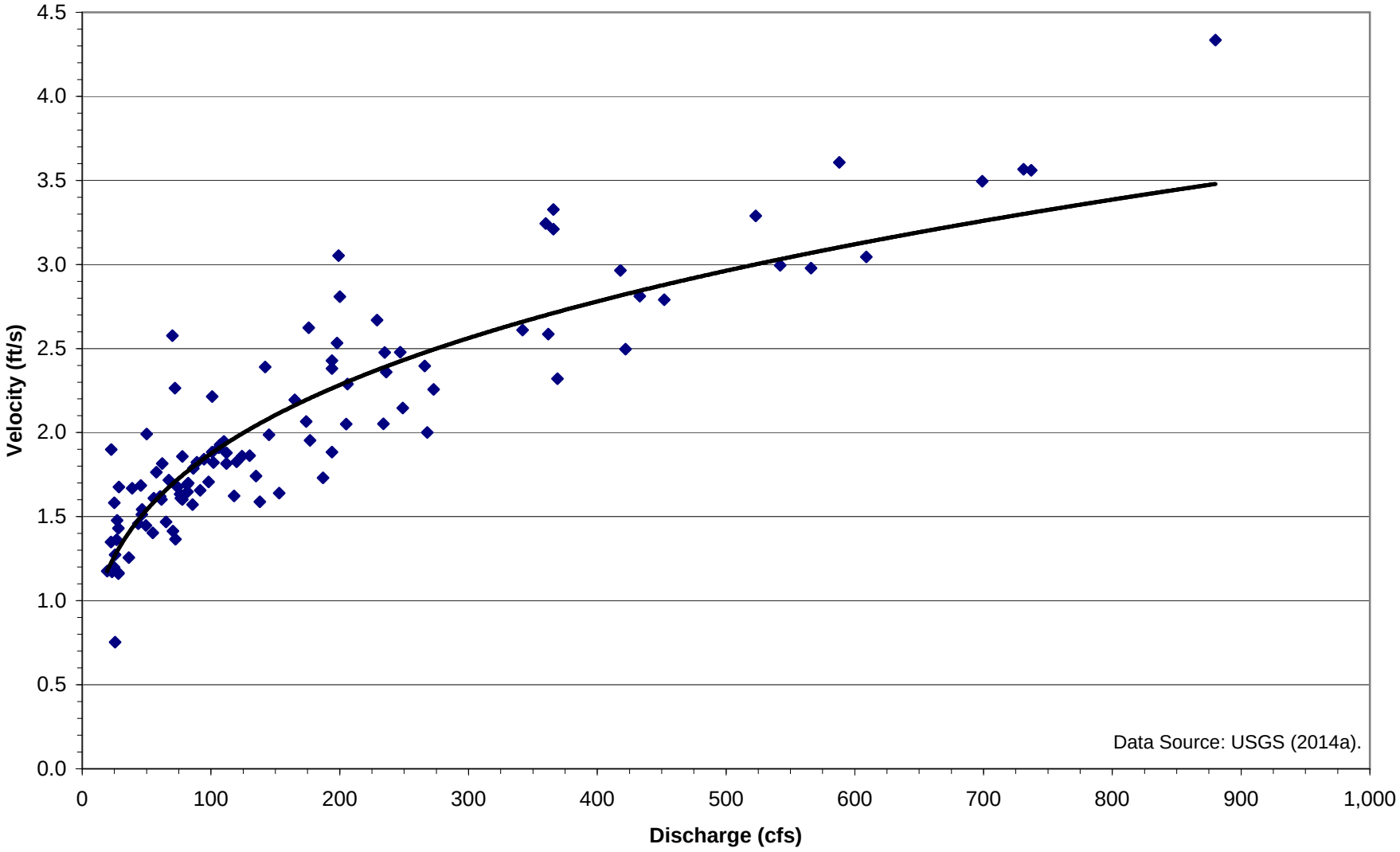


FIGURE E-6a. GILA RIVER WIDTH VS DISCHARGE NEAR CLIFTON, AZ (1928,30-33)

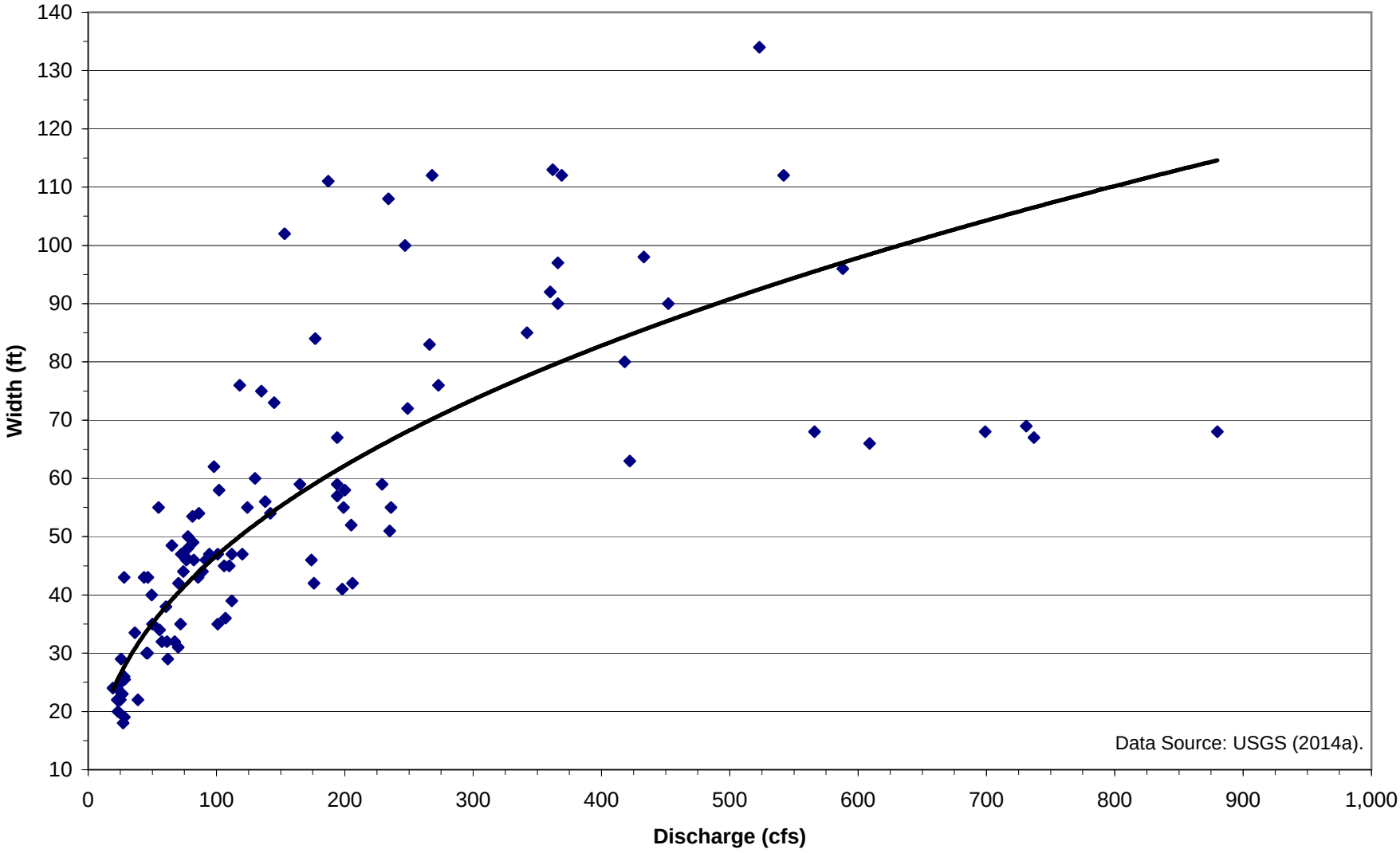


FIGURE E-7. GILA RIVER DEPTH VS DISCHARGE BELOW BONITA CREEK, AZ (1932-33)

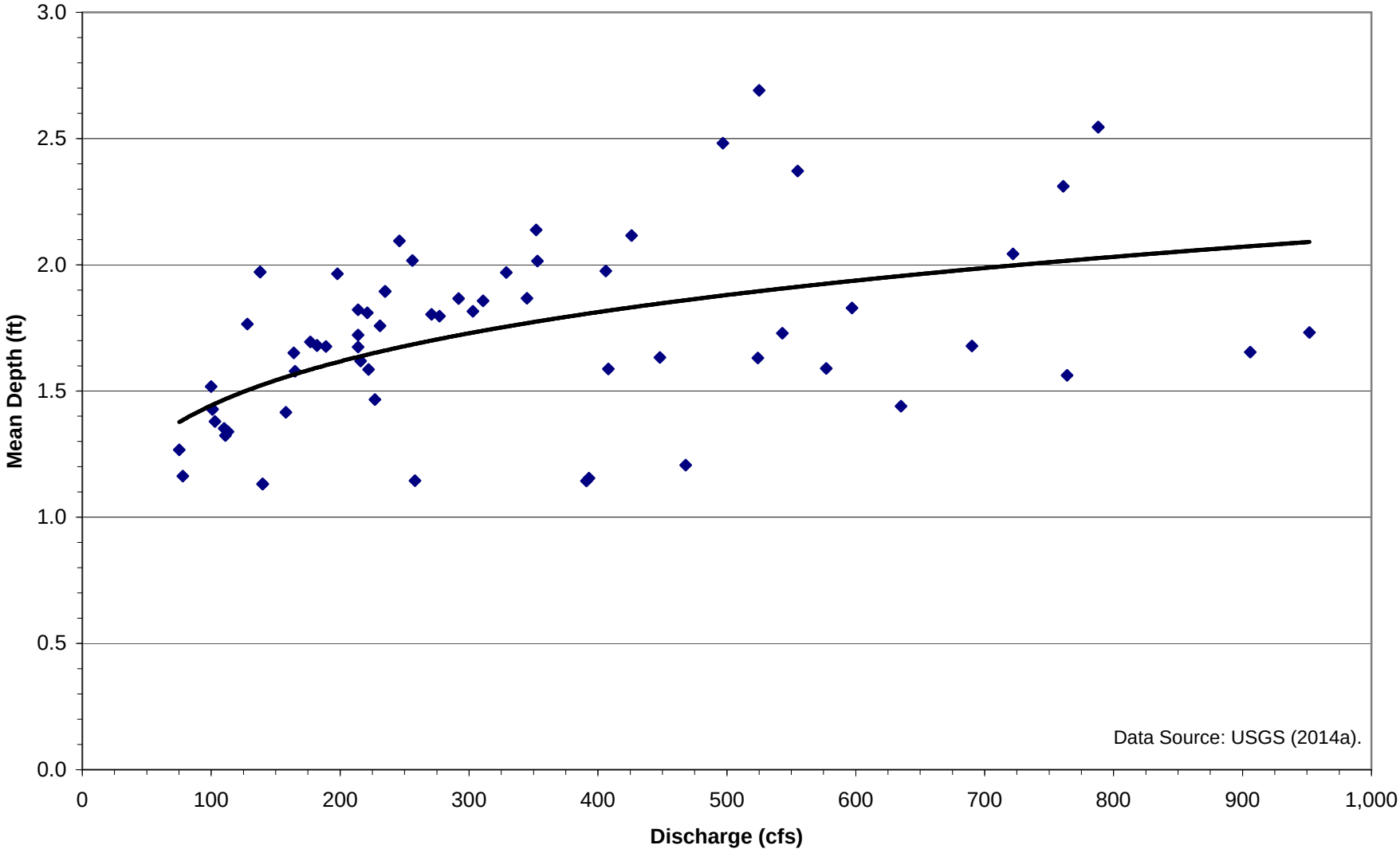


FIGURE E-8. GILA RIVER VELOCITY VS DISCHARGE BELOW BONITA CREEK, AZ (1932-33)

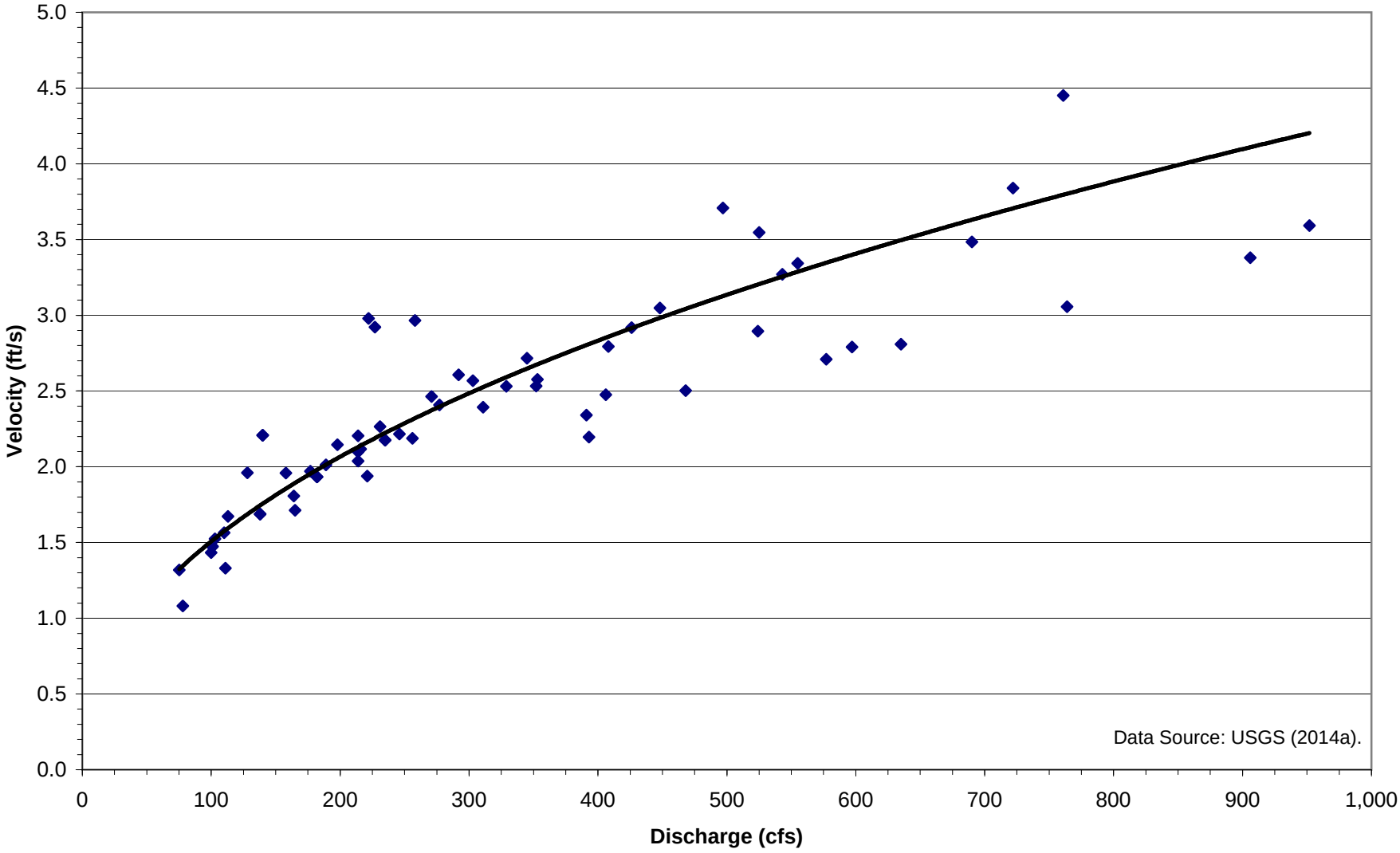


FIGURE E-8a. GILA RIVER WIDTH VS DISCHARGE BELOW BONITA CREEK, AZ (1932-33)

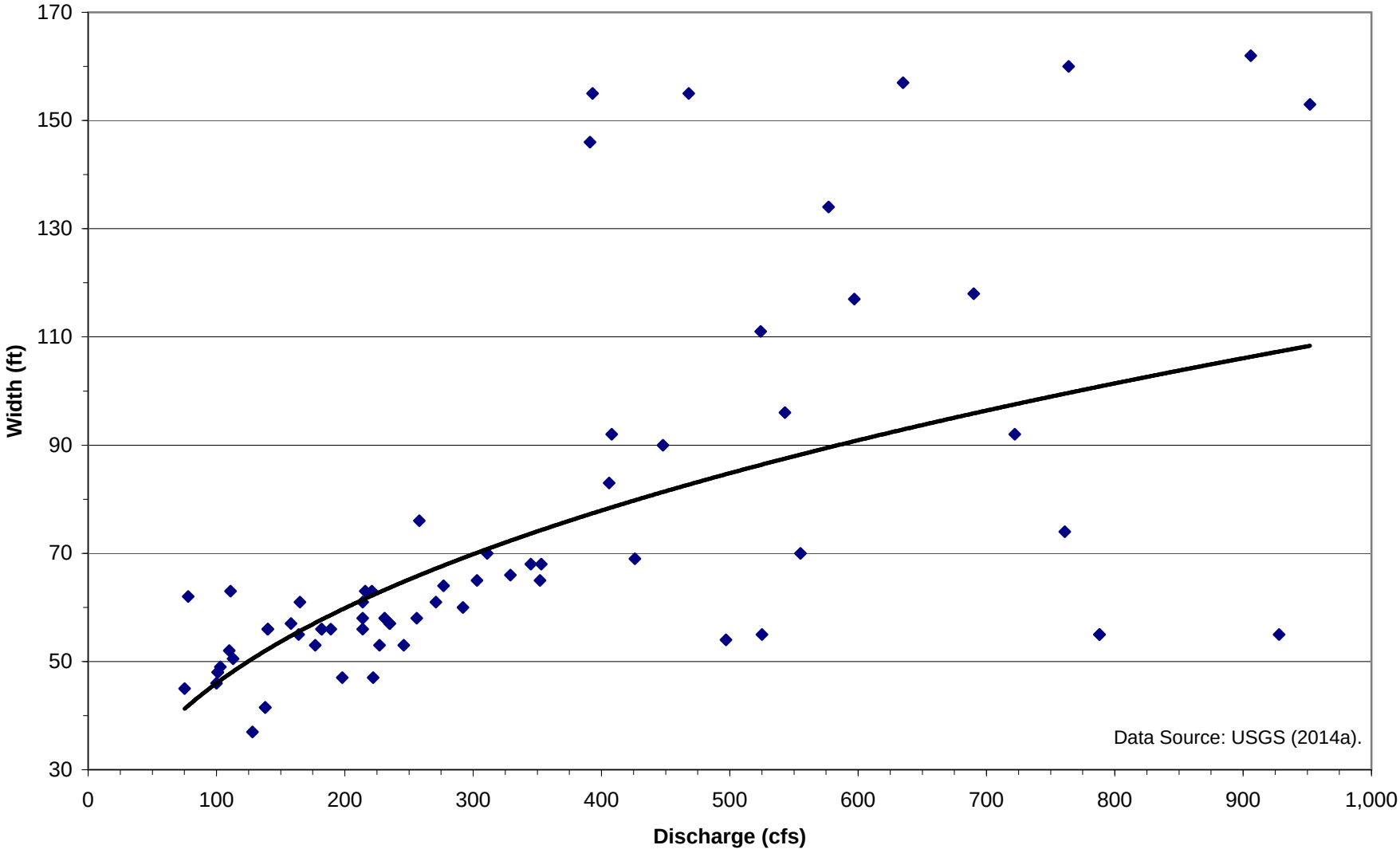


FIGURE E-9. GILA RIVER DEPTH VS DISCHARGE NEAR SOLOMONVILLE, AZ (1920-26,28-32)

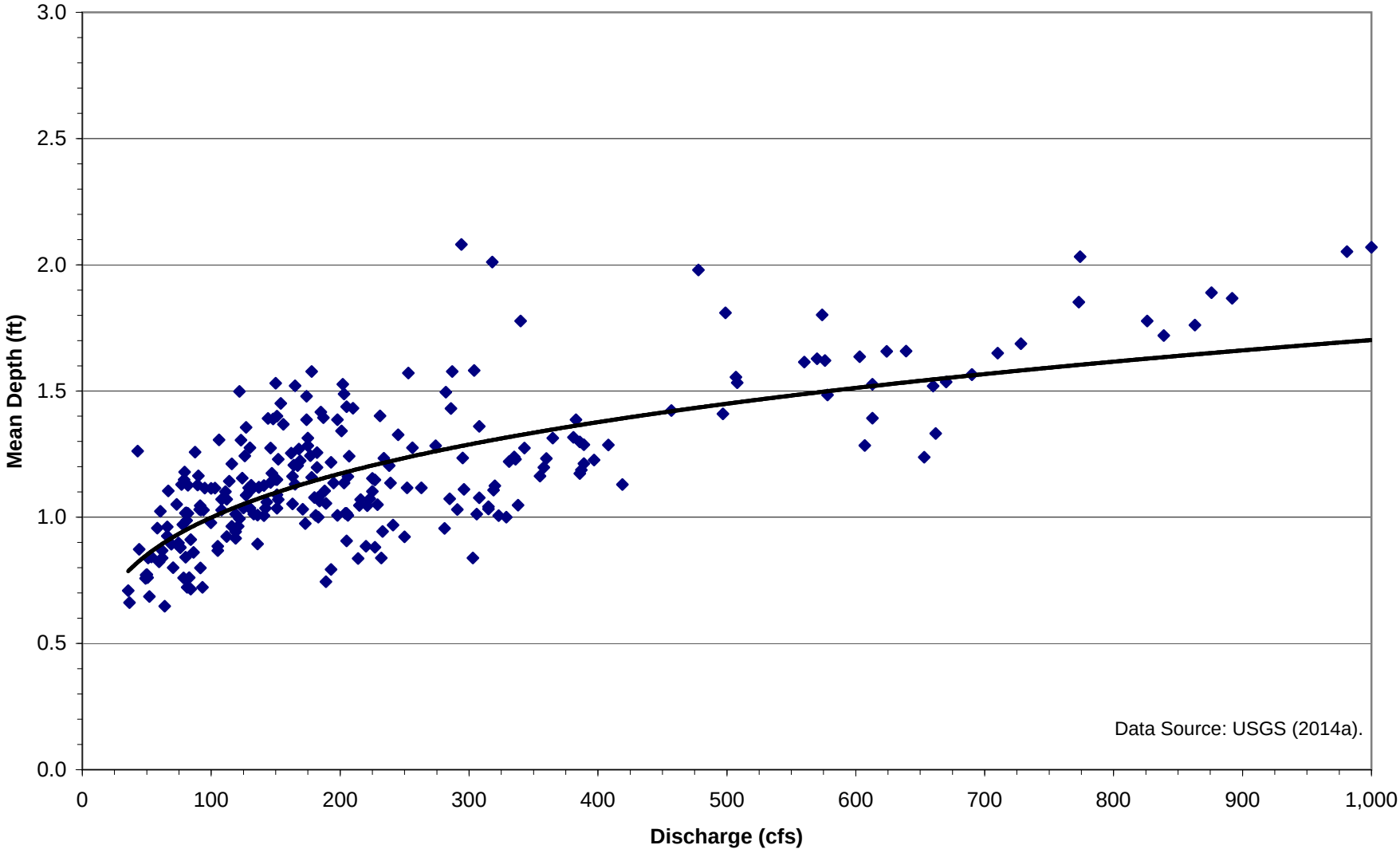


FIGURE E-10. GILA RIVER VELOCITY VS DISCHARGE NEAR SOLOMONVILLE, AZ (1920-26,28-32)

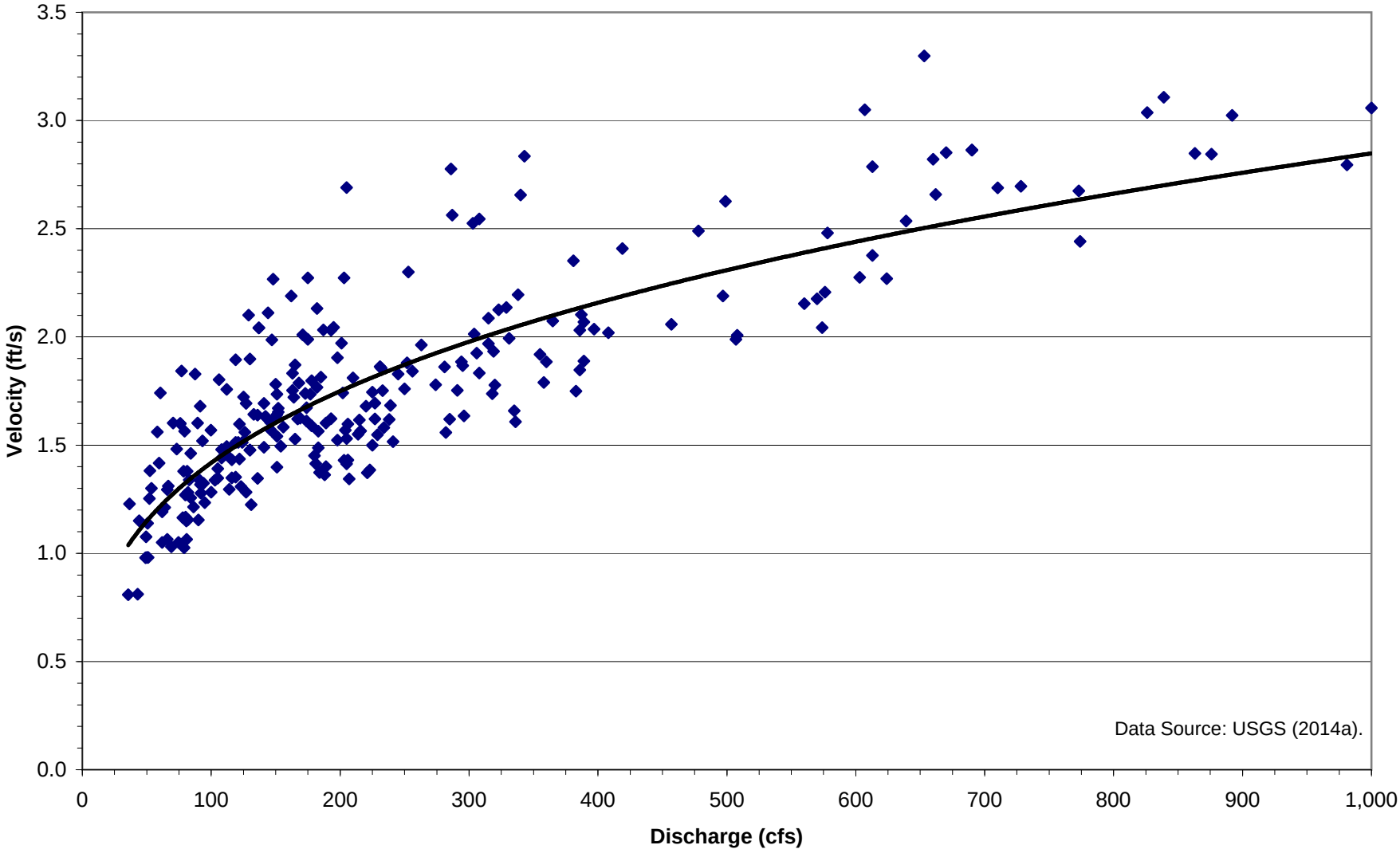


FIGURE E-10a. GILA RIVER WIDTH VS DISCHARGE NEAR SOLOMONVILLE, AZ (1920-26,28-32)

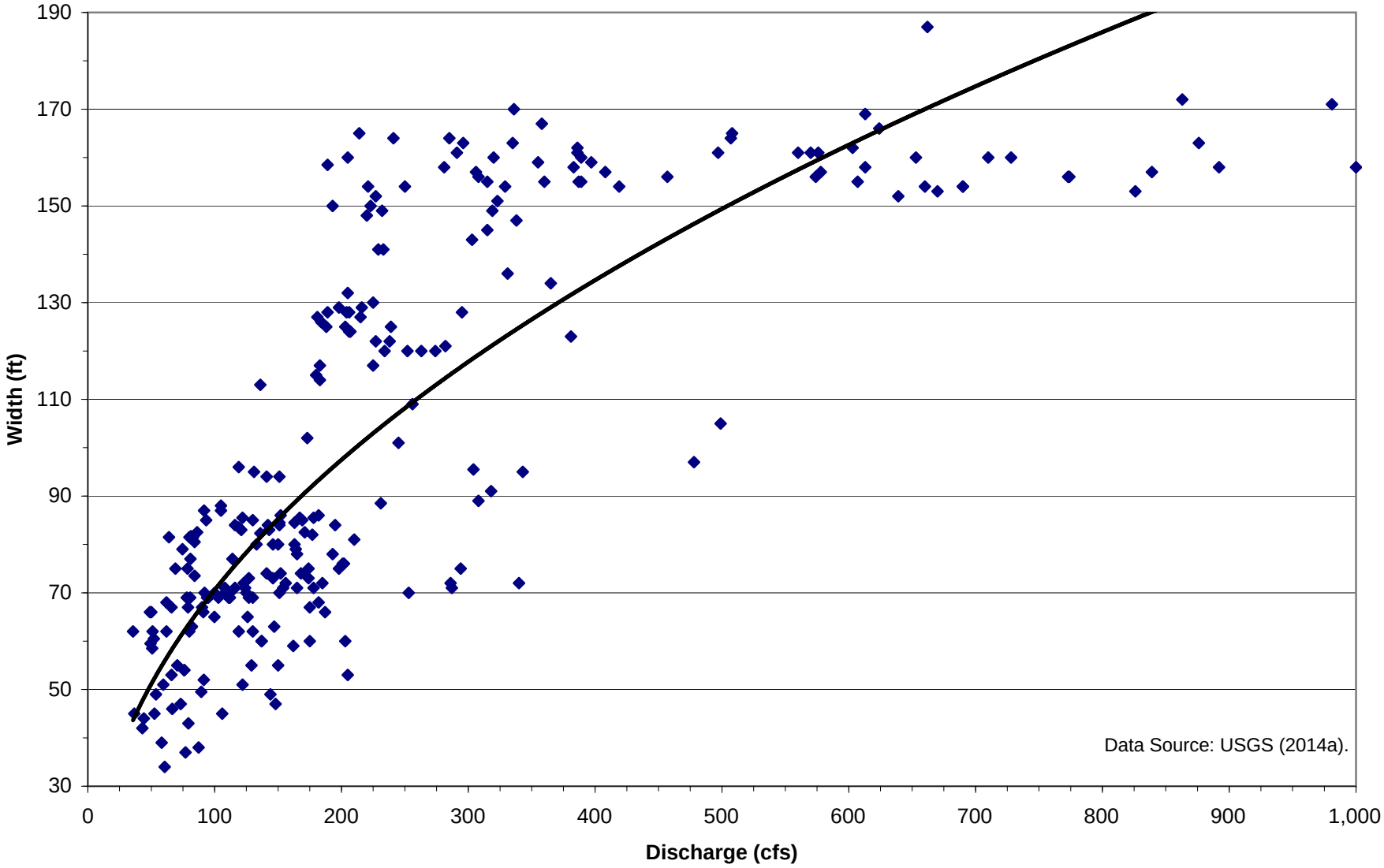


FIGURE E-11. GILA RIVER DEPTH VS DISCHARGE NEAR ASHURST, AZ (1923-28,30-32)

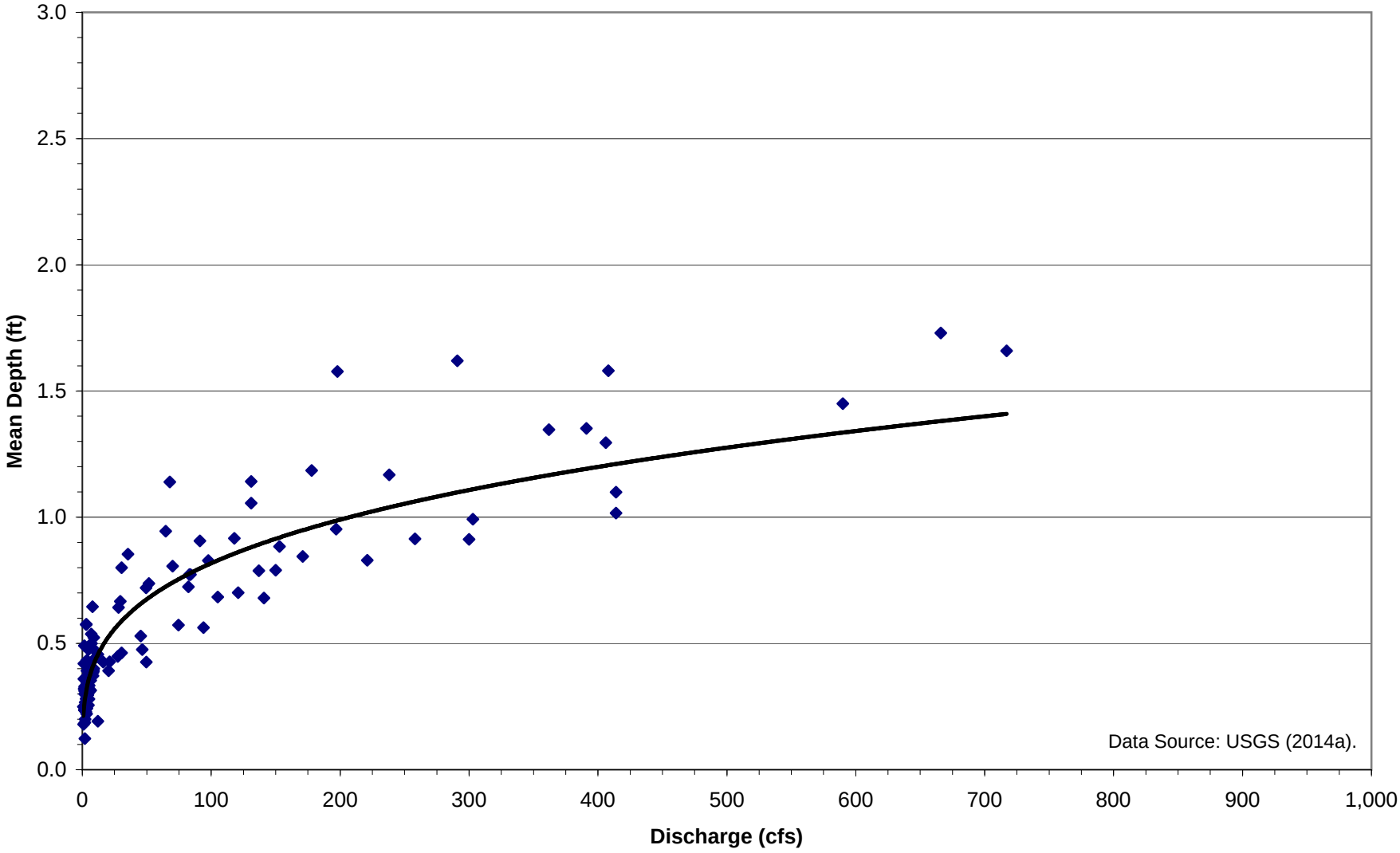


FIGURE E-12. GILA RIVER VELOCITY VS DISCHARGE NEAR ASHURST, AZ (1923-28,30-32)

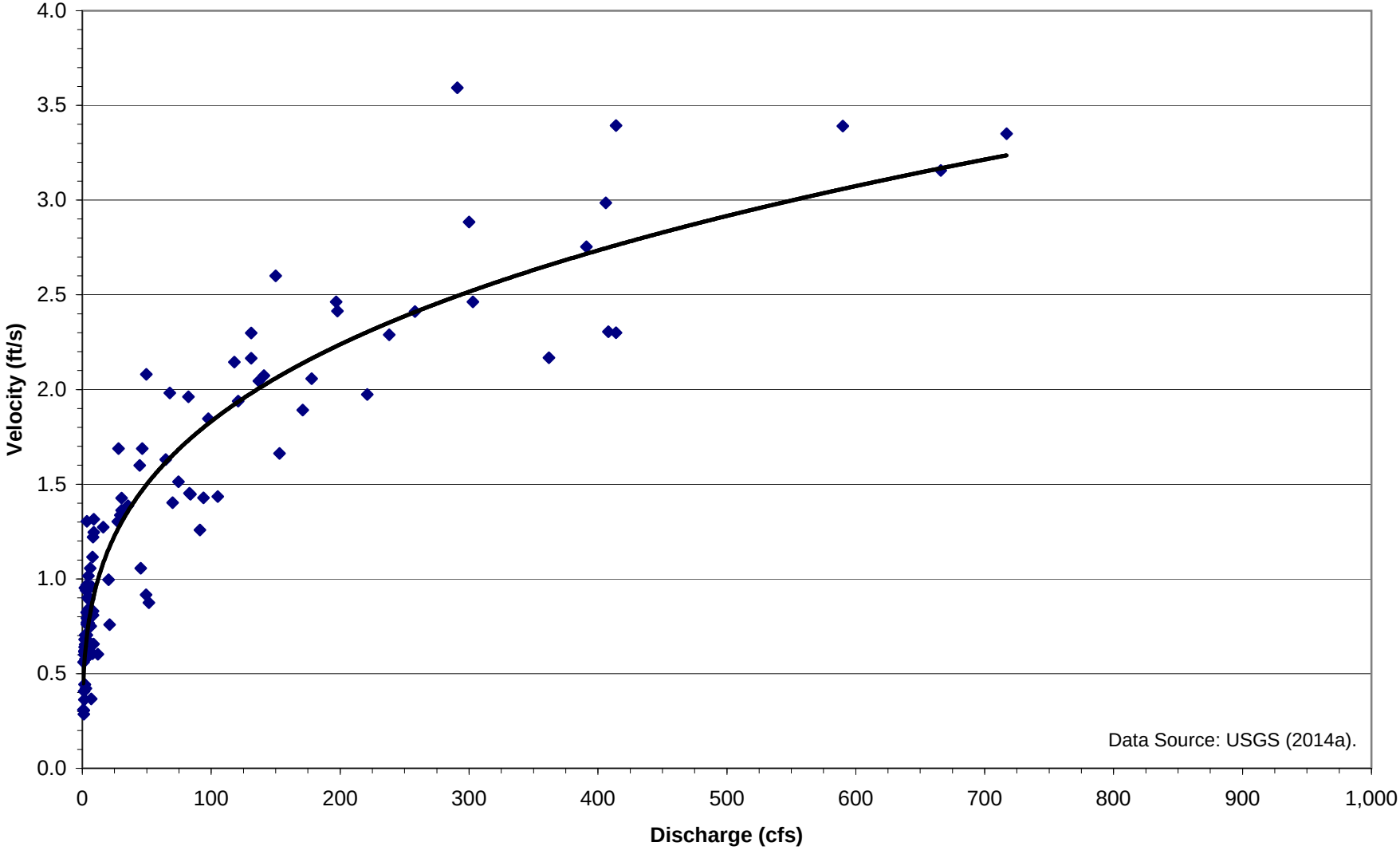


FIGURE E-12a. GILA RIVER WIDTH VS DISCHARGE NEAR ASHURST, AZ (1923-28,30-32)

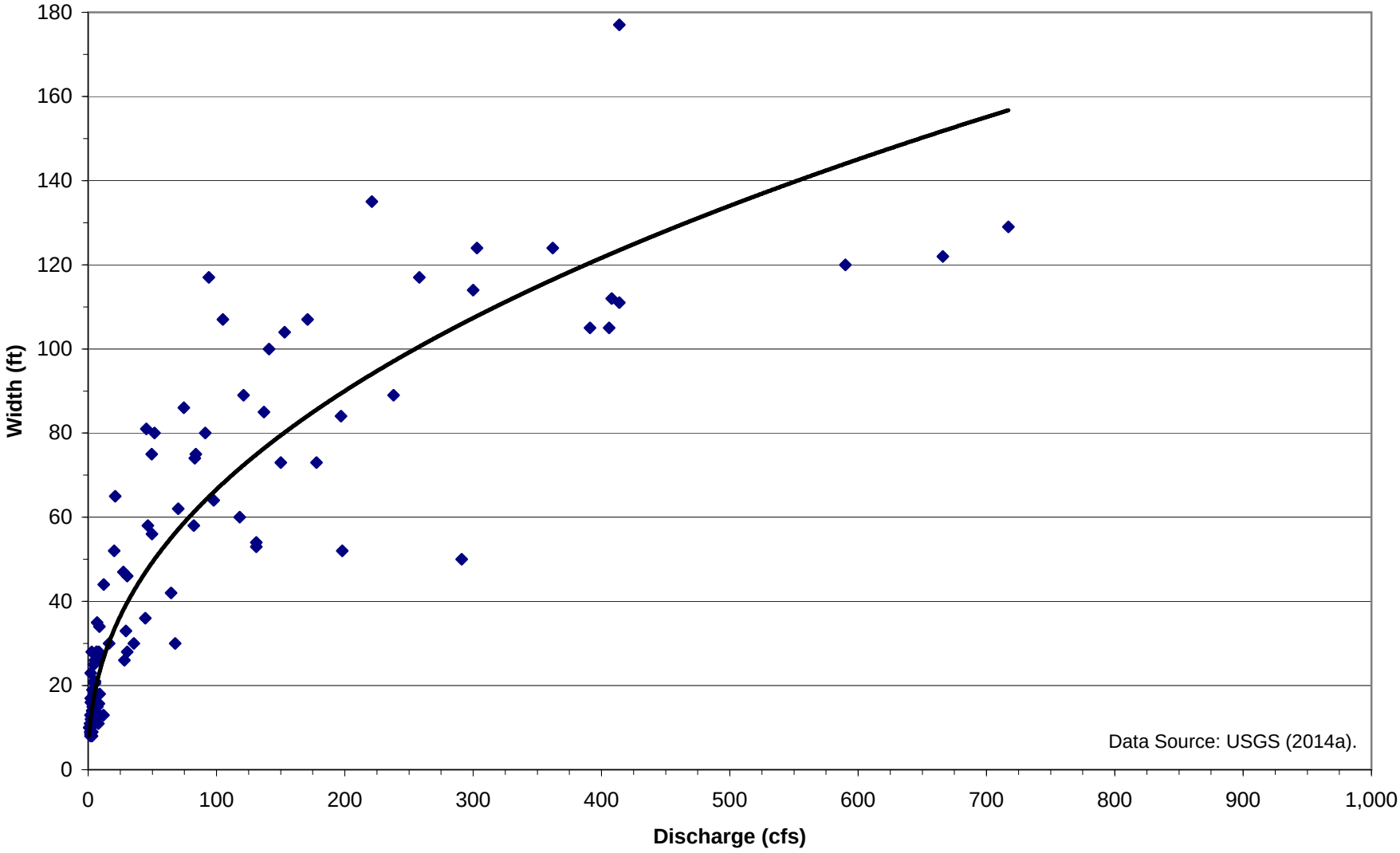


FIGURE E-13. GILA RIVER DEPTH VS DISCHARGE AT CALVA, AZ (1930-33)

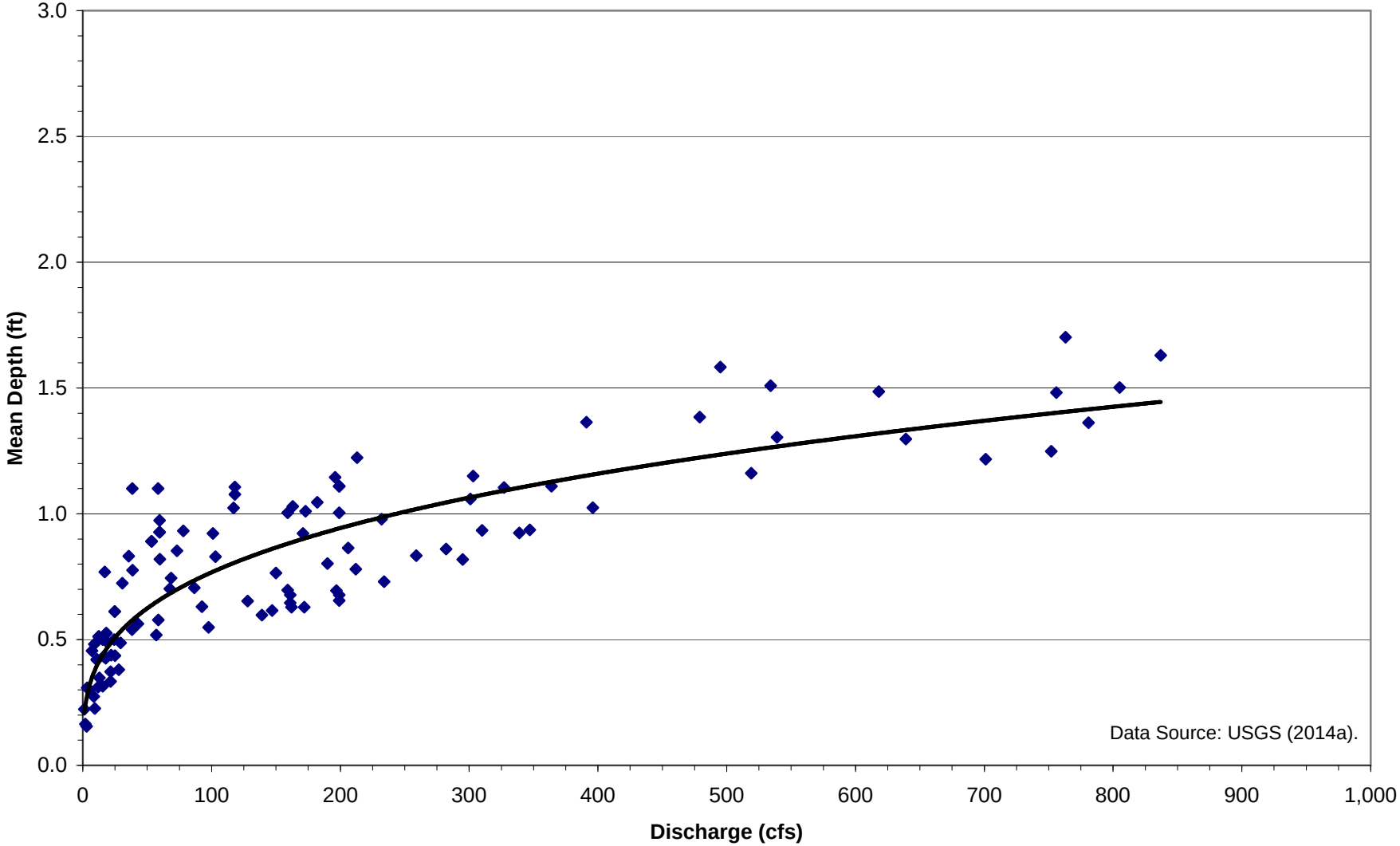


FIGURE E-14. GILA RIVER VELOCITY VS DISCHARGE AT CALVA, AZ (1930-33)

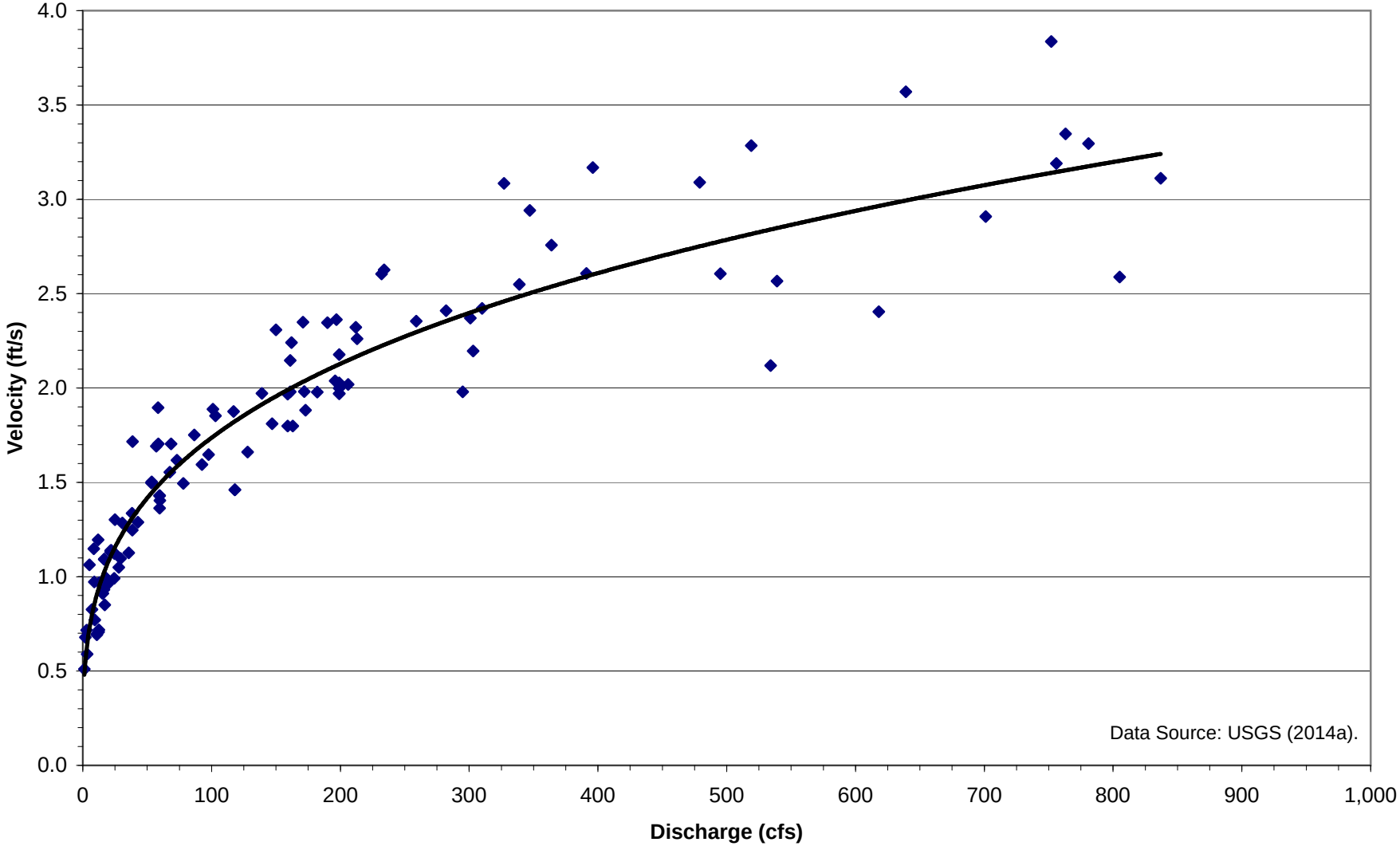


FIGURE E-14a. GILA RIVER WIDTH VS DISCHARGE AT CALVA, AZ (1930-33)

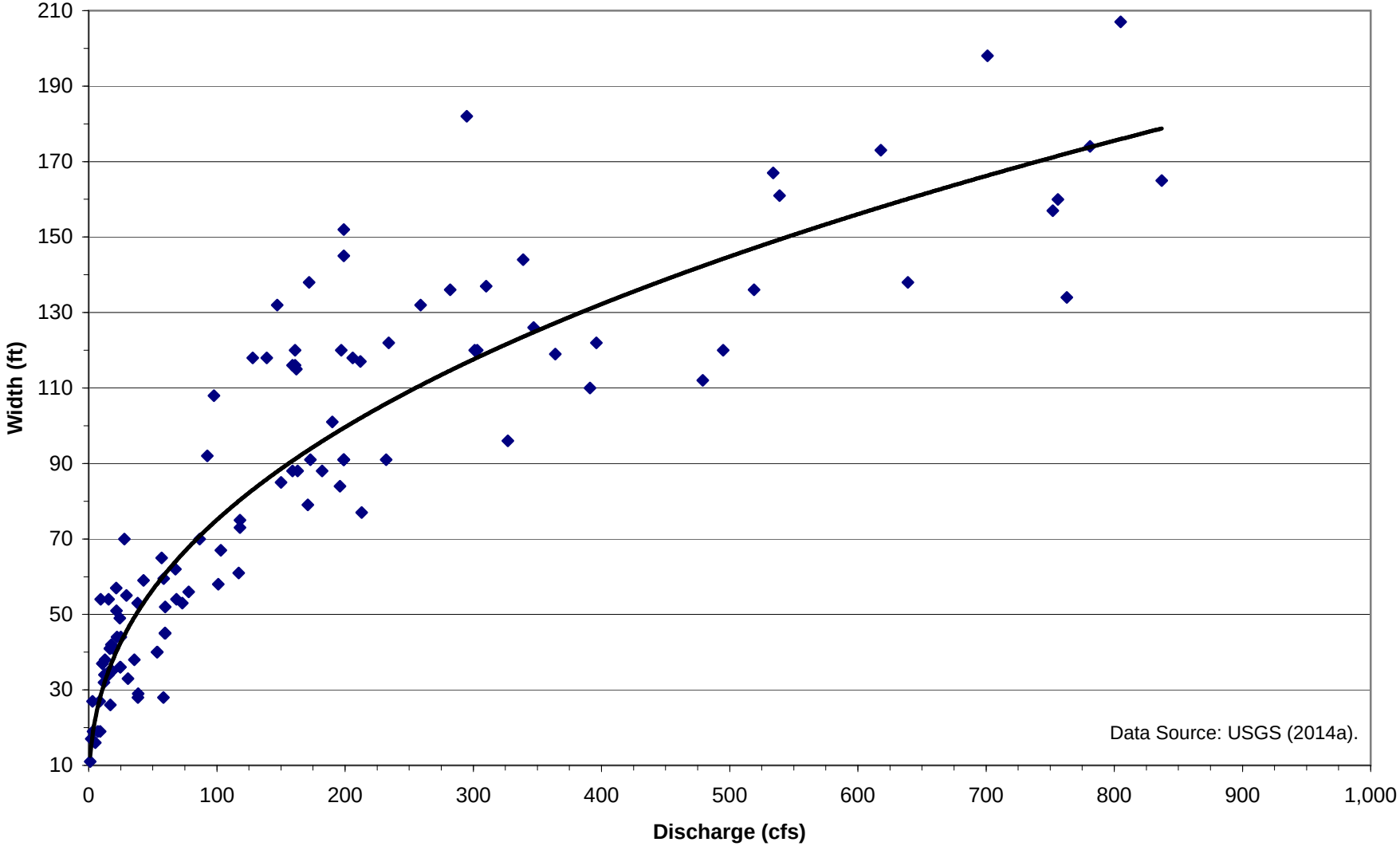


FIGURE E-15. GILA RIVER DEPTH VS DISCHARGE NEAR SAN CARLOS, AZ (1920,22-28)

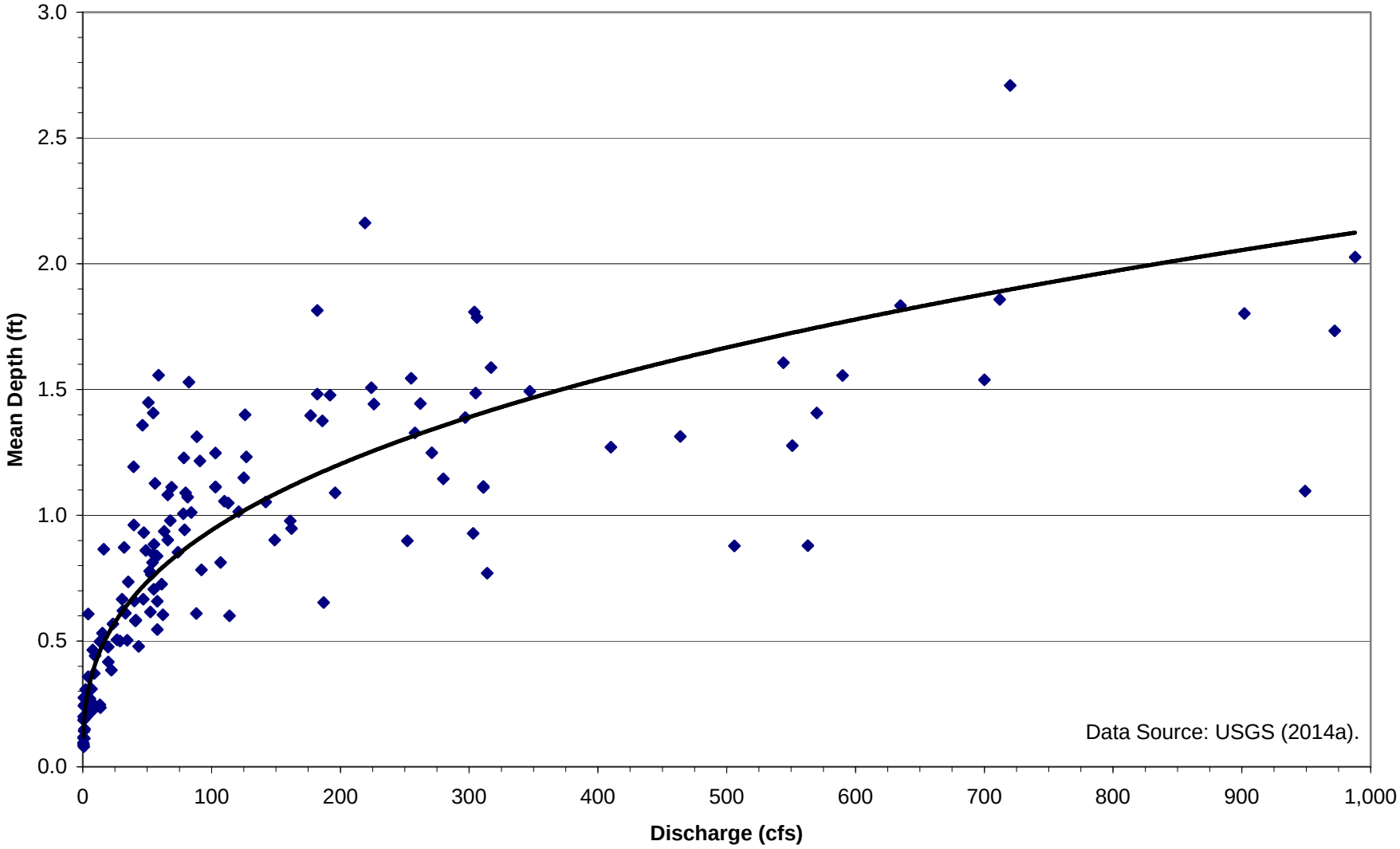


FIGURE E-16. GILA RIVER VELOCITY VS DISCHARGE NEAR SAN CARLOS, AZ (1920,22-28)

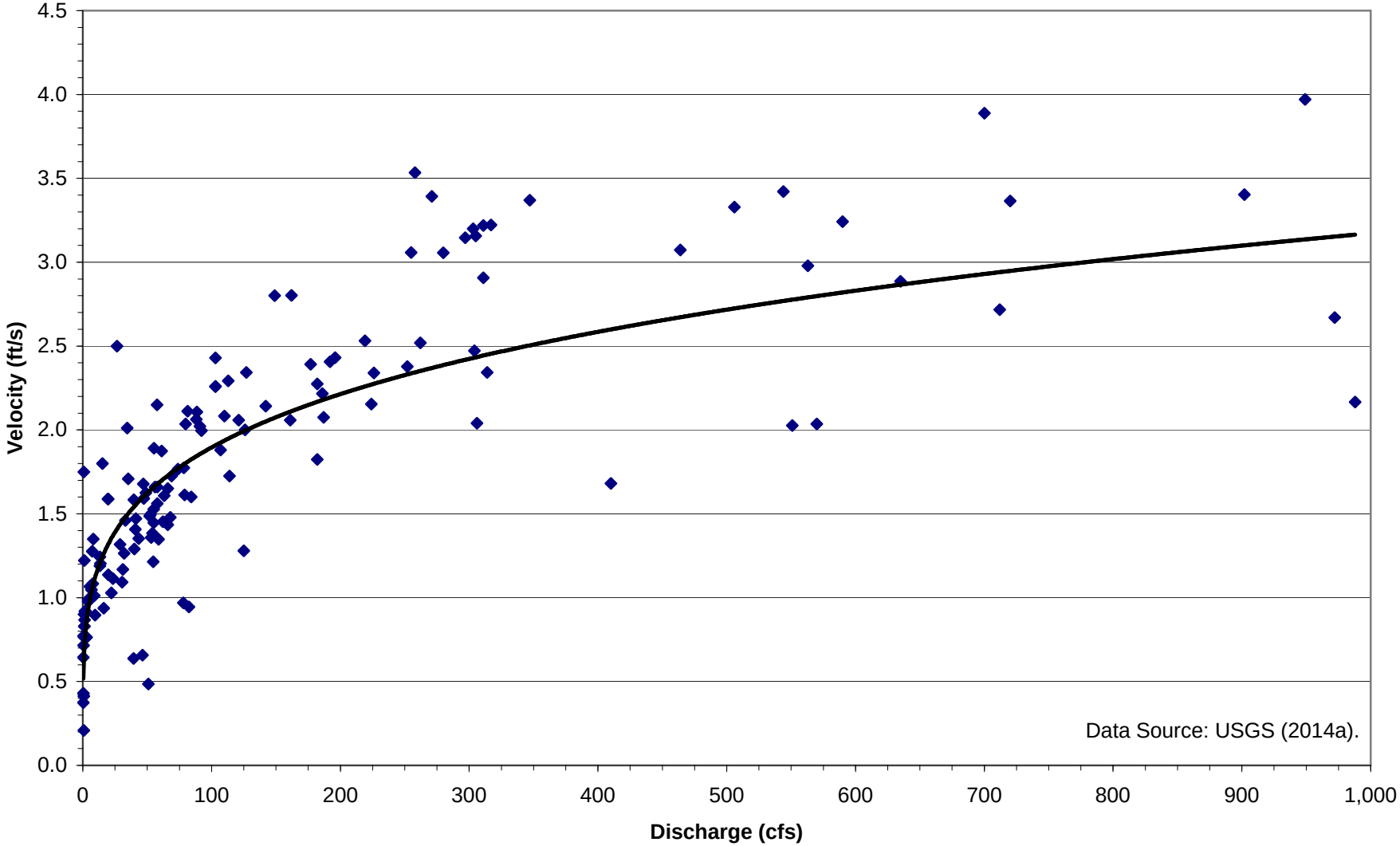


FIGURE E-16a. GILA RIVER WIDTH VS DISCHARGE NEAR SAN CARLOS, AZ (1920,22-28)