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

In re Determination of Navigability of the Verde River
(Case No. 04-009-NAV)

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CONTENTS

TABLES

FIGURES

ATTACHMENTS

DECLARATION OF RICH BURTELL ON THE NON-NAVIGABILITY OF THE VERDE 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 Minerals Corporation (Freeport) to evaluate the navigability of the Verde 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 Verde River, I am mindful that ANSAC intends to receive, review, and consider evidence on two issues: (a) the navigability or non-navigability of the Verde 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 Verde 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 Verde hearing (Hearing No. 04-009-NAV); (b) ANSAC's March 24, 2008 document *Report, Findings and Determination Regarding the Navigability of the Verde River from Its Headwaters to the Confluence with the Salt River*; (c) legal memoranda filed in 2012 by various parties regarding the Verde River and posted on ANSAC's website (www.ansac.az.gov); (d) authorities cited in those legal memoranda; and, (e) evidence regarding the Verde 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), Boating (Section III), Historic Accounts and Early Government Assessments of Navigability (Section IV), Early Transportation Needs (Section V), Natural Impediments to Navigability (Section VI), Stream Discharge Reconstruction (Section VII), River Depth Reconstruction

[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."

(Section VIII) and Conclusions (Section IX). References cited herein follow the last section. A map showing the Verde River watershed and important geographic and cultural features is presented in **Figure 1**.

8. After this introduction and summary of opinions, I discuss in Section II how the Arizona State Land Department (ASLD) recommends dividing the Verde River into five segments for purposes of determining its navigability. Section III presents pre-historic, historic and recent attempts to boat these river segments. Despite a clear need to utilize the river for trade and travel, only a few historic accounts of ferry crossings and outdoor enthusiasts floating down the stream were identified, as well as recent use by recreational boaters.

9. Section IV describes how the river appeared to early travelers. Prior to development and under ordinary conditions, travelers along the river observed a relatively shallow stream characterized by both rapids and wide lagoons. This section also describes early government assessments of navigability which confirm that the Verde River was not susceptible to navigation.

10. The transportation needs of the first Anglos in the region are discussed next in Section V, and it is found that the Verde River was not utilized for trade or travel even though the need existed for both the military and settlers. In Section VI, I present three natural impediments to navigating the Verde River which are consistent with this lack of use – beaver dams, rapids, and shallow water.

11. To further assess how the river looked in its ordinary and natural condition, Sections VII and VIII reconstruct the flow and depth at several points along the Verde River. Flows are reconstructed using an accounting procedure that adjusts gaged records for upstream diversions. Stream depths are reconstructed using these adjusted flows and hydraulic rating curves based on field discharge measurements. The results show that the stream was too shallow to support commercial navigation.

12. Based on my review of existing information and the supplemental evidence presented here, I conclude in Section IX that the Verde 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 Verde River is divided into segments, as recommended by ASLD, none of the segments would have been navigable at that time.

II. RIVER SEGMENTATION

13. 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)

14. In its June 2012 memorandum on the effects of *PPL Montana*, ASLD, an advocate for stream navigability, 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).

15. Based on the above factors, ASLD recommended in its June 2012 memorandum that the Verde River be divided into five segments (pp.6-7):

- Segment 1 (Headwaters to Sycamore Creek) – *"Extends from Paulden Dam through steep, rugged canyons with limited but reliable flow."*
- Segment 2 (Sycamore Creek to Beasley Flat) – *"River flows through shallow canyons and wide alluvial valleys through Verde Valley including communities of Perkinsville* [sic]*, Clarkdale, Cottonwood and Camp Verde. Major tributaries include Oak, Beaver, and West Clear Creeks…Some minor rapids."*
- Segment 3 (Beasley Flat to Verde Hot Springs) – *"River enters deep, narrow bedrock canyon with Wild and Scenic designation. Known as the whitewater reach of the Verde River…"*
- Segment 4 (Verde Hot Springs to Horseshoe Reservoir) – *"River located within several U.S. National Forests and two Wilderness areas. Major tributaries include Fossil Creek and East Verde River. River flows through shallow canyons and narrow alluvial valleys with small*[er] *rapids."*
- Segment 5 (Horseshoe Reservoir to Salt River Confluence) – *"River flows through broader alluvial valleys with some short canyon reaches and few small rapids. Major tributary is Sycamore Creek."*

16. 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.

17. While my opinion is that no segment of the Verde River was navigable or susceptible to navigation, I believe that it is useful to divide the Verde River into segments for purposes of addressing stream characteristics and evaluating navigability. **Figure 2** shows the location of the five river segments proposed by ASLD and referenced within this declaration. The length and slope of these stream segments are listed below[b]:

Segment	Length (miles)	Slope (feet/mile)
1	37	21
2	49	13
3	16	20
4	35	18
5	55	13

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

III. BOATING

18. This section describes prehistoric, historic and recent efforts to boat the Verde River. No evidence of prehistoric boating by Native Americans was found. Eleven historic accounts of boating the Verde River were identified including five reports of ferrying people and/or materials across the river and four hunting or trapping trips. The two other historic accounts were likely also recreational. 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 Segments 2 through 4.

19. 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)

20. The fact that the Verde River was not used for commercial navigation before substantial diversions occurred (see Section V) suggests that the few historic attempts to float down the river were a novelty by outdoor enthusiasts and not a reflection of the practical utility of the river for trade and travel. Natural impediments to navigability (see Section VI), coupled with the results from my undepleted flow analysis (see Sections VII and VIII), further support the conclusion that the river in its ordinary and natural condition was not suitable for commercial boat travel. Recent and current use of segments of the Verde 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

21. According to Fuller (2003, p.2-14) "The (Verde) river provided water for irrigation and has been a communication and trade route among various cultures since prehistoric times, although no evidence of prehistoric boating has been documented."

B. Historic

22. **Table 1** summarizes eleven historic accounts of boating along the Verde River. Included in this table is the month and year of the account, the type of boat used and its length, the boat's cargo and number of passengers, the purpose and direction of the trip, and the associated ASLD river segment(s).

23. The earliest account of boating the Verde River is from 1868 and involved troops from Camp McDowell ferrying their supplies across the river during a period of high flow. Four other accounts of ferrying people or materials across the river occurred in 1878, 1887, 1891 and 1899. Between 1888 and 1931, two hunting and two trapping trips were also reported along the Verde River. Small boats were utilized in at least three of these accounts.

24. Another Verde River boating trip was reported in 1883 by two men from Fort McDowell in a canvas skiff. The purpose of the 18-hour trip to Phoenix is unknown although it was likely recreational. A newspaper reported that the trip "would have been thoroughly pleasant, had rain not fell upon them, during the night in which they camped out." A further account was reported by two newspapers in 1905 regarding plans by Jerome business men to "cruise" the Verde River from the Verde Valley to Phoenix. However, no articles were found that this trip, which appears to have been recreational, was ever made.

25. Taken together, these historic accounts do not demonstrate that the Verde River was reliably used, or susceptible to use, for trade or travel prior to statehood. Most of the accounts either involved using boats to cross the river or were downstream recreational floats. There is simply no evidence of extensive or continued use of the river at that time for commercial purposes.

C. Modern

26. Modern accounts of boating the Verde River are summarized by Fuller (2003, pp.8-4 and 8-5) and further documented by ASLD in recent supplemental evidence. 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.

27. In his *A Floater's Guide to the Verde River*, Williams (1996) provides a detailed description of boating the full length of the river and its associated hazards. For reference, a copy of his river descriptions is presented in **Attachment B**. The Verde River certainly offers a unique opportunity for modern recreational boaters. However, some of the very features that make it attractive for recreational use (remoteness, rapids and shallow, rocky channels) would have made the Verde River unsuitable as a highway of commerce at and or before statehood.

IV. HISTORIC ACCOUNTS AND EARLY GOVERNMENT ASSESSMENTS OF NAVIGABILITY

28. In this section of my declaration, I describe streamflow conditions observed by early travelers and residents along the Verde River before significant settlement in the area and before substantial diversions for irrigation began. Also described are early assessments by government officials that concluded that all or portions of the Verde River were not navigable. Taken together, this information

indicates that, prior to significant development, the Verde River was a shallow stream easily crossed by horse or mule and characterized by both rapids and lagoons. 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 Verde River was not navigable in its ordinary and natural condition prior to statehood.

29. As indicated in **Table 2**, above Fort McDowell, irrigation by Anglo settlers along and near the Verde River increased from about 200 acres in 1864 to nearly 4,000 acres by 1883. Water to irrigate these lands was diverted from the Verde River and its tributaries, notably Beaver, Clear, and Oak creeks. Based on data from Hancock (1914, p.32), Hayden (1940, p.9) and Ross (2010, pp.121-127), I estimate that these diversions initially depleted about 4 cubic feet per second (cfs) from the Verde River and, by 1883, the depletions had probably increased to nearly 80 cfs. As discussed further in Section VII, it is unlikely that even this level of stream depletion would have substantially changed the depth of the stream and impacted its susceptibility to navigation.

A. Accounts

30. In May 1854, ten years before Anglos began to settle the area, trapper Antoine Leroux travelled up the Verde River from its confluence with the Salt River (Segment 5) to the upper Verde Valley (Segment 2). According to his journal, he followed a "road" along the river, probably an Indian trail, for a week before turning up a tributary to reach the Little Colorado River. The portion of Leroux's journal describing his Verde River trip was reproduced by Lieutenant A.W. Whipple. According to Whipple (1855, pp.14-15), Leroux "represents [the] Rio Verde as a fine large stream; in some cases rapid and deep, in others spread out into wide lagoons." On May 19th, two to three days after starting up the Verde, he indicated that his group "was obliged to ford the river about ten times." The relevant section of Whipple's report is provided in **Attachment C.**

31. From late February through early March 1864, Joseph Pratt Allyn, associate judge of the Arizona Territory, travelled up and then down the Verde River by mule with a group of civilians and troops. Following are his descriptions of the river as he recorded in three letters (Allyn, 1974, pp.80-101):

a) near the confluence with Gap or Chasm Creek – "*The Verde here is a fine rushing stream, some fifty yards wide, and not fordable; it is dammed just below with some drift wood. We have struck the river in the canon between the upper and lower valleys, and it will be difficult to get out.*" (ASLD Segment 3)

b) between Gap or Chasm Creek and near Oak Creek – "*The terrible floods of two or three years ago have furrowed this valley with channels, paved it with smooth round stones, and strewn it with drift wood. The volume of water must have been immense, the stream there perhaps a mile wide.*" (ASLD Segment 2 or 3)

c) near Oak Creek – "*The general characteristics of the valley are similar to those of the Rio Grande and there is nearly as much water in the river as there was in that stream when I first struck it coming from Santa Fe. With irrigation, it would yield as the Rio Grande*

does."[c] (Segment 2)

d) near Montezuma Castle – *"On the 29th of February we crossed the river and travelled down the east bank of the trail leading under the shadow of the white, chalky-looking lava bluffs that form the wall of the Mesa above…"* (Segment 2)

e) south of Montezuma Castle – *"Next day we started east, passing over a smooth bench of the valley that might easily be reached and irrigated by an acequia from farther up the stream, which is a rapid one, and would furnish considerable water power.* (Segment 2)

f) below the East Verde River – *"Next day we made the Rio Verde; the trail much better than yesterday…We followed down the stream three days, crossing and recrossing the river."* (Segment 4)

g) near present day Fort McDowell – *"On March 11th we parted company, the Governor and entire party starting for the post* (Fort Whipple), *Mr. Smith and myself going toward the Gila."* (Segment 5)

32. Allyn's journey along the Verde River occurred during the high flow season and in the year when Anglo settlers first began to irrigate lands in the Verde Valley. He never mentions the use of boats during his trip or the suitability of this river for navigation. A copy of Allyn's letters is included in **Attachment C.**

33. In July 1870, Captain G.B. Sanford, commander at Fort McDowell, reported that:

> "A Government farm containing about 150 acres cleared land, with an acequia four miles long, is under cultivation. It is leased by the Government one year at a time…The Rio Verde is generally fordable, during the freshets it is unfordable; it is never dry." (U.S. War Department, 1872, pp.74-75).

34. On September 25, 1875, the *Weekly Journal-Miner*, a newspaper published in Prescott, ran a story in response to questions that it had received regarding Yavapai County. The following quote from the paper was reproduced by Littlefield (2014, p.98):

> "Our mountains contain fine, clear gravel-bottomed streams and lakes, valleys of great beauty and varying in length and width spread out in every direction among the mountains. The San Francisco or Verde River and the Colorado Chiquito (Little Colorado or Flax River) together with the Great Colorado with its wonderful Canon, are the most important rivers of Yavapai, <u>but there is no navigable water in the county</u>; all freight is moved by large trains of pack mules or heavy

[c] Pratt (1974, pp.19-20) followed the Rio Grande River between Santa Fe and Albuquerque during December 1863 and January 1864. The U.S. Supreme Court in *United States v. Rio Grande Dam & Irrigation Co.* found that the Rio Grande in New Mexico "is not a stream over which, in its ordinary and natural condition, trade and travel can be conducted…[i]ts use for any purposes of transportation has been and is exceptional, and only in times of temporary high water."

> wagons drawn by from four to twenty mules to the wagon." [emphasis added]

By the time this article was written, an estimated 50 cfs was being depleted from the Verde River through irrigation.

B. Government Assessments

35. 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 only navigable water in this Territory; that 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 irrigation (about 500 acres) along the Verde River and when the territorial capital was located in nearby Prescott, the memorial makes no mention of the Verde River.

36. In the 1870s, the General Land Office completed several cadastral surveys along the Verde River before depletions from irrigation diversions were significant (see **Table 2**). The location and dates of the surveys are listed below:

Segment 1[d]

- Township 17 North, Range 1 West (September 1883)
- Township 18 North, Range 1 West (September 1883)

Segment 2

- Township 13 North, Range 5 East (December 1873)
- Township 14 North, Range 4 East (April 1877)
- Township 15 North, Range 3 East (April 1877)

[d] Although **Table 2** indicates that irrigation was depleting an estimated 77 cfs from the Verde River above Fort McDowell by 1883, much less was being depleted above and within Segment 1 at this time. **Table 6** shows that, by 1914, diversions from Del Rio Springs and along Granite Creek and the Verde River above Sycamore Creek only totaled about 8 cfs.

- Township 15 North, Range 4 East (April 1877)
- Township 16 North, Range 3 East (May 1877).

Review of the survey plats and accompanying field notes shows that both banks of the Verde River were not meandered during any of these surveys. This is important since, as explained by Littlefield (2014, pp.19-21), surveyors at that time were instructed to meander both banks of rivers that they believed were navigable.

37. None of the government assessments described determined that the river was susceptible to navigation. These assessments, combined with the historic accounts, demonstrate that the Verde River was not susceptible to navigation in its ordinary and natural condition prior to statehood.

V. EARLY TRANSPORTATION NEEDS

38. The first Anglos to occupy the Verde River watershed were military and settlers in the Verde Valley and near Prescott. Although both required a ready means of transporting people and goods through the area, neither the military nor the settlers utilized the Verde River for that purpose, further indicating that the river was not navigable. This section of my declaration describes the early transporation needs of the region and how roads and trails were used to meet those needs, even before irrigation diversions had substantially impacted river flows.

39. By the mid to late 1860s, four military camps were established on or near the Verde River, farming settlements had begun in the Verde Valley, and Prescott had been named the capital of the territory.[e] With this level of early development, it is difficult to explain how military personnel, farmers, and townspeople all failed to use the Verde River as a highway for commerce if it were susceptible to commercial navigation.

A. Military

40. When the first Anglos settled the Verde Valley in the 1860s, four military posts were located on or near the Verde River (Brandes, 1960, pp.53, 61, 70, and 75-77):

- Camp Clark/Fort Whipple – established December 1863 at Del Rio Springs and then moved about 1 mile northeast of Prescott along Granite Creek in May 1864;
- Camp Lincoln/Camp Verde – established January 1864 along the Verde River near the confluence with Beaver Creek;
- Camp/Fort McDowell – established September 1865 along the Verde River about 7 miles above the Salt River confluence; and
- Camp Reno – established October 1867 northeast of Ft. McDowell in Meadow Valley.

[e] Prescott was the territorial capital from 1863 to 1867 and from 1877 to 1889 (Granger, 1983, p.500). By the mid-1870s, Hodge (1877, p.143) estimated that the populations of Prescott and Phoenix had grown to 3,800 and 500, respectively.

41. As early as April 1866, the military began to assess communications between Fort Whipple and Fort McDowell. As noted in the *Arizona Miner*, a Prescott paper:

> "Captain John. H. Coster of General McDowell's staff, who came here with the General, has been staying at Fort McDowell, and last week arrived in Prescott via Agua Frio [sic] and Woolsey's ranch, by which route he came to see if a direct wagon road could be had from McDowell to Prescott. He thinks the country impracticable, although a direct and good road may be had to Wickenburg." (Hanchett, 1998, p.129)

42. **Figure 3** is an 1866 map of Arizona showing the location of the two forts and the wagon roads that connected them. The map also shows the location of the Verde River. Certainly if the Verde had been a practical and reliable means of transportation at this time, the military would have utilized it rather than following the much longer route through Wickenburg.

43. In January 1868, Quartermaster C.C.C. Carr of Camp McDowell was ordered to locate a wagon route between his post and Camp Lincoln. The expedition, which occurred during a period of high flow on the Verde River and involved two attempts to cross the river on a raft, is described by Schreier (1987). A copy of Schreier's manuscript is presented in **Attachment D** and includes a map of Carr's expedition. As concluded by Schreier (1987, p.7):

> "…Carr's lengthy expedition yeilded [sic] no immediate results. True, new country was described, explored, and mapped…but Carr, like Captain Sanford's expedition before him, failed to locate a practicable wagon route between Camp McDowell and Camp Lincoln. The men and the horses recovered at Camp Lincoln for three weeks. They returned to Camp McDowell on February 26, 1868."

If the Verde River had been navigable at this time, it would have provided the most direct route between the camps which were both located along the river.

44. A similar military expedition took place in April 1869. This time, Major D.R. Clendenin of Fort Whipple led a group of 25 men and two wagons to locate a wagon road between his post and Fort McDowell. A copy of Clendenin's field report is included in **Attachment D**. It describes a proposed route that would generally follow the Agua Fria River and cross the Verde River at least twice. As noted in **Table 2**, by 1869, irrigation is estimated to have only depleted about 30 cfs of flow in the Verde River above Fort McDowell.

45. During the early 1870s, the military succeeded in constructing a more direct route between Fort Whipple and Camp McDowell, as well as a side road to Camp Verde. This route generally became known as Stoneman's Road and its location is shown on an 1876 map of Arizona in **Figure 4**. Colonel Stoneman, military commander of the Arizona Territory at the time, travelled the new road between the two posts in October 1870 and was accompanied by journalist J.M. Marion, who recorded the trip. A copy of Marion's notes is provided in **Attachment D** which recount the difficulty of their journey. An alternative means of transportation between the posts, like the Verde River, was clearly not available and, as noted later that month by Stoneman:

> "A very large amount of labor has also been expended during the past

> summer by the troops stationed at Camps Verde, Thomas, McDowell and Whipple, in the construction of wagon-roads, and opening up avenues of communication in the Territory…It is thought the means of transportation now on hand will suffice for the next twelve months; it certainly will with the foregoing recommendations…The failure to connect [via mail] due to bad roads and poor stock is a frequent and frustrated source of inconvenience. It is suggested that there be three [mail] routes established…the third or cross route leaving the northern or Santa Fe route at Prescott and connecting at Maricopa Wells with the southern route, via Agua Fria, Camp McDowell and Phenix [sic]. (Arizona Weekly Citizen, 1871)

46. A few months earlier, in July 1870, Captain G.B. Sanford, commanding officer at Camp McDowell, reported that "communication between [the] post and nearest town [of Phoenix] is by wagon." (U.S. War Department, 1872, pp.74-75) Based on this and the foregoing discussion, the Verde River was not considered a viable means of transportation, either above or below Camp McDowell.

47. The need to improve Stoneman's road was noted in an 1874 annual report by General George Crook, who succeeded Colonel Stoneman.[f] Crook stated that "An appropriation is asked for to build good roads from Camp McDowell, near the center of Arizona, to Prescott, and to Camp Verde." (Arizona Weekly Citizen, 1874) In early 1875, the U.S. Senate and House of Representatives appropriated $15,000 for "construction of military roads in the Territory of Arizona, as follows, namely: From Fort Whipple to Camp McDowell, with a branch to Camp Verde…" (Arizona Sentinel, 1875). **Attachment D** includes a copy of a July 1875 report by Lieutenant E.D. Thomas that describes where and how the aforementioned roads were to be improved. By the time this engineering report was written, an estimated 50 cfs of flow was being depleted from the Verde River by irrigation above Camp McDowell.

48. About the same time that the military was improving Stoneman's Road, Hinton (1878, p.xxviii) reported that a new, 90-mile road along the east side of the Verde River had been completed between Camps Reno and Verde. **Figure 4** also shows the location of this early road. Had the Verde River been navigable, much of this road, which parallels the river, would have been unnecessary.

B. Settlers

49. The need for practical and reliable transportation near the Verde River was not limited to the military. According to Hanchett (1998, pp.63 and 133-134), a stage line that carried passengers and mail between Prescott and Maricopa Wells had begun in August 1868. As shown in **Figures 3** and **4**, had the Verde, Salt, and Gila rivers been navigable, these streams would have offered as direct a route between the two towns as passing overland by stage through Wickenburg.

[f] As indicated in his autobiography, Crook (1960) was familiar with the use of inland waterways for military purposes. He notes trips he made up the Columbia, Klamath and Sacramento rivers by canoe and steamboat (p.13, 58 and 73), being ambushed by Native Americans who utilized canoes on the Wenatchee River (p.64), and receiving supplies on the Yellowstone River via steamboat (p.204). As to the Verde River, he describes a trip made in 1873 from Tucson to Fort Whipple and then to Camp Verde via a military wagon or "ambulance" (pp.177-180).

50. A stage line connecting Prescott and Phoenix was eventually established in 1878. However, by 1873, the need for a more direct freight route between Camp Verde and the small town of Phoenix had already become a reality. According to Hanchett (1998, pp.130-131):

> "Hellings Flour Mill, from Phoenix, had a large contract with Camp Verde and its associated Indian Reservation. Transportation of goods all the way to Prescott over the Wickenburg road and then on to Camp Verde would be far too expensive. It made a lot of sense to establish a more direct road through the Black Canyon."

The Verde River, if it were navigable, would have satisfied this need.

51. In November 1873, the *Arizona Miner* announced the opening of the new freight route between Phoenix and Camp Verde:

> "The new road from Phoenix in Salt River Valley, to Camp Verde, in the Rio Verde Valley is completed. The first wagons have made the trip with great ease. Freight between points above named is 2½ cents per pound. Cause for congratulation on Salt River and elsewhere. This rules out New Mexico flour and grain, and gives our farmers and business men every facility for supplying the red men of the Verde reserve." (Rozum, 1989, p.166).

52. Within the Verde Valley, roads were also being used by early settlers for transportation of goods rather than the river. Naomi Strahan, who arrived in the area during 1875, recounted that:

> "Arriving at our destination my father worked at hauling hay for the government with an ox team. The hay was cut with heavy hoes and raked with a hand rake. It was then hauled to Fort Verde where my father received $90.00 a ton for it. My father then hauled wood on a contract to Fort Verde from Clear Creek. This occupied most of the winter." (Verde Valley Pioneers Association, 1954, pp.55-56).

53. As concluded by Fuller (2003, pp.3-10 and 9-2), "early transportation in the middle Verde River Valley was typically conducted on horseback, mule train, wagon, and stage…Overland transportation was often difficult, especially during rainy periods." The Verde River was not used, or susceptible to use, as a highway for commerce.

VI. NATURAL IMPEDIMENTS TO NAVIGATION

54. In the prior three sections of this declaration, I (a) describe the lack of prehistoric and limited historic boating along the Verde River (Section III); (b) present historic accounts and early government assessments which indicate that, prior to significant development, the Verde River was generally shallow with rapids and lagoons and not considered navigable (Section IV); and (c) demonstrate that the need for practical and reliable transportation existed in the area before substantial development of the river began (Section V). In this section, three natural impediments to navigation are discussed that demonstrate why the Verde River was not actually used,

or susceptible to use, as a highway for commerce in its ordinary and natural condition. These impediments include beaver dams, rapids, and shallow water.

A. Beaver Dams

55. **Table 3** lists several historic accounts of beaver dams along the Verde River. The accounts reveal that, from the 1860s through the 1880s, beaver dams were common along Segments 1, 2 and 5 of the river.

56. Beaver dams are still frequent along Segment 1 today. In 2009, Prescott College Professor Walt Anderson and his students surveyed the population of beavers on the Verde River from its headwaters to Sycamore Creek. Six active beaver dams were encountered and, according to Ayers (2010):

> "in one stretch, the students discovered a series of 3 dams in succession, stretching for a mile. The upper dam is minimal. The second dam is fairly substantial, backing water up to the base of the upper dam. The lower dam, however, although almost a half mile below the second dam, zigs and zags for 351 feet across the river channel backing water to nearly the base of the middle dam."

Additional information regarding Professor Anderson's beaver survey is presented in **Attachment E.**

57. Given the occurrence of beaver dams along the Verde River both historically and recently and how quickly beavers can repair their dams following floods, such conditions would have posed an ongoing impediment to boat travel prior to stream development. The occurrence of these dams may also explain, at least in part, the lagoons noted by early travelers and settlers in the region. Removal of beaver from the river through trapping would eventually have caused the pools formed behind their dams to drain and locally lowered stream levels.

B. Rapids

58. Williams (1996, pp.iii through 119) identified over 100 rapids along the Verde River from its headwaters to Horseshoe Reservoir. **Table 4** lists the river mile, name and class of these rapids. From the headwaters to Sycamore Creek (Segment 1), Williams noted 22 rapids ranging from Class I to Class II. Ten more rapids, typically Class I+, were encountered between Sycamore Creek and Beasley Flats (Segment 2). Below Beasley Flats to Verde Hot Springs (Segment 3), he mapped an additional 33 rapids, most between Classes II- and III. Another 36 rapids, mostly class I+ to II+, were identified from Verde Hot Springs to Horseshoe Reservoir (Segment 4).[g]

59. **Figures 5** and **6** show several ground-level photographs of the Class I to II rapids that Williams mapped along Segment 1 and the upper reach of Segment 2. As seen in the photos, these relatively small rapids are characterized by boulder-choked channels, drops, and turbulent water. All of these conditions pose an impediment to navigation and the frequency of rapids along the Verde River would have been more than just a nuisance to commercial boaters before statehood. The

[g] Williams identified other, smaller rapids within Segments 3 and 4 but did not specify their class.

increased frequency and still larger rapids between Beasley Flats and Horseshoe Reservoir would have posed an even greater impediment to navigation.[h]

60. When compared to the findings of the Special Master in *United States v. Utah*, the frequency and class of rapids encountered along the Verde River above Horseshoe Dam indicate that these segments of the stream 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 occurrence of rapids and the steep slope of the riverbed:

> "The number of difficult rapids, with steep and rapid drops, (whether that number be 37 as estimated by Miser or 30 as estimated by Allen, or 16 or 12 by Hoyt) make it impossible, in my opinion, for any boat to navigate safely unless conducted with great caution and by expert boatmen; and even then boats must ordinarily be "lined" or portaged or their cargoes portaged at several places. These rapids occur at intervals throughout the entire stretch of the River. Moreover, the general gradient or slope of the River bed, viz. an average of 7 feet per mile, with long stretches of 8 feet per mile, is so steep as to make navigation difficult and impracticable. Out of the total of 133 miles, there is practically no stretch of River of any considerable length where the gradient is less than 5 feet per mile…accompanying such gradients, there are naturally high velocities, far exceeding the velocities on the Green, Grande, or Colorado Rivers in the sections involved in this suit. Such velocities, combined with the narrowness of the River and with the fact that it flows in many portions through box canyons with no opportunity to spread out in case of sudden floods, unquestionably make navigation a matter of hazard to boats and cargoes, even if not to life and limb (Warren, 1930, pp.180-181).

61. According to Southwest Paddler (2010), the rapids along the 26.5-mile reach of the San Juan River from Sand Island to Mexican Hat are "run-of-the-mill Class I to II boulder gardens" and the rapids along the 58-mile reach from Mexican Hat to Clay Hills Crossing are "mostly Class I and II, with a few class III's thrown in for good measure." The latter reach is considered "one of the nation's most popular river trips."

62. Like the San Juan River, the Verde River is very popular among modern recreational boaters. It also shares the San Juan's Class I to III rapids, relatively steep slopes (see Section II) and narrow canyons. It is my opinion that these factors alone demonstrate the Verde River is non-navigable under *The Daniel Ball* standard.

C. Shallow Water

63. Prior to development, the Verde River was a relatively shallow stream, easily crossed on foot and by horses and mules except during flood events and spring snowmelt. In the next two sections of my declaration, stream flows and depths are reconstructed in their ordinary and natural condition at several sites along the river. I

[h] The prior evidence log for this case includes numerous photographs of the rapids encountered below Beasley Flats. For that reason, I have not reproduced additional photographs of these rapids here.

find that reconstructed mean stream depths at these sites typically remained below 2.0 feet during 75% of the year and would not have been suitable for boats customarily in use for commerce prior to statehood.

VII. STREAMFLOW RECONSTRUCTION

64. In this section of my declaration I describe how ordinary and natural streamflow conditions were reconstructed at five USGS gaging stations on the Verde 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 cultural depletions. In the paragraphs that follow, the period that stream flows were reconstructed is described first, followed by a discussion of the gages used and upstream diversions and depletions. Results from the analysis are presented next and then compared to other undepleted flow estimates.

65. I conclude from this analysis that, for 75% of the time, undepleted streamflows along the Verde River remained (a) below 100 cfs in Segment 1 and the upper reach of Segment 2; (b) below 500 cfs in Segment 3 and the lower reach of Segment 2; and, (c) below 600 cfs in Segments 4 and 5. Because the quantities diverted upstream of the gages and added back to the river to reconstruct flows were not corrected for the effects from infiltration and evapotranspiration (ET), these values for undepleted streamflow should be considered an *upper estimate*. Actual undepleted flows along the Verde River would have been lower. Results from this analysis are used in Section VIII to estimate the depth of the reconstructed flows and their suitability for navigation.

A. Analysis Period

66. Several factors were considered before selecting a flow period to reconstruct along the Verde 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 1910s and ending in 1940 was selected.

67. For the period analyzed, there were at least six or more years of data for each gaging station and quantification of the major diversions in the area was available near the beginning and at the end of this period.

68. When reconstructing streamflows it is 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 7** shows annual streamflows in the Verde River below Bartlett Dam reconstructed from 1820 to 1960 using tree rings. Also shown in this figure is the median annual streamflow at this point on the river based on tree rings dating back to the year 1330. These data show that, over the period of my flow reconstruction, about an equal number of years had annual flows above and below the long-term median. However, the period from 1910 to 1920 was relatively wet with annual flows typically above this median.[i]

69. Determining the effects of well pumpage on streamflows can be complex. An effort was therefore made to reconstruct streamflows when there was relatively little impact from pumping on Verde River baseflows. To assess this impact, I reviewed the results from a recent USGS study by Garner and others (2013) which utilized a regional groundwater flow model to quantity the cultural effects on the hydrologic system of the Verde Valley from 1910 to 2005. For modeling purposes, they assumed well pumpage within the Verde Valley above Camp Verde increased from 2 to 3,370 acre-feet per year between 1910 to 1940 (p.32-33). Results from their model simulations indicate that this level of pumpage reduced baseflows in the river above Camp Verde by less than 1 cfs over the period (pp.34-35). Based on these results, the period selected for streamflow reconstruction was considered unaffected by well pumpage.

70. 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 diversions are relatively stable. Fortunately, the acreage of irrigated lands in the Verde Valley did not change substantially between 1914 and 1940 based on data reported by Hayden (1940, p.180-181).

B. Gages

71. Undepleted streamflows were reconstructed at five USGS gages along the Verde River:

- near Clarkdale (09504000);
- at Camp Verde (09505000);
- near Camp Verde (09506000);
- below East Verde River (09508000); and
- below Bartlett Dam (0951000).

Figure 2 shows the location of the gages. The gages near Clarkdale and at Camp Verde are located near the upper and lower reaches of Segment 2, respectively. The

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

other gages are located within Segments 3, 4, and 5.

72. Data for the gages are presented in **Table 5**. Flow duration rates are listed for each gage based on measured daily mean flows.[j] The 25% flow rates shown indicate that, over the period of record, daily mean flows measured at the gage equaled or exceeded the specified value 25% of the time. In other words, flows remained less than the rate 75% of the time. Similarly, the 50% values indicate that the specified flow was equaled or exceeded at the gage 50% of the time. The latter is equivalent to the median daily flow over the period of record. These percentiles were used for flow reconstruction rather than average flow rates since the latter are less representative of typical flow conditions and skewed by large flow events.

C. Diversions and Return Flows

73. To reconstruct natural and ordinary streamflow conditions along the Verde River, stream depletions resulting from cultural diversions upstream of the USGS gaging stations were added to the gaged flows. Irrigation diversions were by far the largest cultural water use in the region at this time and are discussed further below.

74. Irrigation diversions upstream of the gages are summarized in **Table 6**.[k] During the period of flow reconstruction, the acreage irrigated along the Verde River above the gages was relatively stable and totaled between about 8,000 and 9,000 acres. The rates that surface water was diverted from the Verde River and its tributaries to irrigate these lands was reported by Hancock (1914, p.32) and Hayden (1940, p.9) for most of the irrigation canals and ditches in the area.

75. As explained by Hayden (1940, pp.11-12 and 15), a portion of the water diverted from the Verde River for irrigation quickly returned to the river:

> "That a considerable portion of this diverted [irrigation] water does find its way back to its natural channel is a certainty, unless the absurd claim be made that this district is unlike all others known. Also it is true that physical conditions are such as to favor the speedy return of seepage or leakage to the stream beds. Only bottom lands are irrigated and at no place do they extend over a half-mile from the main channel. The live flow of streams and springs at all times keeps porous underground beds saturated, and the limited storage space between the permanent water table and the ground surface leaves no room for accumulated reserves. No evidence of any such accumulations was found in the entire basin to an extent which would threaten the land with waterlogging and the natural drainage is such that continuous irrigation in the same manner for periods from 40 to 50 years has disturbed but little, if any, the balance between inflow and outflow…Local water users…are quick to assert that no amount of control would affect the flow reaching the lower (Verde) river, since they claim that all leakage and seepage is returned quickly to the natural stream channels, and that, over the entire year, all surplus diversion above the water consumptively used is automatically accounted for in this manner. This contention has much to

[j] For the gage below the East Verde River, daily mean flow data were unavailable so monthly mean flow data were used instead.

[k] Based on reported diversions and cropped acreages, each 1 cfs diverted from the Verde River and its tributaries irrigated an average of about 30 acres during the period of flow reconstruction.

support it…"

76. Unfortunately, the total quantity of water diverted from the Verde River and its tributaries for irrigation that returned to the river was not quantified. As further explained by Hayden (1940, p.10):

> "Surface flow in the Verde River occurs in such a manner as to make its measurement in conjunction with the numerous diversions and the return seepage, with contributions from natural ground water and springs, a highly complex and difficult problem. A brief touch on the conditions as observed in June and July 1940 over the 40-mile course of the river below Sycamore Canyon will give a general idea of the great number of indefinite factors to be considered. Starting out with an estimated flow of 75 sec.-ft. below Sycamore Creek, this stream was observed to have diminished to not over 10 or 15 sec.-ft. six miles below, near Tapco. A mile or so lower down, at Clarkdale, 20 sec.-ft was diverted and about the same flow remained in the river. The Hickey Ditch, ½ or ¾–mile downstream diverted 20 sec.-ft. and the Cottonwood, ¼-mile below that, 45 sec.-ft. In the 35-mile course of the river to Clear Creek an estimated total of 184 sec.-ft was being taken out, with approximately 25 sec.-ft coming in at Oak Creek and none visible from Beaver or Clear Creeks. Yet below Clear Creek there still remained a flow estimated at 50 sec.-ft. These figures five a total of 144 sec.-ft excess observed diversions over observed inflow, which added to the 50 sec.-ft in the river below Clear Creek give a total of 234 sec.-ft. for the main Verde flow, which had there been no diversions, would have been in the river below Clear Creek, less, of course, the amount of contributions which came from canal and land losses."

77. Recent measurements by Ross (2010, pp.121-127) do, however, provide an estimate of the percentage of irrigation diversions in the Verde Valley that return to the river. Between October 2008 and May 2010, Ross measured the quantity of surface flow diverted into and directly returned to the Verde River along four ditches – Diamond S, Eureka, OK and Verde. He found that, on average, approximately 43% of the water diverted was directly returned to the river. The remaining 57% was either consumptively used or seeped back to the river via the subsurface. For purposes of flow reconstruction I assumed that, between 1910 and 1940, 57% of the water diverted from the Verde River and its tributaries for irrigation was depleted from the river and needs to be added back to the river above the gages. A summary of Ross' diversion and return flow data is provided in **Attachment F**.

78. **Table 6** lists typical surface water diversion rates during the period of record, my estimate of streamflow depletions below the ditch returns, and estimated depletions in flow upstream of the five USGS gaging stations. The latter were added to the gauged data to reconstruct undepleted flows.

79. One major non-agricultural diversion was identified upstream of four of the gages. During the period of flow reconstruction, Phelps Dodge (PD) diverted about 9 cfs directly from the Verde River in the Clarkdale area for mining purposes (Hayden, 1940, pp.101-102). As noted in **Table 6**, it was assumed in this case that 100% of PD's diversion was depleted from the river (i.e. there were no return flow).

D. Results and Qualifications

80. Reconstructed flows at the five USGS gaging stations are summarized in **Table 5**. My analysis showed that, absent cultural depletions, flows in the Verde River remained less than 600 cfs along all five stream segments during 75% of the year. Reconstructed flows along Segment 1 and the upper reach of Segment 2 typically remained below 100 cfs.

81. When reviewing these results, it is important to remember that adjustments were not made for gains in streamflow from infiltration of irrigation water or natural losses in stream flow from ET. It is assumed in the analysis that none of the water diverted upstream of a gage site for irrigation or mining returned to the river via baseflow and was measured by the gages. It is further assumed that all of the depleted water added back to the river reached the downstream gage (i.e. none was naturally lost along the channel from ET). Both assumptions are unlikely and, as a result, my reconstructed flows are conservative and considered an upper estimate. Actual Verde River streamflows would be lower in their natural and ordinary condition.

E. Comparison to Other Estimates

82. Two earlier studies were identified that reconstructed streamflows on the Verde 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.

83. 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 others (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)."

84. At the USGS gaging station below Bartlett Dam, BOR (1952, p.152) determined that the *average* or *mean annual* undepleted flow of the Verde River was approximately 752 cfs. By comparison, the flows that I reconstructed at this gage ranged from 437 to 570 cfs for the 50% and 25% *daily mean flow* durations, respectively. As expected and explained in paragraph 72, my flow reconstructions were lower than BOR's average annual undepleted flow estimate since the latter is skewed by large flow events. In either case, undepleted flows at this point on the Verde River were relatively small and, when evaluated in the next section in terms of their associated depths, would have been unsuitable for commercial navigation.

85. Near the mouth of the Verde River, downstream of the Bartlett Dam gage described above, Krug and others (1987, p.321) calculated an average annual undepleted flow of approximately 1,021 cfs. The drainage area here is about 400 square miles larger which may explain, in part, their higher undepleted flow estimate. As discussed below, even at this higher flow rate, the mean flow depth at the Bartlett gaging station I evaluated would have been about 2.0 feet.

VIII. RIVER DEPTH RECONSTRUCTION

86. The streamflows reconstructed in Section VII are used in this section to reconstruct the depth of the Verde River. Stream depths prior to depletion were determined using hydraulic rating curves based on USGS field discharge measurements at the five gaging stations.

87. Rating curves for the gaging stations near Clarkdale and at and near Camp Verde were developed by Fuller (2003, pp.7-16 through 7-18) and are reproduced in **Figure 8**. I developed my own rating curves for the gaging stations below the East Verde River and below Bartlett Dam and these are presented in **Figures 9** and **10**, respectively. The latter were developed based on hundreds of USGS field measurements taken over multiple years during the analysis period.

88. To reconstruct the depth of undepleted streamflows in the Verde River, the 25% and 50% flow durations reconstructed in Section VII were compared to the hydraulic rating curves which relate stream discharge to mean depth.[1] The results are summarized in **Table 5**. By combining my reconstructed streamflows with the hydraulic rating curves described above, I found that undepleted flows in the Verde River typically had a mean depth of less than 2.0 feet during 75% of the year. An exception was the gage below the East Verde River where the mean stream depth remained less than 2.2 feet over 75% of the year with a median (50%) depth of 1.8 feet. None of these stream depths would have supported commercial boat travel in light of prior court decisions (e.g. *United States v. Utah*, discussed in paragraphs 90 and 91) and certain navigability guidelines (see paragraph 92).

89. Note that the reconstructed stream depths listed in **Table 5** represent conditions at discrete points along the river where the USGS found the channel was relatively uniform and unaffected by rapids and, therefore, suitable for a gaging station. However, as described in Section IV of this declaration, rapids are common along four of the five Verde River segments and at these points flow depths would likely have been lower and more irregular.

90. When compared to the findings of the Special Master in *United States v. Utah*, the mean stream depths reconstructed for the Verde River indicate that this 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 46% of the year (Warren, 1930, pp.154-181). By comparison, along the Verde River, reconstructed stream depths were typically less than 2 feet during 75% of the year at all gaging stations except the one below the East Verde River, as explained above. This comparison weighs even more for the non-navigability of the Verde River considering the conservative nature of my streamflow reconstructions (see paragraph 81).

91. 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

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

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 Verde River in its ordinary and natural condition.

92. It is also helpful when reviewing the reconstructed stream depths of the Verde 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 Verde River is also non-navigable in its ordinary and natural condition using these criteria.

93. As described in this and prior sections of my declaration, shallow stream depths, rapids and beaver dams were all characteristic of the Verde River prior to its development. These natural impediments to navigation explain why the river was neither used nor susceptible to use as a highway for commerce at and prior to statehood.

IX. CONCLUSIONS

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

95. It is also my opinion that if the Verde River is divided into segments, as proposed by ASLD, none of the segments would have been navigable in their ordinary and natural condition.

96. I base these opinions on my review of existing and supplemental evidence presented in this declaration including, but not limited to: (a) past and recent efforts at boating; (b) observed predevelopment streamflow conditions and early government assessments of navigability; (c) early transportation needs in the area; (d)

natural impediments to navigability; and (e) reconstruction of the ordinary flow and depth of the river prior to development.

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

Executed on this 17th *day of September, 2014.*

RICHARD T. BURTELL

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TABLES

TABLE 1. HISTORIC ACCOUNTS OF BOATING THE VERDE RIVER

YEAR	MONTH	BOAT		NUMBER OF PASSENGERS AND CREW	CARGO	PURPOSE	DIRECTION	ASLD RIVER SEGMENT	SOURCE	COMMENTS
		Type	Length							
1868	January	raft	unknown	two	supplies	ferry used by Camp McDowell troops to transport supplies across the river during a period of high flow		3	Schreier (1987, pp.1-7)	First raft capsized.
circa 1878		unknown			people	ferry used by Fort Verde troops to cross the river during periods of high flow		2	IO Report (1878) as cited in Fuller (2003, p.8-3)	
1883	February	canvas skiff	unknown	two	unknown		Fort McDowell to Phoenix	5	Arizona Gazette (1883) as cited in Fuller (2003, p.3-20)	Trip reportedly completed in 18 hours by "jolly mariners" from Fort McDowell; high flow season.
circa 1887		"collapsible U.S. Army issue boat"	about 12 to 14 feet		people	ferry used to take couriers across the river during periods of high flow		2	Munson (1981, pp.28-29) and Fuller (2003, p.3-20)	Based on personal communication with Munson and a Library of Congress photograph showing one boater in a military uniform.
1888	December	canoe	unknown		supplies	hunting	Fort McDowell to Phoenix	5	Phoenix Herald (1888) as cited in Fuller (2003, pp.3-20 and 3-21)	
1891	September	"small boat"		two	supplies	trapping	Camp Verde to Yuma	2 through 5	Arizona Sentinel (1892)	Over 800-mile trip completed "in a little less than six months"; one boater indicated that it was his fifth trip down the river.
1891	March	"raft constructed of (railroad) ties"		one		crossing river to repair a telegraph line and railroad track		probably 1	Weekly Journal-Miner (1891)	"his frail craft went to pieces"; high flow season.
1899	June	"boats or rafts"	unknown		rock	dam building	near Perkinsville	1	Fuller (2003, p.8-3)	Based on undated article by Don Willard.
1903	early	"steel boat"	unknown	two	supplies	hunting	16 miles downstream within the Verde Valley	2	Palmer (1979, p.29) as cited in Fuller (2003, p.3-21)	Trip possibly taken during high flow season; boat hauled "on the axle of two wheels" by a horse.
1905	May	"two iron boats"	unknown	four to ten	probably recreational (trip described in articles as a "cruise" by Jerome business men)		Van Deren's Crossing to Phoenix	2 through 5	Arizona Silver Belt (1905) and Weekly Journal Miner (1905)	Unknown whether trip was actually made; "expect to make trip in seven days. In places they will have to shoot rapids, and in others it will be necessary to carry their boat."
1931	January - February	flat-bottom	unknown	two	supplies	trapping	Clarkdale to near Fort McDowell	2 through 5	Verde Copper News (1931) as cited in Fuller (2003, 3-21)	High flow season; unknown whether beaver or otters were still in river at this time.

TABLE 2. HISTORIC IRRIGATION ALONG AND NEAR THE VERDE RIVER ABOVE FORT MCDOWELL

YEAR	IRRIGATED ACREAGE[a]	ESTIMATED SURFACE WATER DIVERSIONS FOR IRRIGATION (cfs)[b,c]	ESTIMATED STREAMFLOW DEPLETION BELOW IRRIGATED AREAS (cfs)[b,d,e]
1864	215	7	4
1865	527	18	10
1868	1,243	42	24
1869	1,548	53	30
1870	1,649	56	32
1871	1,958	67	38
1872	1,998	68	39
1873	2,470	84	48
1874	2,648	90	51
1875	2,731	93	53
1876	2,989	102	58
1877	3,062	104	59
1878	3,670	125	71
1879	3,729	127	72
1880	3,941	134	76
1881	3,991	136	77
1883	3,994	136	77

Notes:

[a] From Hayden (1940, pp.177-178).

[b] cfs = cubic feet per second.

[c] Calculated by multiplying the irrigated acreage by an average diversion rate of 3.4 cfs per 100 acres. The latter is based on data from Hancock (1914, p.32) and Hayden (1940, p.9).

[d] Calculated by assuming that, on average, 57% of irrigation diversions do not immediately return to the river. The average return rate of 43% is based on field data collected by Ross (2010, pp.121-127) between October 2008 and May 2010 from four ditches within the Verde Valley (Diamond S, Eureka, OK and Verde).

[e] Does not account for diversions that return to the river through subsurface seepage or natural evapotranspiration (ET) losses downstream of the diversions. As such, these values overestimate actual streamflow depletions.

TABLE 3. HISTORIC ACCOUNTS OF VERDE RIVER BEAVER DAMS

DATE	DESCRIPTION	SOURCE	REFERENCE	COMMENTS
SEGMENT 1 (Headwaters to Sycamore Creek)				
February 1864	*"within three miles [* of Postol's Ranch] *is the head of one of the branches of the San Francisco (* Verde) *river, where beaver dams form a succession of ponds that are literally filled with fish"*	Allyn	(1974, p.67)	Judge appointed to the Arizona Territory Supreme Court.
1890s	*"According to Mrs. Nick-Perkins (personal communication), the floodplain of the river was quite stable in the 1890s, and Yavapai Indians were using canals to irrigate their crops along the banks of the stream. The river flows slowly, impeded by many beaver dams, and extensive marshes occupied the floodplains."*	Minkley and Alger	Fuller (2003, p.3-14)	Resident described conditions in the vicinity of Perkinsville.
SEGMENT 2 (Sycamore Creek to Beasley Flat)				
1860s	*"bottom [* of the Verde River] *was from one half to one mile wide, and was covered with a dense forest of trees, with thick underbrush, which it was very difficult to even get through on foot, every half mile or mile there would be a beaver dam."*	Hawkings	Stoutamire (2011, p.5)	Jerome dentist.
1864 - 1865	*"Judging from the accounts of old trappers, its [* beaver] *numbers seem even to have increased as of later; owing, doubtless, both to the diminished value of its fur…and to the Indian difficulties…Particularly upon the Rio Salado and San Francisco [* Verde] *is it very abundant; and its dams occur, in some places, every few hundred yards."*	Coues	(1867, p.362-363)	Ornithologist and surgeon stationed at Fort Whipple.
circa 1868	*"Thirty-one years ago the Verde River was full of beaver dams and was not confined to an even channel, as it is now."*	Hance	The Arizona Republican (1899)	Verde Valley pioneer.
1884 - 1887	See **Attachment E** for Mearn's notes regarding the occurrence of beavers in streams near Fort Verde.	Mearns	(1907, pp.354-359)	Naturalist and surgeon stationed at Fort Verde.
SEGMENT 5 (Horseshoe Reservoir to Salt River Confluence)				
1885	*"[* we] *made a survey of the Verde River only a few blocks from the fort. We discovered that the river was full of beaver dams with plenty of fish behind the dams where the water was deep."*	Huntington	(1957, p.7)	Stationed at Fort McDowell.
1888	*"A party of Prescott trappers have caught a good many beaver on lower Verde."*	Tombstone Weekly Epitaph	(1888)	

TABLE 4. VERDE RIVER RAPIDS MAPPED ABOVE HORSESHOE RESERVOIR[a]

RIVER MILE[b]	NAME	CLASS	RIVER MILE[b]	NAME	CLASS	RIVER MILE[b]	NAME	CLASS
ASLD SEGMENT 1 (Headwaters to Sycamore Creek)								
3.3	Unnamed	I	16.0	Unnamed	I or II (low water)	20.9	Old Bear Ford area	I or II (low water)
5.4			16.5			23.5	Guv Drop	
6.4	Roper Tank Canyon area		16.8	Boulders One		28.0	Unnamed	shallows
8.4	Muldon Canyon area	I or II (low water)	17.0	Boulders Two		29.9	Horseshoe Drops	I+
13.6	Gold Basin Canyon area		17.2	Boulders Three		31.4	Tricky Two Drops	
14.6	Unnamed		18.6	Tri-Canyon Rock Gardens		32.6	Rafael's Gauntlet	
14.8	Duff Drop		20.4	Old Bear Ford area		34.6	Unnamed	
14.9	Duff Gauntlet		20.6					
ASLD SEGMENT 2 (Sycamore Creek to Beasley Flat)								
37.6	Sycamore Chute	I+	40.3	USGS Rapids	I+	85.8	Platform Banks Droppings	I (I+ to II at high water)
38.1	Unnamed		42.7	SOB Drop		88.3	Roller Uno	
38.6	Little Swamper		68.0	Cherry Creek Drop				
39.3	Gauge Drops		81.2	Clay Banks Rock Garden	see next			
ASLD SEGMENT 3 (Beasley Flat to Verde Hot Springs)[c]								
89.5	Roller Dud	I	93.8	Palisades Cliff	II+	99.4	Gospel Drop	II-
90.5	Off the Wall	II+	95.1	Formations Rock Garden	I+	99.7	Unnamed	I+
90.6	Unnamed	II	95.5	Wanna Be Punk	II	100.1		
90.8	S Curve	II-	96.0	Punk Rock	III	101.1	Good Ride	II+
91.1	Safety Valve	II	96.6	Powerline #1	I	101.6	Good Ride, Too	II
91.2	Pre Falls	III	97.1	Unnamed near Towel Creek	I+	101.9	Unnamed	I+
91.3	The Falls	IV	97.5	Bushman	III-	104.3	Unnamed	
91.5	Post Falls	II+	97.8	Unnamed	I+	104.5	Powerline #2	II+
92.3	Unnamed	I+	98.2	Lil Do Drop	II-	104.9	Unnamed	I+
93.1	Sycamore	II-	98.5	Rocky Split	II+	105.3	Powerline #3	II-
93.5	Two-Rock Drop		99.2	White Flash	II-	105.4	Childs Rock Garden	
ASLD SEGMENT 4 (Verde Hot Springs to Horseshoe Reservoir)[c]								
105.8	Unnamed	I+	119.7	Unnamed	II	130.7	Split Shoot	II-
106.7	Childs Play/Game and Fish	II	122.3	Who Do	I+	131.5	Unnamed	I+
107.0	Unnamed	I+	122.8	Unnamed		132.6		
107.5	Rock n Middle	II	123.2	The Gauntlet	II	133.2	Nice Ride	
107.8	Rocks at Top of Drop	II-	125.1	Cave Drop	II-	134.0	Unnamed	
110.2	Nasty Little Dog Leg	II-	125.3	Closure	I+	134.2		
110.8	Reunion Drop #2	I+	125.5	Tree Hazard	II	135.0		I
111.0	Unnamed	I	126.5	Unnamed	I+	136.0		II
115.8		II	128.0			137.0	Honey Chute	II-
116.8	Redwall	I+	128.3	Mell of a Hess		138.5	Tangle Creek	II
117.1	Tree Row	II	129.3	Red Creek	II+	139.3	Sheep Chute	II+
118.5	Goat Chute	I	130.2	Wet as	II	139.7	Horse as Chute	II-

Notes:

[a] Williams (1996, pp.iii through 119) provided the river mile, name and class of rapids within Segments 1 through 4. He considered the river at 'low water' when the Camp Verde gage read 250 cubic feet per second (cfs) or less, and at 'high water' when this gage read from 500 to 1,000 cfs.

[b] River miles begin at Sullivan Lake Dam (0.0) and increase downstream.

[c] Williams describes and locates other rapids within Segments 3 and 4 but does not specify their class.

TABLE 5. RECONSTRUCTED VERDE RIVER STREAM FLOWS AND DEPTHS

USGS GAGE	ASLD STREAM SEGMENT	DRAINAGE AREA (square miles)[a]	PERIOD OF RECORD	DURATION OF DAILY MEAN FLOW (cfs)[b, c]				RECONSTRUCTED MEAN STREAM DEPTH (feet)[f]	
				Measured[d]		Reconstructed[e]			
				25%	50%	25%	50%	25%	50%
near Clarkdale	2	3,530	June 1915 to July 1921	92	84	101	93	1.6	1.6
at Camp Verde	2	4,220	January 1913 to March 1920	265	149	432	316	1.4	1.1
near Camp Verde	3	5,000	April 1934 to December 1940	243	184	419	360	2.0	1.9
below East Verde River	4	5,610	July 1934 to December 1940	404 [g]	257 [a,g]	587	440	2.2	1.8
below Bartlett Dam	5	6,180	February 1925 to February 1939	387	254	570	437	1.6	1.5

Notes:

[a] From USGS (1954, pp.685-693).

[b] cfs = cubic feet per second.

[c] 25% indicates that, over the period of record, daily mean flows at the gage equaled or exceeded the specified value during 25% of the time. Similarly, 50% indicates that the specified flow was equaled or exceeded 50% of the time. The latter is equivalent to the median daily flow over the period of record.

[d] Daily mean flow data from USGS (2014a).

[e] Calculated by adding the estimated stream depletions from **Table 6** to the measured flows listed here.

[f] Based on the reconstructed flow rates listed here and the rating curves presented in **Figures 8** through **10**.

[g] Daily mean flow data were unavailable for this gauge so monthly mean flow data were used instead.

TABLE 6. CULTURAL DEPLETION OF VERDE RIVER STREAMFLOWS ABOVE USGS GAGING STATIONS CIRCA 1914 TO 1940

GENERAL LOCATION[a]	TYPICAL SURFACE WATER DIVERSION RATE (cfs)[a, b]	ESTIMATED STREAMFLOW DEPLETION BELOW DITCH RETURN (cfs)[b, c]	ESTIMATED REDUCTION IN FLOW UPSTREAM OF USGS GAGING STATIONS (cfs)[b, d]				
			near Clarkdale	at Camp Verde	near Camp Verde	below East Verde River	below Bartlett Dam
Del Rio	4	2	2	2	2	2	2
Granite Creek	4	2	2	2	2	2	2
Upper Verde (above mouth of Sycamore Creek)	8	4	4	4	4	4	4
Verde (between Sycamore and Oak Creeks)	80	46	*below station*	46	46	46	46
Phelps Dodge at Clarkdale	9	9		9	9	9	9
Verde (between Oak and Clear Creeks)	95	54		67 [e]	54	54	54
Small creeks and springs tributary to Verde	5	3		3	3	3	3
Oak Creek (in Forest Reserve)	20	11		11	11	11	11
Lower Oak Creek	41	23		23	23	23	23
Beaver Creek	19	11		*below station*	11	11	11
Clear Creek	17	10			10	10	10
East Verde River	14	8			*below station*	*8*	8
		Total Upstream Depletion:	***9***	***167***	***176***	***183***	***183***

Notes:

[a] From Hancock (1914, p.32) and Hayden (1940, p.9); higher rate used if two values available for same location.

[b] cfs = cubic feet per second.

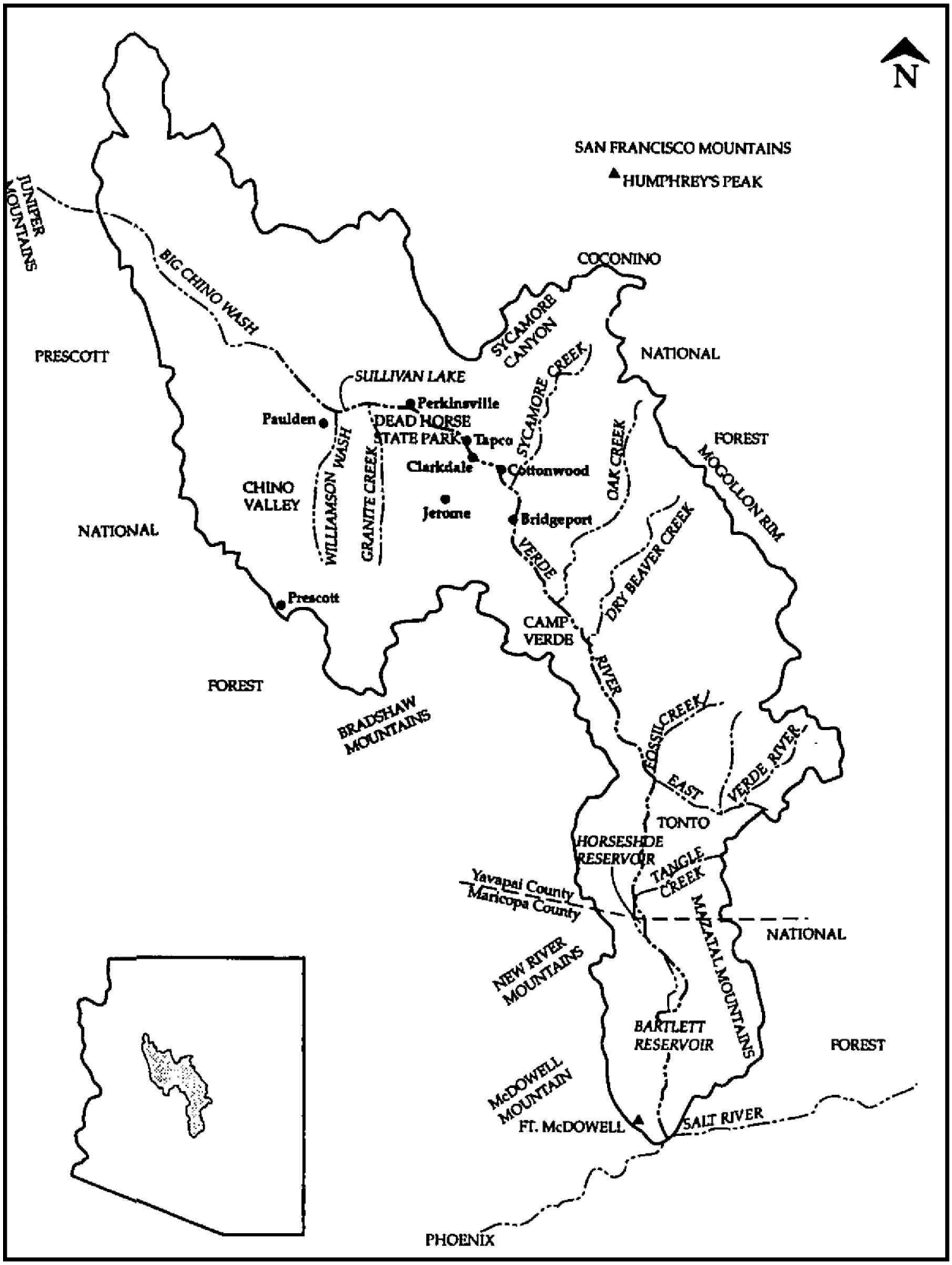
[c] See footnote d in **Table 2**; no portion of the surface water diverted by Phelps Dodge for mining was assumed to return to the river.

[d] Does not account for diversions that return to the river through subsurface seepage or natural evapotranspiration (ET) losses between the diversion and the gage site. As such, these values overestimate actual streamflow depletions.

[e] Adjusted to account for ditches within this reach where (i) the diversion and return are both below the gage (Diamond S); (ii) the diversion and return are both above the gage (OK); and, (iii) the diversion is above but the return is below the gage (Eureka and Woods).

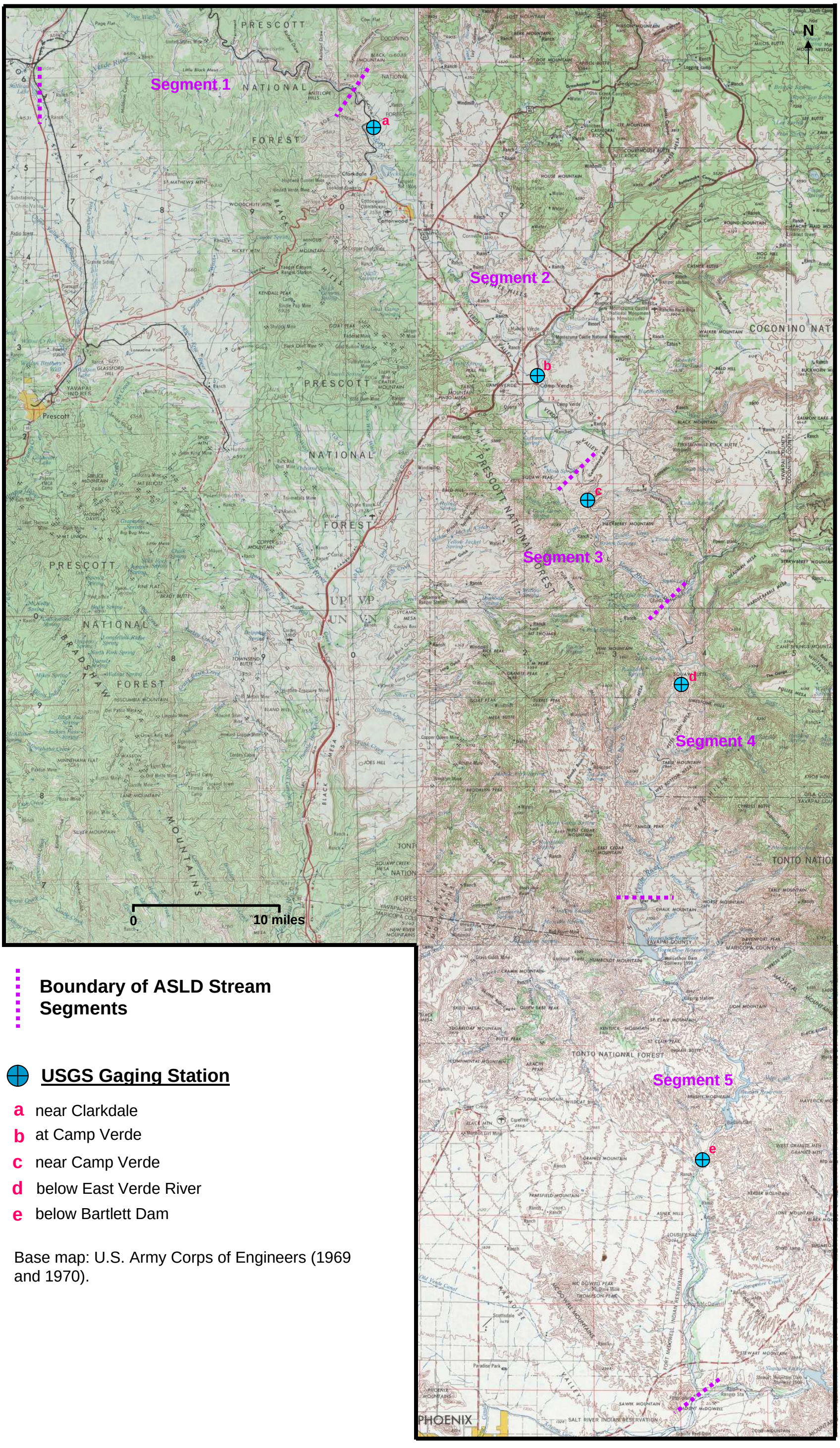
FIGURES

FIGURE 1. MAP OF THE VERDE RIVER WATERSHED



Source: Fuller (2003, p.7-1).

FIGURE 2. VERDE RIVER STREAM SEGMENTS AND USGS GAGING STATIONS



Boundary of ASLD Stream Segments

USGS Gaging Station

- **a** near Clarkdale
- **b** at Camp Verde
- **c** near Camp Verde
- **d** below East Verde River
- **e** below Bartlett Dam

Base map: U.S. Army Corps of Engineers (1969 and 1970).

FIGURE 3. WAGON ROADS CONNECTING MILITARY POSTS LOCATED ALONG AND NEAR THE VERDE RIVER CIRCA 1866

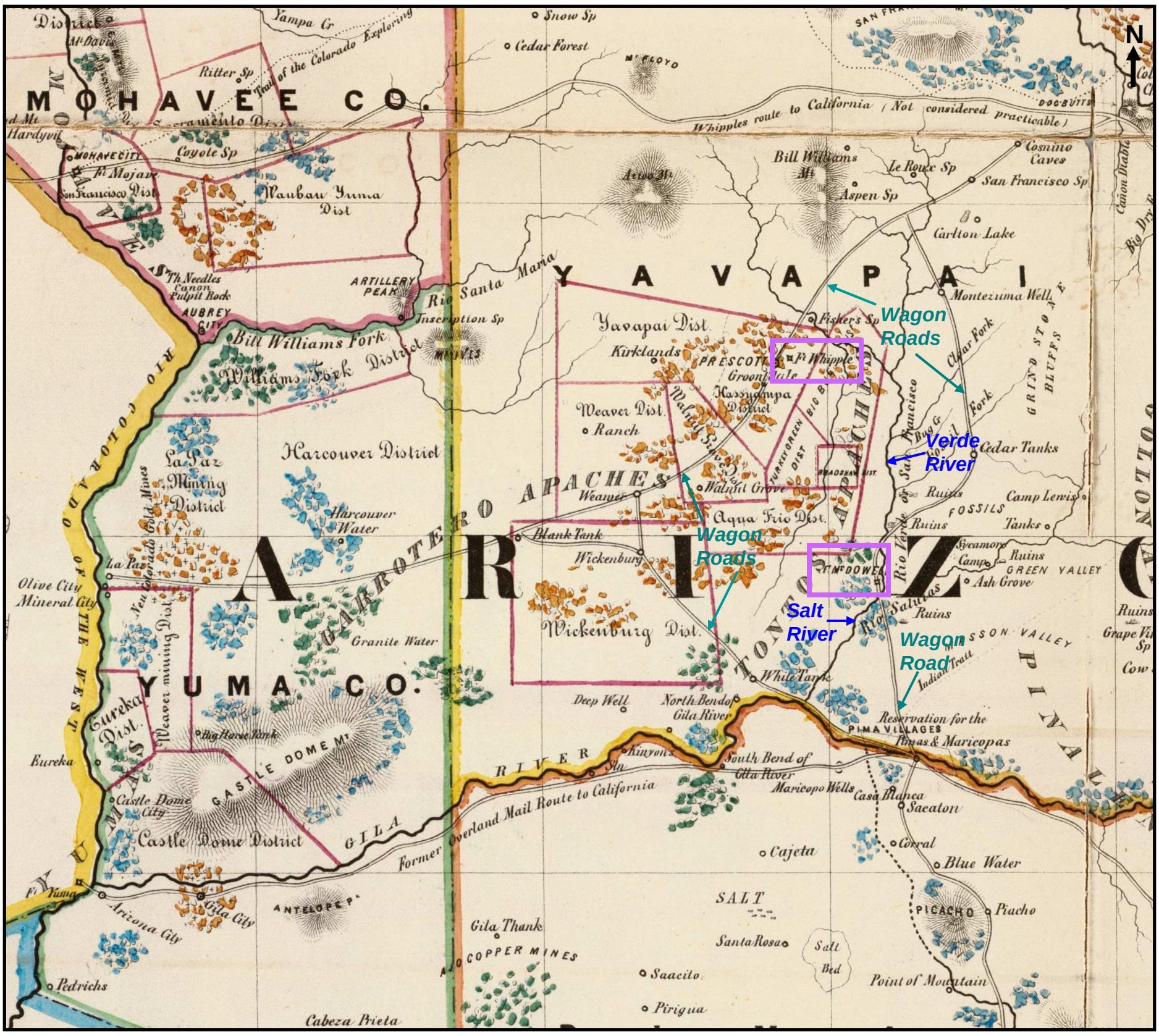


FIGURE 4. TRANSPORTATION ROUTES CONNECTING TOWNS AND MILITARY POSTS ALONG AND NEAR THE VERDE RIVER CIRCA 1876

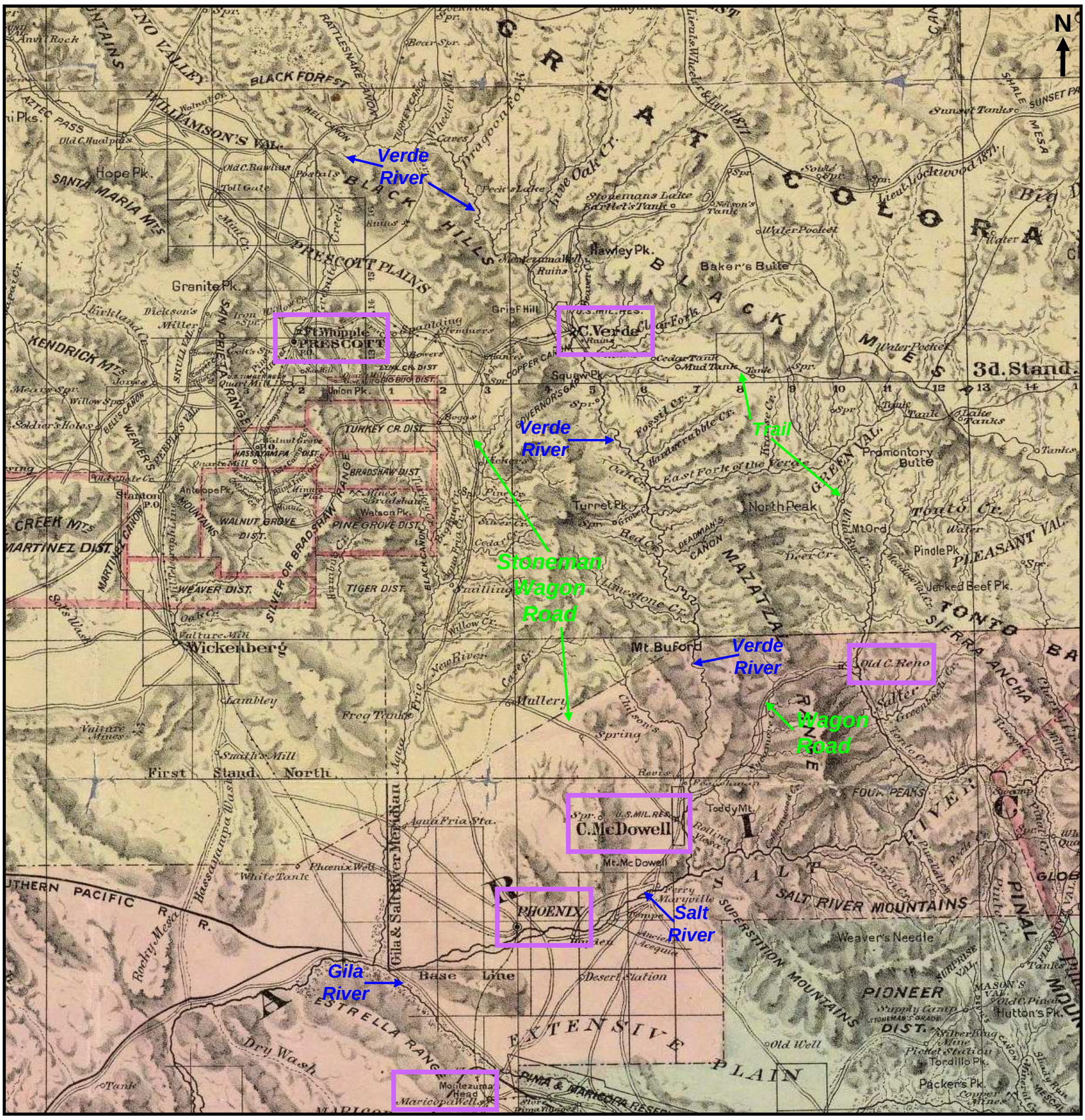
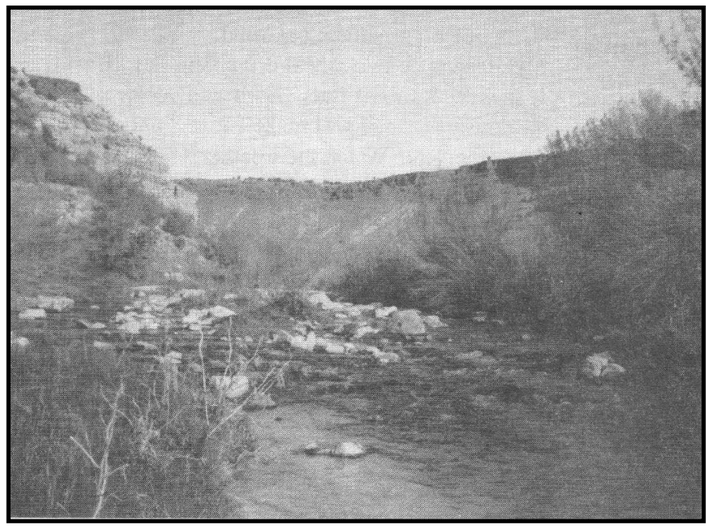
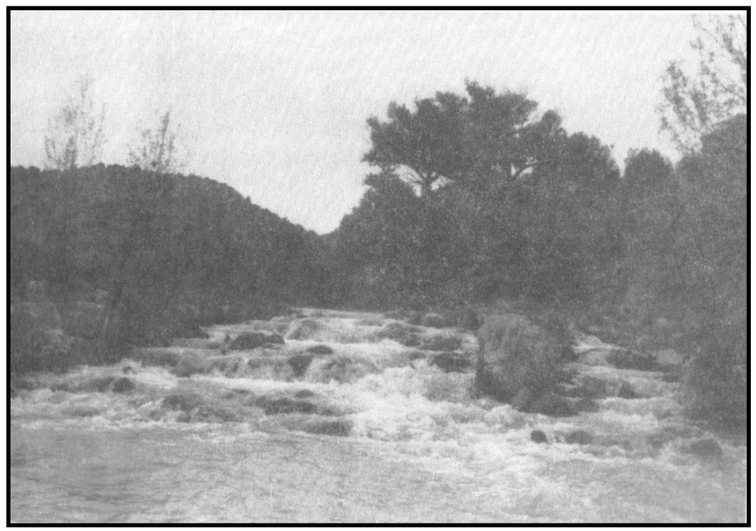


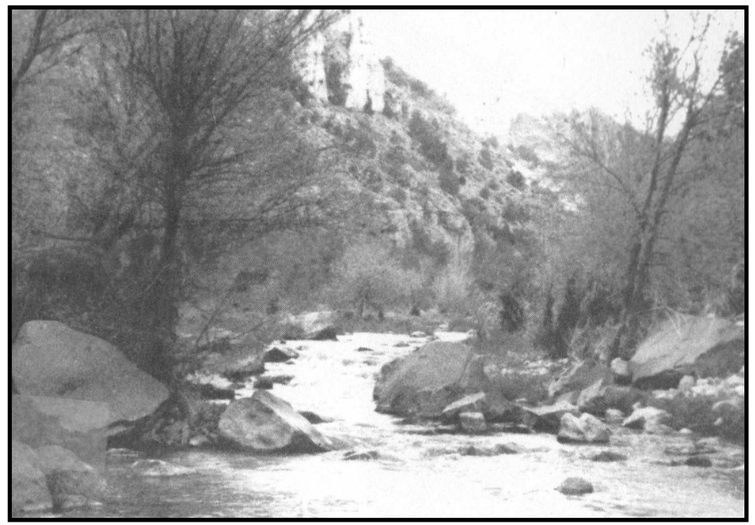
FIGURE 5. GROUND PHOTOGRAPHS OF VERDE RIVER RAPIDS ALONG STREAM SEGMENT 1



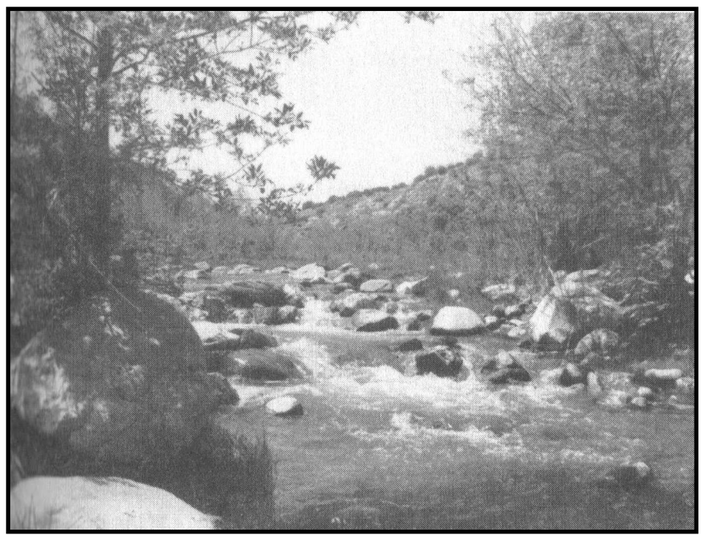
Unnamed Rapid (River Mile 3.3)



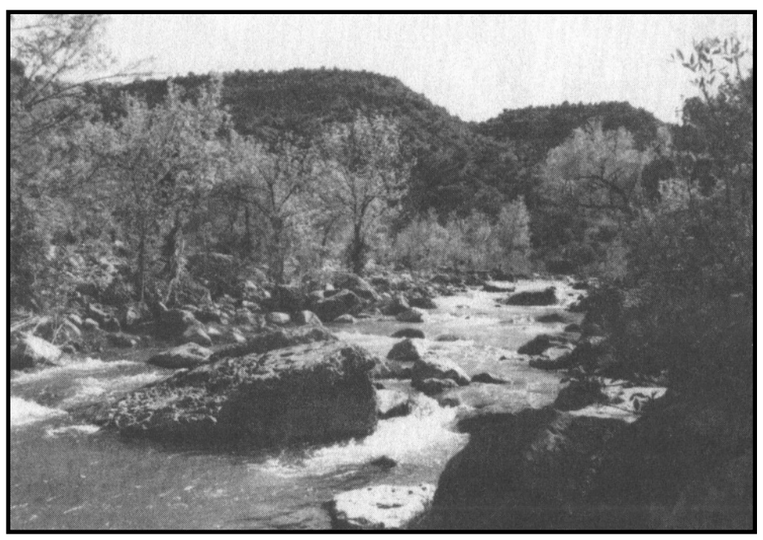
“Duff Drop” (River Mile 14.8)



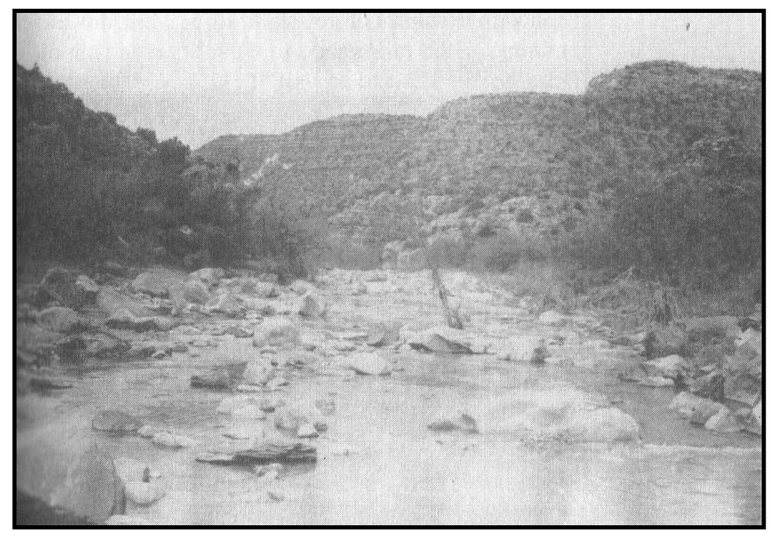
“Boulders Three” (River Mile 17.2)



“Guv Drop” (River Mile 23.5)



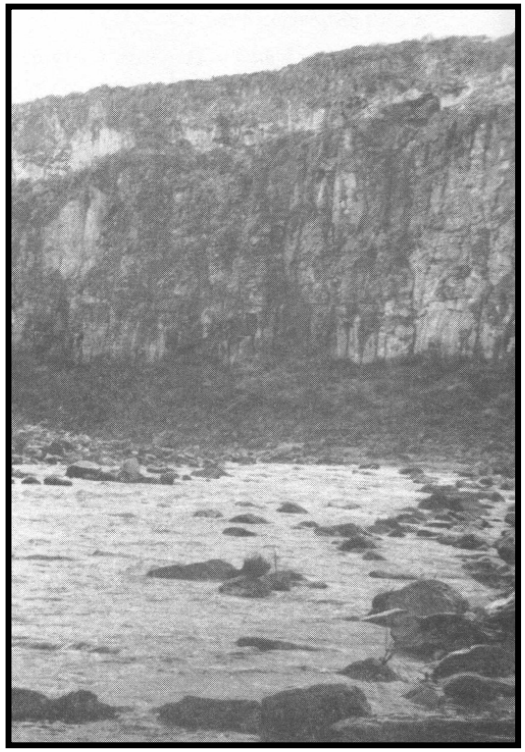
“Horseshoe Drop” (River Mile 29.7)



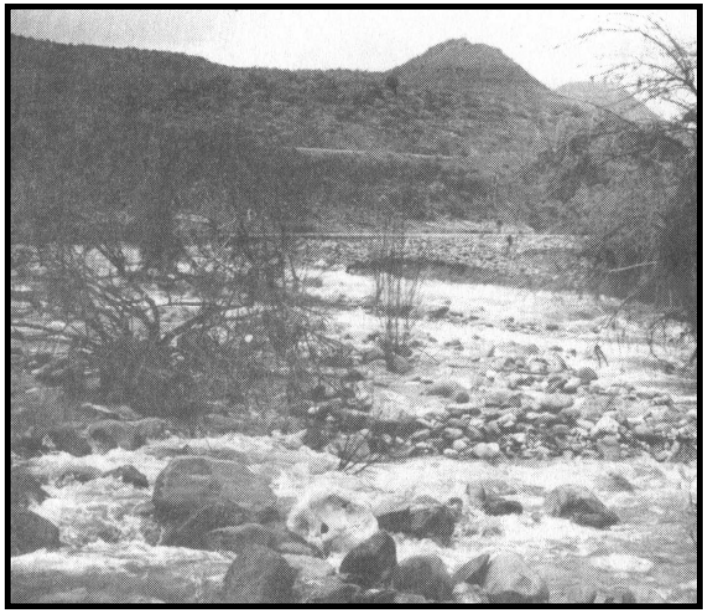
“Rafael’s Gauntlet” (River Mile 32.5)

Source: Williams (1996, pp.9-37).

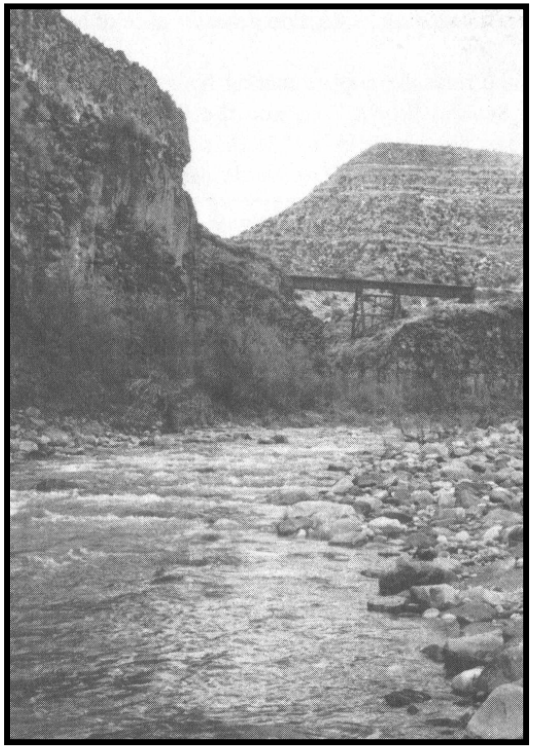
FIGURE 6. GROUND PHOTOGRAPHS OF VERDE RIVER RAPIDS ALONG THE UPPER REACH OF SEGMENT 2



“USGS Rapids” (River Mile 40.3)



“Little Swamper” (River Mile 40.3)



“SOB Drop” (River Mile 42.7)

Source: Williams (1996, pp.28 and 42-43).

FIGURE 7. ANNUAL VERDE RIVER STREAMFLOWS BELOW BARTLETT DAM RECONSTRUCTED FROM 1820 THROUGH 1960 USING TREE RINGS

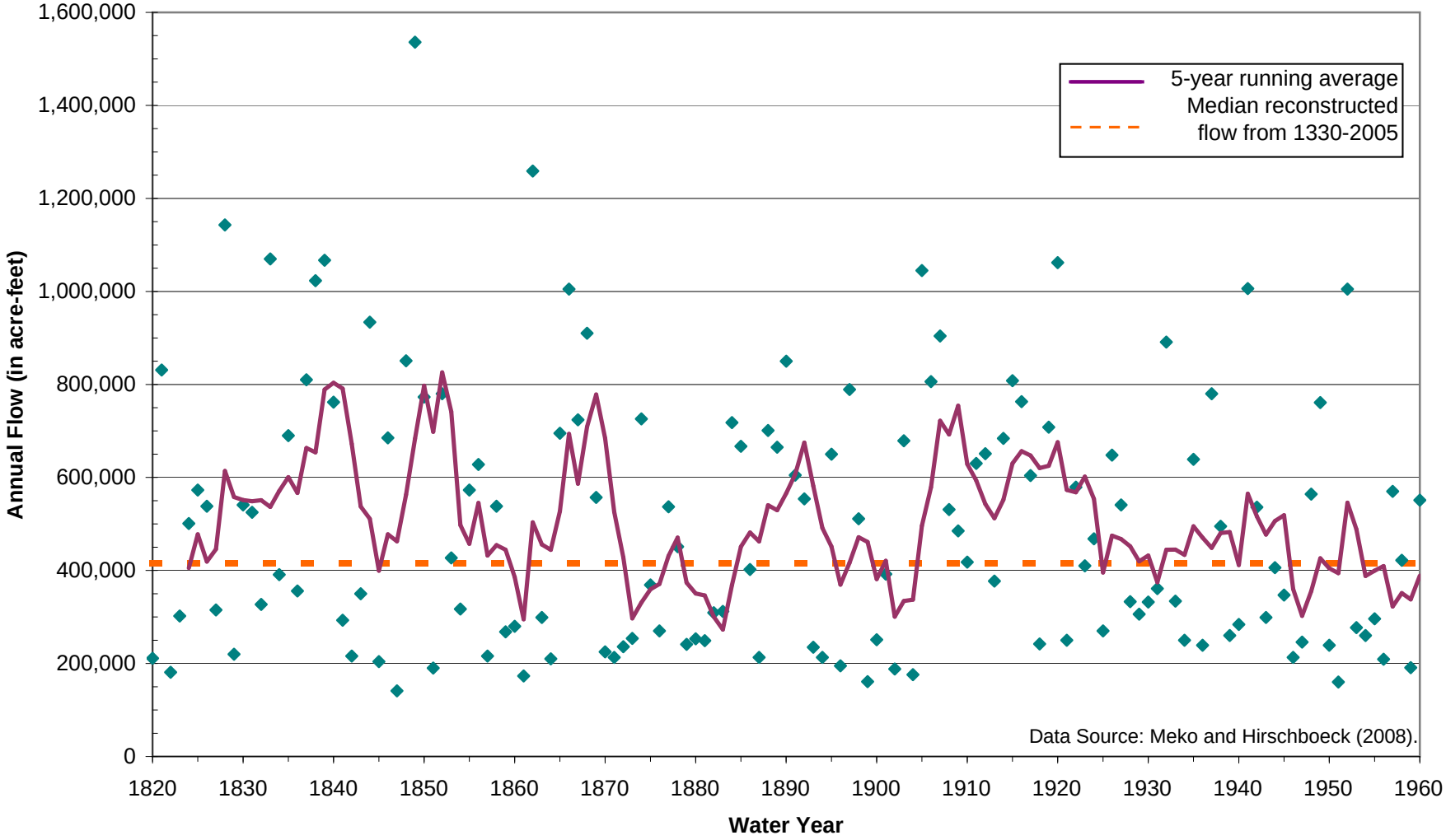


FIGURE 8. VERDE RIVER DEPTH VS. DISCHARGE AT USGS GAGING STATIONS NEAR CLARKDALE AND AT AND NEAR CAMP VERDE

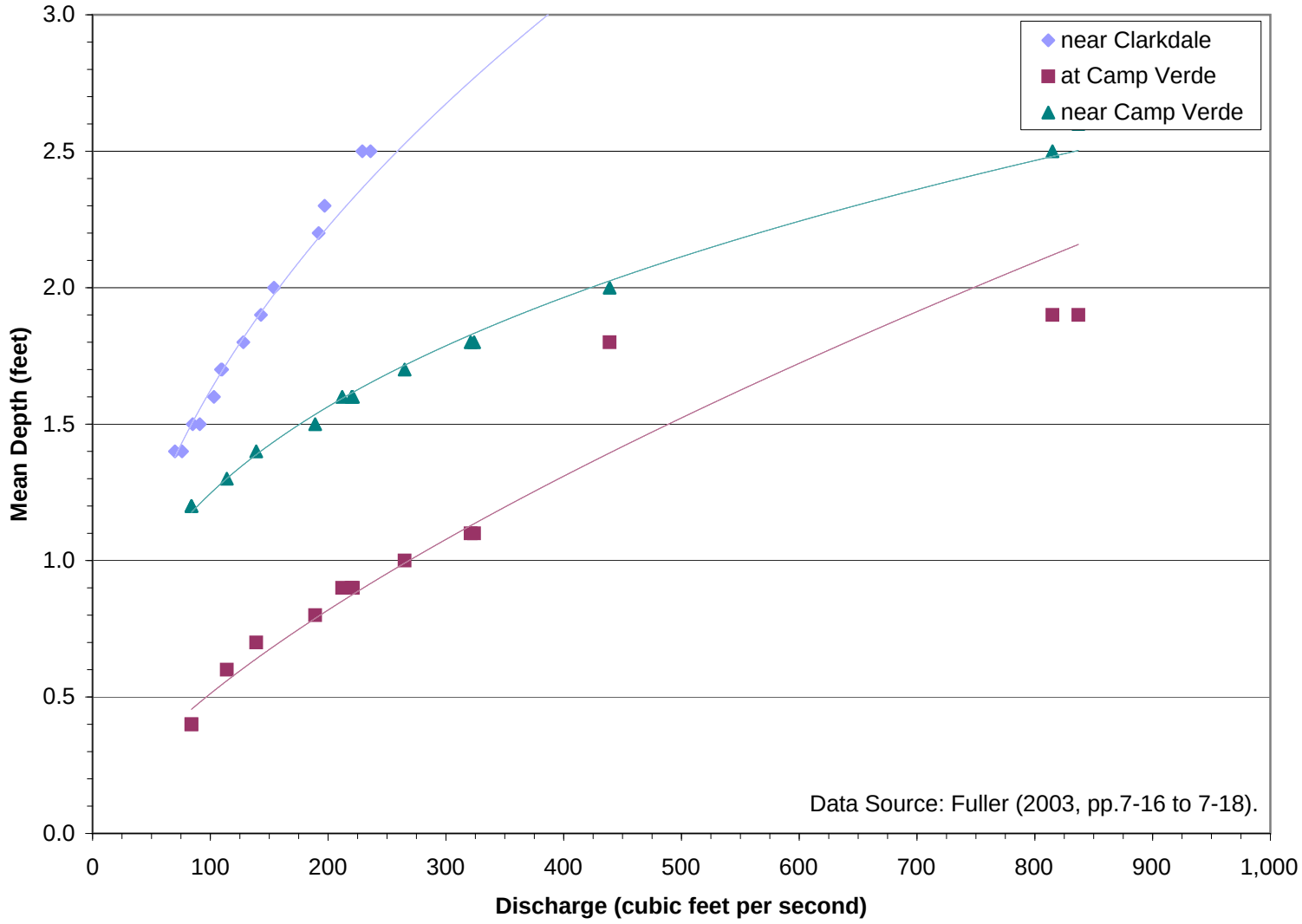


FIGURE 9. VERDE RIVER DEPTH VS. DISCHARGE AT USGS GAGING STATION BELOW EAST VERDE RIVER (1935-41)

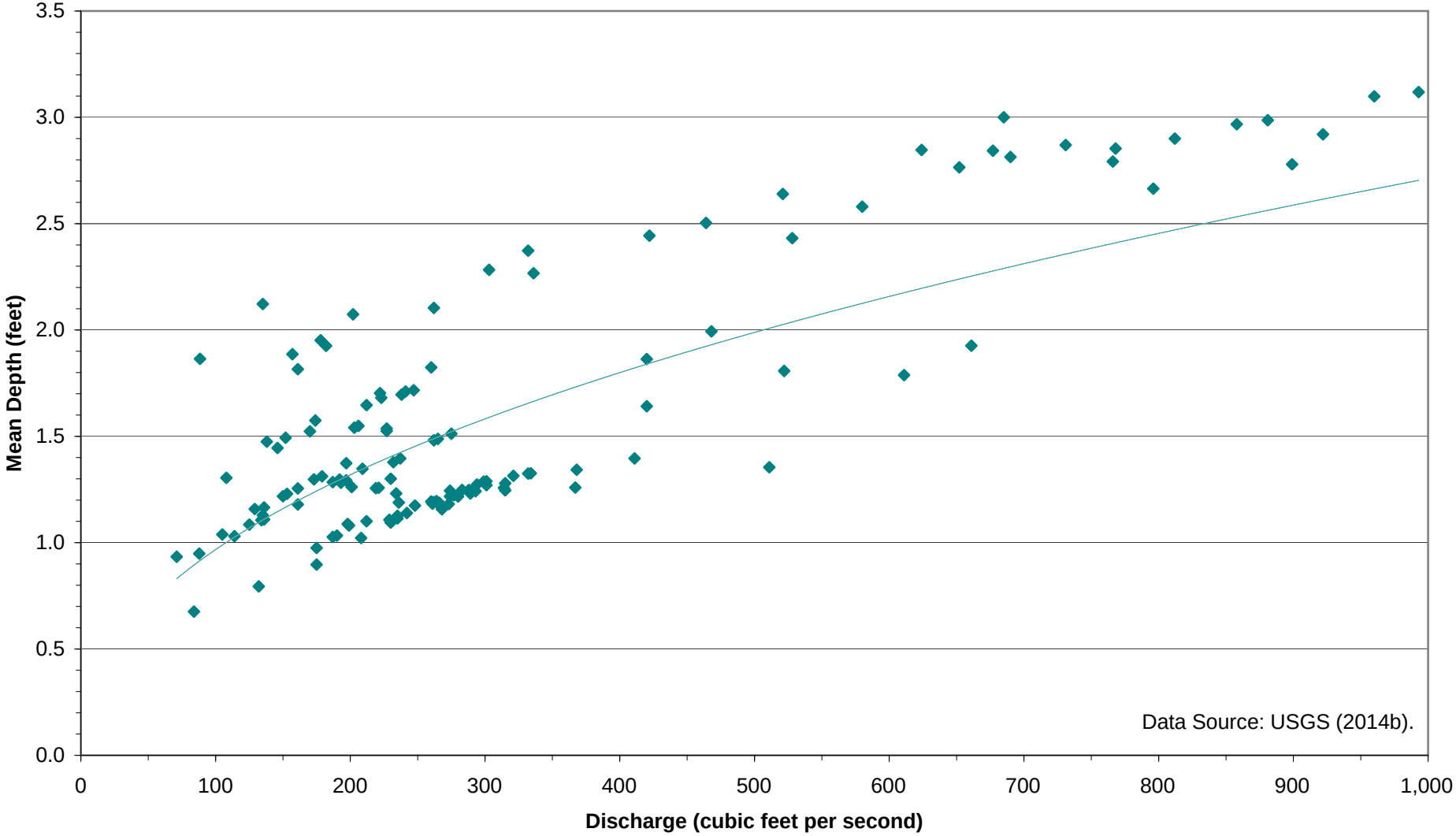
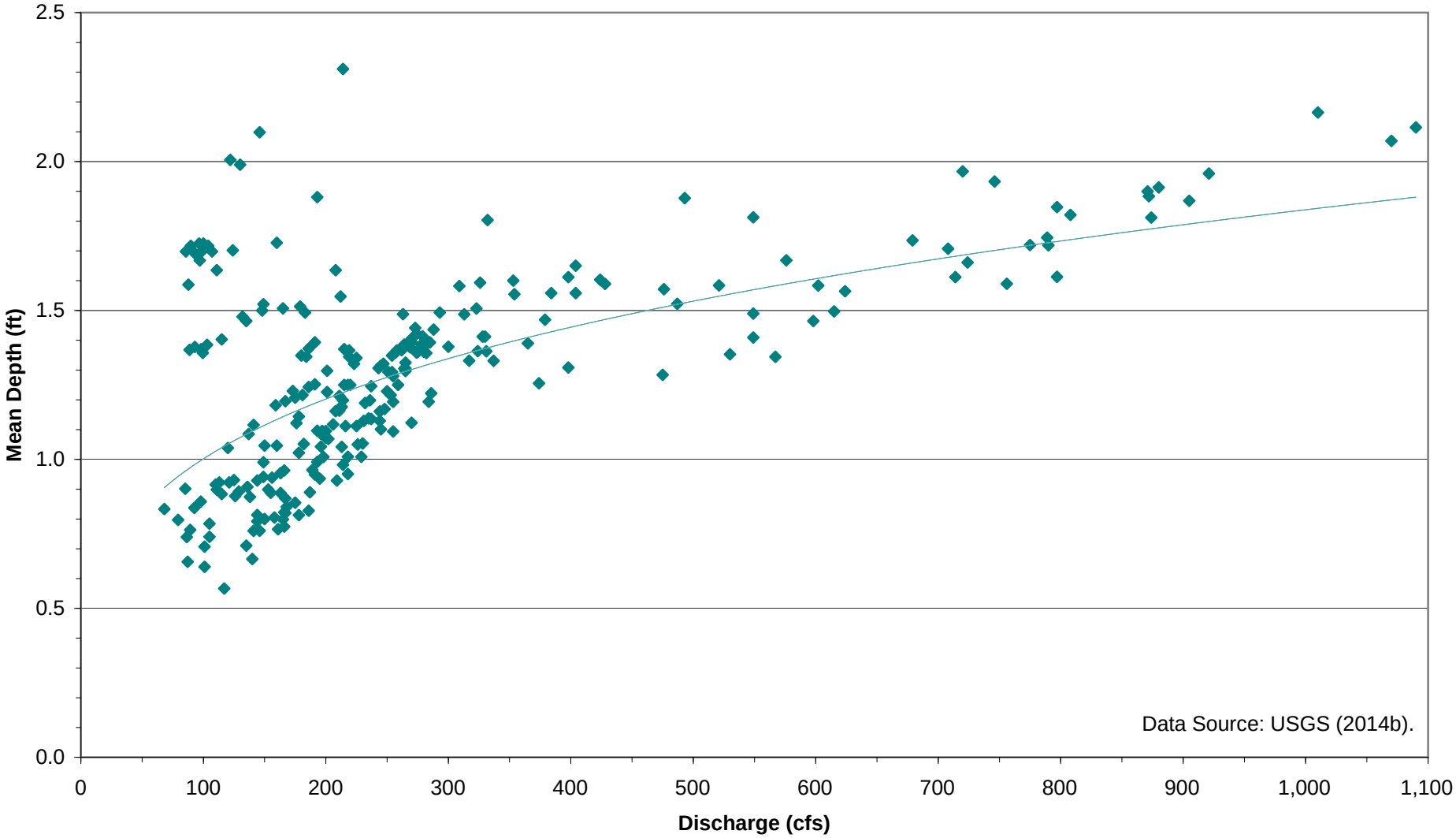


FIGURE 10. VERDE RIVER DEPTH VS. DISCHARGE AT USGS GAGING STATION BELOW BARTLETT DAM (1934-39)



ATTACHMENTS

ATTACHMENT A

Curriculum Vitae for Rich Burtell

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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 rights assessment, NM (Pueblo of Laguna)
- 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

Recent Description of Verde River Boating Conditions

A FLOATER'S GUIDE TO THE VERDE RIVER

by
Bob Williams

Published by The Graphic Center
of Prescott, Arizona
1996

Distributed by Williams' Whims
2810 Willow Oak Road
Prescott, Arizona 86301

SULLIVAN LAKE DAM (M.0) TO GRANITE CREEK (M.1.8)

- **Total River Miles - 1.8**
- **Elevation Drop - 4,360 to 4,240**
- **Average Drop - 66 feet per mile**
- **Class - not applicable**
- **Topo Map - Chino Valley North**
- **Shuttle Time - not applicable**
  Days needed - not applicable

~Origin Canyon - Mile 0~

RIVER ACCESS POINTS ~RAPS~

Old Highway 89 (mile 0) - Drive four miles north of Chino Valley on Highway 89 until you see the "Old Highway 89" sign on your right. Take Old 89 for two miles until you reach the bridge and adjacent railway trestle. You are at the Verde River's origin.

Granite Creek (mile 1.8) - Strictly private roads and private access.

GENERAL DESCRIPTIONS, HIGHLIGHTS AND CAUTIONS

The Verde River origin is Sullivan Lake, but the technical headwaters lie upon the slopes of 7,400-foot Mount Floyd just northeast of Seligman, some 60 miles north. From there, multitudes of washes gather on a southerly course to their settlement in the Big Chino area. The Big Sandy Wash, as it is called just

~Mile 0 -- The Floods of '93~

west of Seligman, is a major wash that is crossed by thousands of motorists daily. Curiously, the Big Sandy is actually the beginning of the Big Chino! Somewhere between Interstate 40 and the advent of the Juniper Mountains, it changes its name.

Only during rapid snowmelt or intense rains, such as early 1993, will the waters of the Big Chino reach Sullivan Lake as surface flow. Instead, most of the drainage from the vast headwaters region seeps through the porous soil and sandy beds into the Big Chino aquifer.

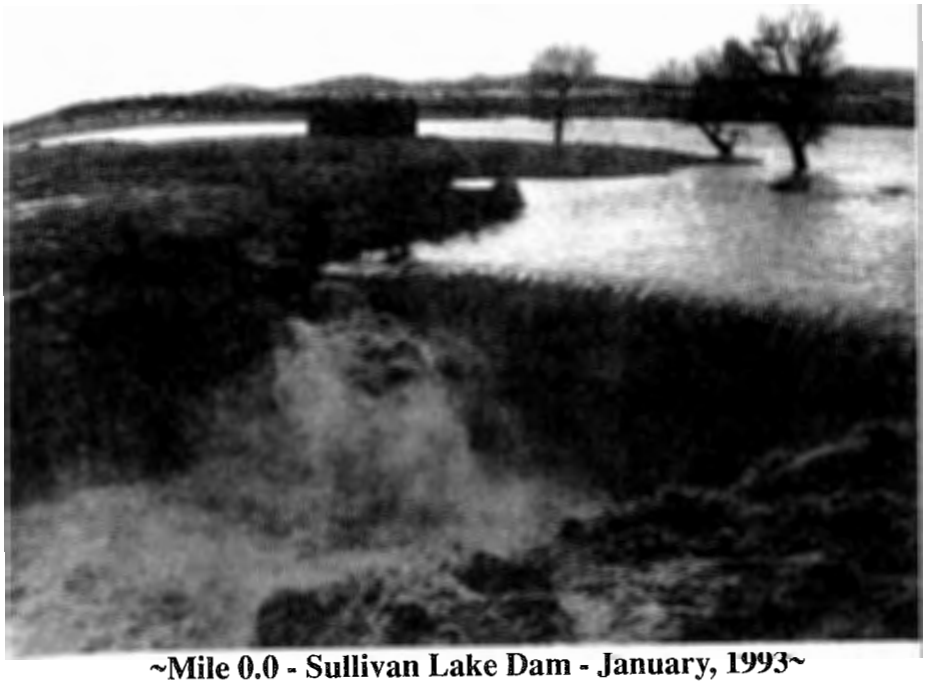
~Mile 0.1 - Normal~

The Big Chino is one of the major aquifers of the entire Southwest. It is so enormous, reliable, valuable and of such vital importance to the perennial flow of the Verde that it is a battleground as well as a water farm. Chino Valley, Prescott, other small towns, downstream users, developers (a lot is happening in these parts!), preservationists, ranchers, landowners, State and Federal agencies and interests, and you name it are all in the frays over this subterranean resource. Water battles are not new in the arid Southwest, so this region of such far-reaching importance will likely continue to persevere its share.

Sullivan Lake Dam was built in 1938 by the WPA. The City of Prescott had the idea of making the origins area into a recreation lake and park. However, the WPA funds dried up before the entire project was completed, so that only man-made historical testaments to effort and natural features remain, awaiting the tests of time.

~Mile 0.1 - Extraordinary~

The largest of the stone buildings was to have been the clubhouse and the smaller ones – duck blinds! Sullivan "Lake" itself, named for the early day ranch owner, Jerry Sullivan, has been rendered practically useless because it is silted to the hilt behind the tough old WPA Dam. Vestiges of the gorge above the dam are barely evident.



~Mile 0.0 - Sullivan Lake Dam - January, 1993~

The Sullivan area is a provocative place to ponder and explore, and it is an especially ideal small-scale region of study for anyone interested in the effects of dams on river and stream morphology.

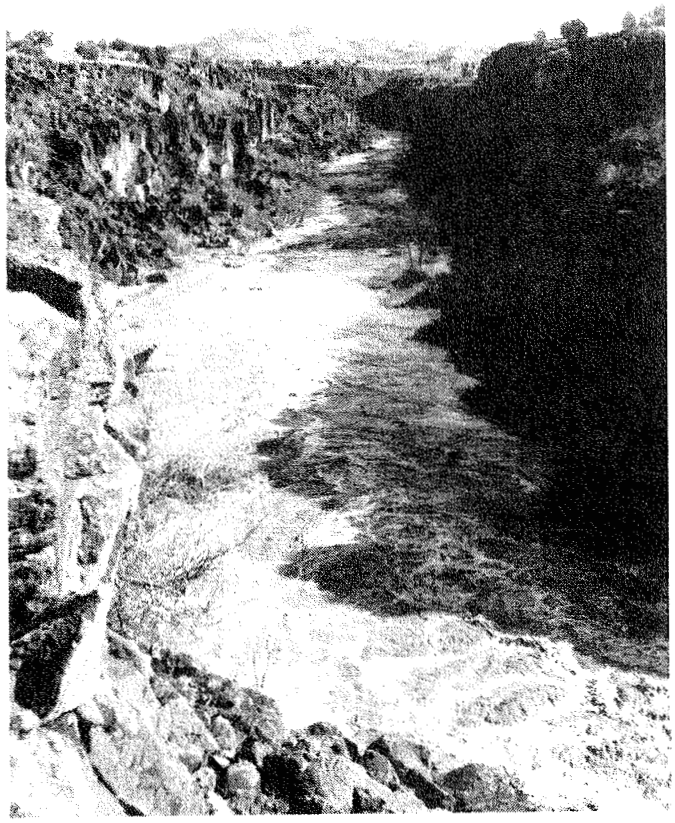
Below Sullivan Lake dam, the Verde immediately begins retaking its shape and characteristics of origin. Small pools can be found even in the driest of times throughout this mile-long slot of jumbled basalt. The perennial trickle won't begin, however, until below the Springs at mile 1.0.

The Springs that mark the beginning of the perennial flow of the Verde at Mile 1.0 are of the same network as the historic Del Rio Springs about three miles due south. Del Rio Springs (meaning "of the river springs") was the site of one of the lesser known chapters of Arizona history.

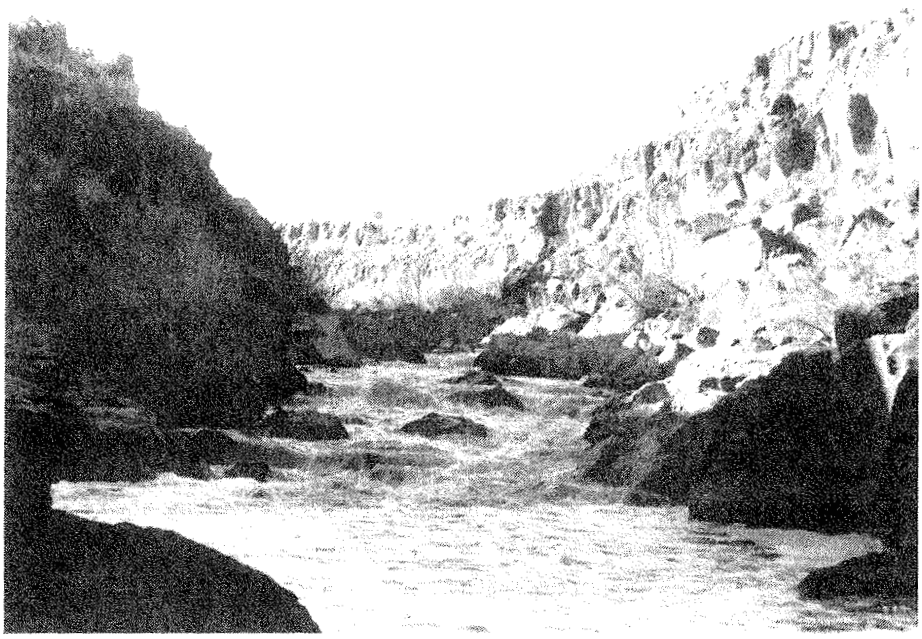
Books commonly state, and many fellow Prescottonians loyally uphold the notion, that in 1864 Prescott became the first territorial capital of Arizona. Well, Prescott was the first "permanent" capital, but an interesting twist of events in the later months of 1863 actually made Del Rio Springs the original (albeit temporary) location of the government of the Territory of Arizona.

On December 20, 1863, Governor Goodwin's advance military scouts thought they had arrived in Prescott because that pinnacle four miles northeast of Del Rio Springs so closely resembled the Thumb Butte described to them by earlier parties. The similarities of the two "Thumb Buttes" are remarkable, and considering the distance the group had traveled, it is not hard to imagine their elation overcoming good judgement at finally reaching journey's end.

In a matter of time, the advance party realized they had undershot Prescott by about twenty miles; but they settled in nevertheless, established the original Fort Whipple and awaited Governor Goodwin's arrival. Our first Governor to serve arrived at Del Rio Springs on January 22, 1864,



~Mile 0.4 - Looking down river towards "the butte"~



~Mile 0.4~

and from there oversaw the origins of Arizona government until moving his entourage south in May, 1864, to the shores of Granite Creek, the shadow of the true Thumb Butte and the permanence of Prescott . . . . Quite a twist. And the rest, as they say, is history!

The tale of the origins of territorial governance is but an appetizer on the rich historical menu "Of The River Springs" region. From the beginnings of the settlements by the ancient native peoples to the illustrious days of such missionaries as Father Kino (who some say fathered the name "Chino") to the heyday ranching era to the rise of modern development and accompanying water needs, the abundance of Del Rio and the entire origin's area has sprung forth countless prominent people, profound events and perennial history.

The gorge below Sullivan Lake dam is a unique, intimate and fascinating place. I refer to it as origin gorge, but other names I've heard are Sullivan Canyon, Morgan Ranch Canyon and Inscription Canyon (petroglyphs are here). It is a relatively little-known favorite of local climbers, scramblers, hikers, birders and general explorers. Because of the brush and boulders, a hike to mile 1.0 and back will take at least two hours.

As of this writing, these activities in the gorge are tolerated by the landowners. What is <u>not</u> tolerated is any unauthorized motorized entry, off-road use, hunting, fishing or any irresponsible presence. The ranchlands surrounding the origins are well posted. You must seek permission for any restricted activity.

I know the frustration of having access limited to natural lands because of private ownership. It is, however, a fact of life. Setting oneself up as an adversary to landowners proves little up here where ranching traditions run far deeper than the Verde itself. I hope that the intrusive behaviors of the relative few don't completely exhaust the goodwill of the ranch owners, or we all may be out of luck.

Until January 11, 1991, the thousands upon thousands of acres surrounding the gorge were owned by Mrs. Learah Cooper Morgan. On that date, Yavapai County lost one of its true and beloved pioneers when Mrs. Morgan died at her ranch at the age of 83.

~Mile 0.4~

~Mile 0.2~

It is now left to the private business of Mrs. Morgan's numerous relatives to determine the future of the origin lands and the expansive Morgan Ranch property.

After mile 1.0 and the Origin Springs, the terrain of the canyon begins to widen around the beautiful Morgan Ranch Pool. This pool extends from Mile 1.3 clear to the low water ford where Granite Creek enters at mile 1.8. If you were so allowed and so inclined, you could paddle up to the far end of this pool and declare yourself upon the very first place that the Verde is floatable all year round! For us boaters and lovers of the Verde, Mile 1.3 is a truly significant and symbolic spot.

Until January, 1993, it was inconceivable to me that the Verde's origin canyon could ever be floated at any time in any way above mile 1.3 – inconceivable . . . period . . . ! Well, that notion dramatically changed when Mother Nature unleashed an historic period of prolonged and relentless storms upon all of Arizona that resulted in what many called the real arrival of the 100-year floods.

I have never witnessed a more incredible sight in all my times on or near the Verde than the origin gorge during the peak of these floods in early 1993. The peaceful and normally parched place that I had visited scores of times had been transformed – by five to six vertical feet of runoff topping the dam – into a roaring, foaming and silt-suspended grinding torrent. The "Sight at Sullivan" rendered me so slack-jawed and wide-eyed that I snapped off two rolls of film in no time at all for fear that waking from my dream would return me home with no earthly records of the scene. Absolutely and indescribably unbelievable!

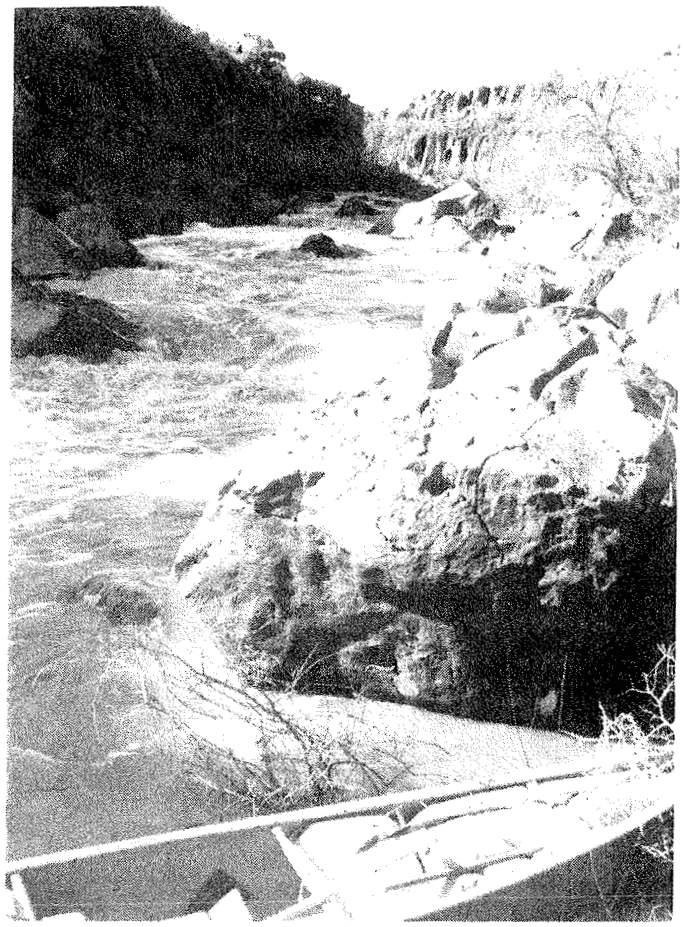
I spent a lot of time at the sight at Sullivan during that memorable week. I'd walk the lip of the gorge down to the overlooks of the Granite Creek confluence (another sight to behold) and all the while wonder, scout and ponder the possibilities of canoeing this rare treat. Would there ever again in this lifetime be this much water flowing through here?

Huge boils; meat grinder holes; angular and sharp boulders unshaven by such waters; squirrelly, confused and horrific currents; trees; nearly impossible scouting and portaging footing; difficult rescue and the 100-feet-per-one-mile drop all made this maelstrom very hazardous territory.

It wasn't until the runoff quieted to approximately two feet over the dam that I decided to give the gorge a go. The attempt would prove to be my shortest, most laborious, yet most memorable Verde adventure.

I put in on the South side of the gorge at the pipeline crossing at mile 0.1. Getting my gear down this steep break in the basalt formation was just the first of the several ordeals of this undertaking. Immediately after putting in, I hit the first small drop and settled down and into a comforting level stretch that allowed me some moments to drift and relish the scenery from this surreal perspective. It seemed that both the floater and the water did not know how to behave in these newfound, curious and bewildering surroundings!

I pulled over above the first lengthy drop, tied up and set about scouting. This was the second ordeal. Big boulders, slick ice and moss, flood debris and thick brush made for tough footing. The drop itself was very narrow and would require many manuevers to



~Mile 0.3~

~Mile 0.3~

avoid stopper obstacles, but since a line was impossible and a portage torturous, I decided to let her rip! I lapped some water and collided with several rocks, but otherwise managed adequately during the serpentine course of this drop at mile 0.3.

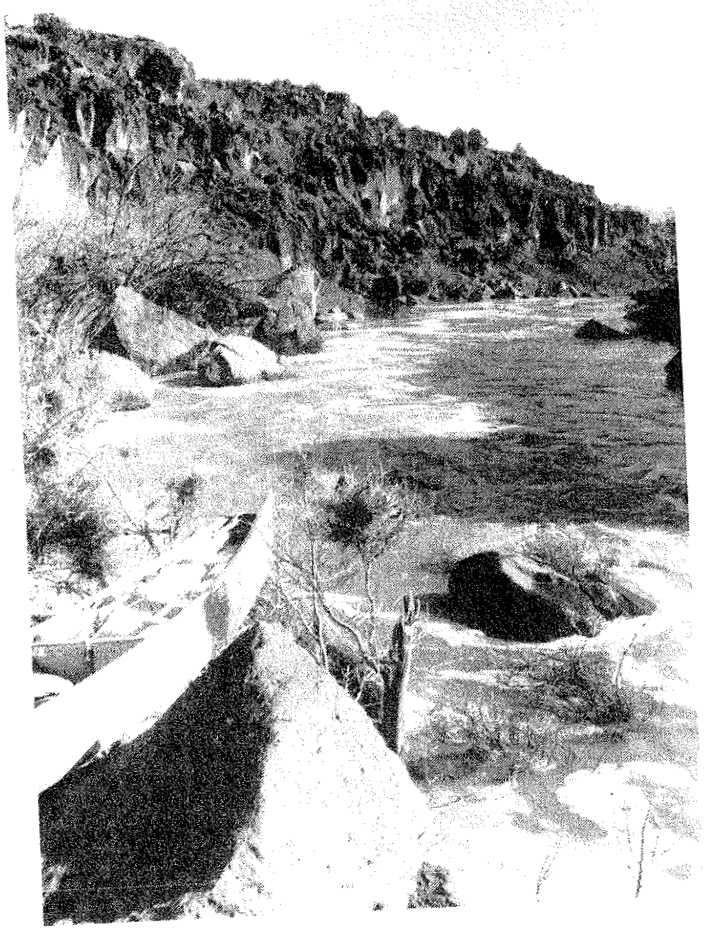
The next drop at mile 0.4 presented a similar but more difficult array of problems. It was steeper, more choked, and would require perfect sideslips and swerves to stay with the only clear course. The real possibility of broaching on a rock put a lump in my throat. After a long and painstaking scout (including peeling backwards off a boulder five feet down to a, fortunately cushioned, debris pile), I reluctantly took the plunge. All went well during the first stage on the right, but just as I set up to work the canoe hard left, I caught a small, sharp submerged rock and over I went! Lady Luck was with me on this one because I did not take a long swim before I was able to get myself and my canoe secured. Had I capsized on the upstream instead of the downstream side, it is likely that the boat would have become pinned. Also, from where I was perched, it was relatively easy to get to the right shore. There was no way and no room to get far left and shoot the rest of this drop, so I was left with a rough portage on the right – which is what I should have done in the first place! The "portage" was only about 50 yards, but it lasted over half an hour and took quite a toll on my gear and me.

There was a beautiful, long and slow pool below this "ordeal drop." Upon that pool, I decided that unless the origins became more hospitable, I'd have to make an early exit.

It didn't – so I did!

I said "uncle" on the north shore of the gorge just up from the prominent side canyon at mile 0.6. There is a steep but negotiable break in the canyon wall that presented me with the last of the labors of this origin's ordeal: less than half a mile of "river" run in over three hours time! Yep, the origins was a thrill, but also an awful lot like work!

The floods of early 1993 provided the rare opportunity for this origin attempt that satisfied my ill-guided urge for completion of the entire river. Well, the urge is gone and renewed respect and reverence have taken its place; so even if such torrential times come again, I doubt I'll "give 'er a go" a second time. It was a humbling (and bumbling) experience that I'll always remember, but one I'd not wish or invite upon others. The origins remains one of my favorite places in Arizona, so I'll be back from time to time – only with my feet planted firmly on the ground. For me, I've learned: some places are just better left that way!



Humble Origins?
No, Humbled by the Origins!

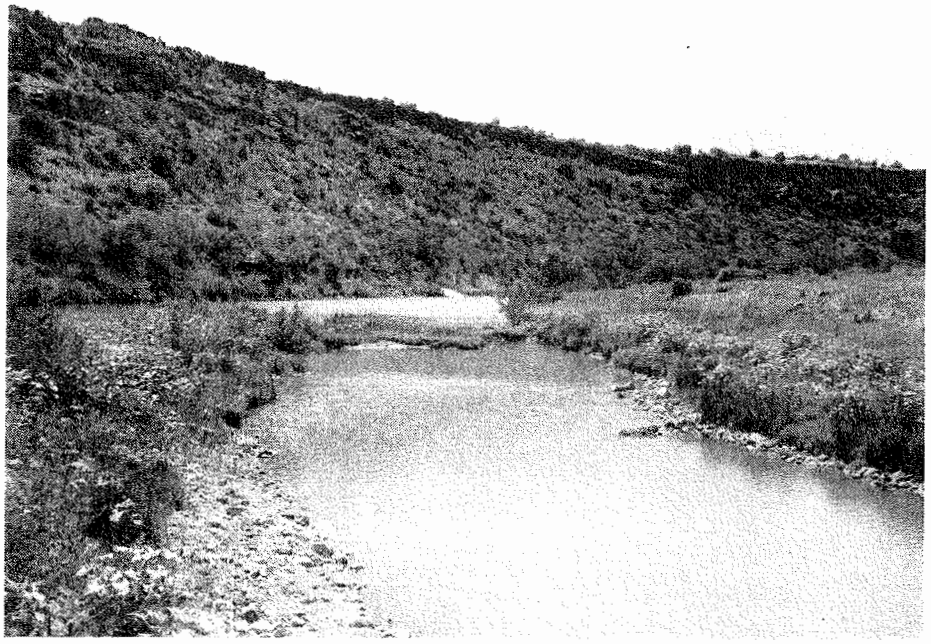
RIVER MILE LOG

Not applicable.

~Early 1993 -- Mile 0.0 - Sunset spectacle at Sullivan Lake! ~

GRANITE CREEK (M 1.8) TO FOREST ROAD 638 (M 7.1)

- **Total River Miles - 5.3**
- **Elevation Drop - 4,240 to 4180**
- **Average Drop - 11 feet per mile**
- **Class - Class I (see the Cautions section)**
- **Topo Maps - Chino Valley North, Paulden, Hell Point and King Canyon**
- **Shuttle Time - 2 to 4 hours, or more!**
- **Days Needed - Half day or more**



~Mile 1.8~
Looking upriver from the Granite Creek Confluence.

RIVER ACCESS POINTS ~RAPS~

Granite Creek Confluence (M. 1.8)

This is the uppermost point where the Verde is accessible by motorized vehicles. Do not enter here without written permission from the Morgan Ranch owners! There are gates and fences and the land is well posted. As emphasized earlier, private landowners around here are growing more irritable and less tolerant of intruders — especially those relative few who partake in damaging and upsetting activities. Careless and thoughtless off-roaders who parade with a six-pack and a sidearm on these lands may be reserving the right to get arrested.

Forest Road 638 - "Pipeline Road" (M. 7.1)

Forest Road 638 reaches the Verde from both the north and south. The south is the easiest. Find the Perkinsville Road turnoff from Highway 89 on the north end of Chino Valley. Take it for 4.2 miles until you see the FR 638 turnoff on your left. It is the first turnoff after you cross Granite Creek. From the Perkinsville Road, it is 11 miles to the Verde. Turnoffs and directions may not be well marked along FR 638, so it is advisable to have your forest and topo maps with you. Although the pipeline, as locals call it, is not a passenger car road, it can be driven by high-clearance two-wheel drive vehicles. However, if it is wet, the mud flats, steep and rocky grades and sand near the river will make FR 638 only passable by four-wheelers. Watch the weather!

The northern route of FR 638 is four-wheel only and passes through more private land, so although it may appear the shorter way on the maps, it is definitely not recommended for shuttles to or from your RAP at Mile 7.1.

Old Morgan Ranch (M. 4.0)

Private and locked to all public access.

GENERAL DESCRIPTIONS, HIGHLIGHTS AND CAUTIONS

Very few floaters visit this stretch, but I include a discussion of it anyway because it is, simply, a beginning part of the whole.

Unless you have permission, or ownership and restriction conditions change in the future, you should consider the FR 638 RAP at mile 7.1 as the uppermost spot to begin any Verde adventures.

This five miles is shallow and narrow most of the year. You'll use your paddle more as a pole as you plod down this tiny and fragile creek of a river. Expect wear and tear during the countless drag-throughs. You'll be sorely disappointed if you came down here expecting a leisurely paddle-dipping cruise.

On the other hand, if this river is running high in the spring or if it is in flash flood, it can be critically dangerous for boaters. The same lush and beautiful riverside greenery that embraces you during normal flow trips will turn into the severest of strainers.

Help is a good distance away, so be careful whatever the flow!

~Mile 7.1 - FR 638 "Pipeline" RAP~

I float down here now and then for the primary reason that this is the first free flowing stretch of the mighty Verde. Of course, more flow, more thrills and more diverse scenery can be found farther downstream, but sometimes there is nothing like going back to the source to help put our fascinating resource back in perspective for me.

RIVER MILE LOG

Mile 1.8 - Granite Creek, the first of the Verde's major tributaries, enters on the right. This creek, so well known to Prescottonians, originates from the Sierra Prieta Mountains southwest of Prescott. It winds its way through town until it settles into Watson Lake Reservoir about four miles north of Prescott. The dam there was constructed for irrigation and water storage, but does provide some modest recreation as well.

Because of the dam and diversions, very little water makes its way to the union with the Verde except during wet times. There are some surprisingly beautiful regions along Granite Creek during its twenty or so mile meander to this private point at M. 1.8.

~Mile 3.3~

PIPELINE/FR 638 (M.7.1) TO PERKINSVILLE (M. 25.1)

~ "Guv Drop" - Mile 23.5~

- **Total River Miles - 18.0**
- **Elevation Drop - 4,180 to 3,810**
- **Average Drop - 20 feet per mile**
- **Class - Low water boating class I and II (refer to the Cautions section)**
- **Topo Map - Paulden, Chino Valley North, Hell Point, King Canyon, Perkinsville and Munds Draw**
- **Shuttle Time - Three to four hours**
- **Days Needed - Two is really pressing. Plan 3 days or more.**

RIVER ACCESS POINTS ~RAPS~

Pipeline/FR 638 (M.7.1) - Please refer to the previous chapter.

FR 635/Verde Ranch Area (M. 10.4) - Strictly private and you'll encounter locked gates on both the southern and northern routes to the river. Consider the Verde Ranch off limits for RAPS except in emergencies or if you have special privileges granted by the landowners. Intrusions are common down here, pinpointing this as yet another place that we infrequent river guests must adhere to the highest degree of river floating ettiquette.

Tri-Canyon and Hell Point (M. 18.0) - Free access is to the canyon rims only. Disregard these as floater RAPS. Bear is very close anyway.

FR 492A/Bear Siding/U.S. Mines (M. 20.5) - This is a good RAP. Although riverside vehicle access has been restricted for the reasons cited earlier, you'll only have a short carry to the river. Bear to Perkinsville makes for a lovely day run with an easy shuttle. Give it a try to see if low water floating strikes your fancy.

Bear is reached off the Drake/Perkinsville FR 492. Signs mark it well, and it is usually passable with good clearance two-wheel vehicles.

Perkinsville Road Bridge (M. 25.1) - This major RAP can be reached four different ways. All are two-wheel accessible under normal conditions, but you are advised to inquire locally during wet times. Although the following roads are well marked, it is a good idea to have your Prescott National Forest maps with you.

From Chino Valley - Take the Perkinsville Road (FR 354) for 20 miles to the bridge.

From Jerome - It is 18 miles along FR 318. FR 318 is one of the most scenic drives of the entire Verde River corridor.

From Highway 89/Drake Turnoff - About 15 miles north of Chino Valley, you'll see signs to Drake. From that turnoff it is about 15 miles more along FR 680, 492 and 354 to the river.

From Williams - Floaters coming from the northern parts of the state likely will find this their road of choice. From downtown Williams, take the Perkinsville Road (FR 173, 492 and 354) for about 35 miles to the Verde. The majority of the miles are paved and the whole of it is as lovely as can be.

GENERAL DESCRIPTIONS, HIGHLIGHTS AND CAUTIONS

For reasons explained later, I refer to this as the "Walk and Run" stretch of the Verde.

This section and the short one upriver account for the two least commonly boated areas of the entire Verde. For me, that is the primary reason that I put this float on my yearly spring list. From Pipeline access it may not seem very appealing as a true wilderness run, but all you have to do is persevere for a day and you'll be treated to one of the most awe-inspiring pieces of unspoiled river canyon anywhere on the entire 200 miles of Verde River magic. The mid-section of this run can only be reached by hikers and floaters and occasional horsemen with true grit in their bones. Miles 14 to 18 are a low water boater's paradise of solitude and scenery.

I've not run this section during heavy flow, nor do I have first-hand reports from anyone who has. It is my guess though that one would be in for a hazardous and challenging run. The twenty-feet-per-mile average drop (with some thirties) coupled with the tight turns and trees should render this stretch off limits to all except the highly skilled and prepared. Even in normal to low flows, the likelihood of pins on rocks and strainers is high.

~Perkinsville Bridge - Mile 25.1~

~Duff Drop (Pre - '93) - M. 14.8~

Expect slow going and long miles during this stretch of the Verde during normal flow. If you paddle a heavily loaded tandem canoe, it may be a laborious task to cover only five miles in a day. Going solo, you may find some easier times; but even if you ride as high as a water strider and work as hard as a beaver, you'll be lucky to cover ten.

There are enough lovely small pools to enjoy some actual paddling moments, but on the whole you'll find yourself zagging and zigging among the countless low spots that are just waiting to bump you around or bring you to a grinding halt. Take your time

and bring your patience to fully enjoy this "Walk and Run" stretch.

As hard as you may try to play the paddling game of "find the deeper water" (usually the first offering you see near a shore), you will inevitably be forced to walk your boat down some places. In the sandy flats, it is okay to grab your bow painter and mule team your canoe to deeper water. However, in the rocky drops, always walk upstream of your boat or line it from the shore. Even in the most innocent looking walk-throughs, there will always be some push and deep spots around the rocks. A misstep could cause serious injury. Be careful, wear proper footwear and use your canoe as a buoy.

~Mile 17.0~

You have to read the river just as cautiously while walking as you do on the run during this unique trip.

Most "drops" can hardly be classed as rapids during normal flow, but they are noted on the topos for reference none the less.

Because I love to "Walk and Run" this part of the Verde, I keep an old Coleman around. It is the only craft that I worry not about subjecting to such abuse. Those Colemans are sturdy buggers and despite the mess of metal and cussword keel, they are the barge that I'd recommend for the upper Verde.

On the subject of gear — it is also recommended to bring an extra sturdy paddle or two. Don't bring your old fave that you use on full water trips because it is likely to get mighty chewed up.

Now, to the river — go with care and peace upon this wonder"full", unparalleled and pristine place of the "Walk and Run."

~Mile 16.4~

RIVER MILE LOG

Mile 7.1 - Elevation 4,180 - Pipeline FR 638 RAP. You are technically on private land here, and it is possible that the landowners may fence it off someday. I dread the notion . . . . Unfortunately, many of the

PERKINSVILLE (M.25.1) TO TUZIGOOT (M.49.5)

- **Total River Miles - 24.4**
- **Elevation Drop - 3,810 to 3,350**
- **Average Drop - 20 feet per mile**
- **Class - Class II+ (Please refer to the Cautions section.)**
- **Topo Maps - Perkinsville, Sycamore Basin, Munds Draw and Clarkdale**
- **Shuttle Time - Normally the shuttle time will be in the neighborhood of three hours, but this all depends upon the condition of FR 318 up and down from Jerome. If you have to go out to Chino via FR 354 and then through Prescott to the Verde Valley, you can count on a shuttle of over four hours.**
- **Days Needed - Two and a half to four**

~ Looking Down at the Perkinsville Railroad Bridge - Mile 26.5 ~

RIVER ACCESS POINTS ~RAPS~

Perkinsville Road Bridge (M. 25.1) - See the previous chapter.

Perkins Ranch Properties (M. 26) - All private access. You must have written permission to access here.

Alvarez Ranch (M. 35.8) - All private access.

Packard Ranch - Sycamore Creek (M. 37.4) - All private access. Any floater access via The Sycamore Canyon Wilderness parking area down the ranch road should be specifically approved by the owners or caretakers.

Sycamore (M. 37.4) to TAPCO (M. 46) - There are numerous access points of varying degrees of negotiability off the Sycamore Road between TAPCO and Sycamore Creek. Some are private and some are very crude, so know where you're going before you plan either a put-in or take-out any place in this ten-mile stretch. They are really best left for emergency purposes only.

TAPCO (M. 46) - This is easy enough to find. Just look for the old smoke stack rising above the historic Arizona Power Company (hence, TAPCO) plant around M. 46. From the Tuzigoot Road/Sycamore Road junction it is about three miles of improved dirt to TAPCO. The spacious benches of cottonwoods that make up the TAPCO play area are technically on private land, but all manner of foolishness is still tolerated at this time. It is heavily, heavily used during the warmer months.

TAPCO is actually the more common take-out for floaters from Perkinsville or Sycamore because of the relative sluggishness of flow and ugliness of scenery that awaits during miles 46 to 49.

Mile 48 - From here on down through the entire Verde Valley, there are scores of potential RAPS. Most are of the private residential variety, so plan any shoreline activities with respect in mind and trouble the homefolks only in cases of need.

Tuzigoot Bridge (M. 49.5) - From Old Town Cottonwood, take Main/Broadway for about two

miles northwest towards Clarkdale. You'll see the Tuzigoot National Monument turnoff on your right. The Verde is less than a half mile down the road. This Tuzigoot road, by the way, is the high water entrance to Dead Horse Ranch State Park — a popular RAP at M. 52.6.

~ Notes ~

~TAPCO - Mile 46~

GENERAL DESCRIPTIONS, HIGHLIGHTS AND CAUTIONS

This stretch could be called "The Train Run" of the Verde because indeed the Central Arizona Railroad is the most dominant unnatural feature. For better than two-thirds of the twenty-five miles, you can't help but notice its presence in these spectacular canyons. Twice a day, at least, you'll likely share the scenery with hundreds of rail passengers as they roll to and from Clarkdale and Perkinsville. They love gawking at floaters.

~ Tuzigoot Ruins as viewed from Mile 50.8 ~

~ Mile 28.0 ~

One's opinion of this railway depends entirely upon perspective . . . . I'll try not to railroad mine upon the reader too heavily, but instead try to present a brief historical report about its origins and present day operations.

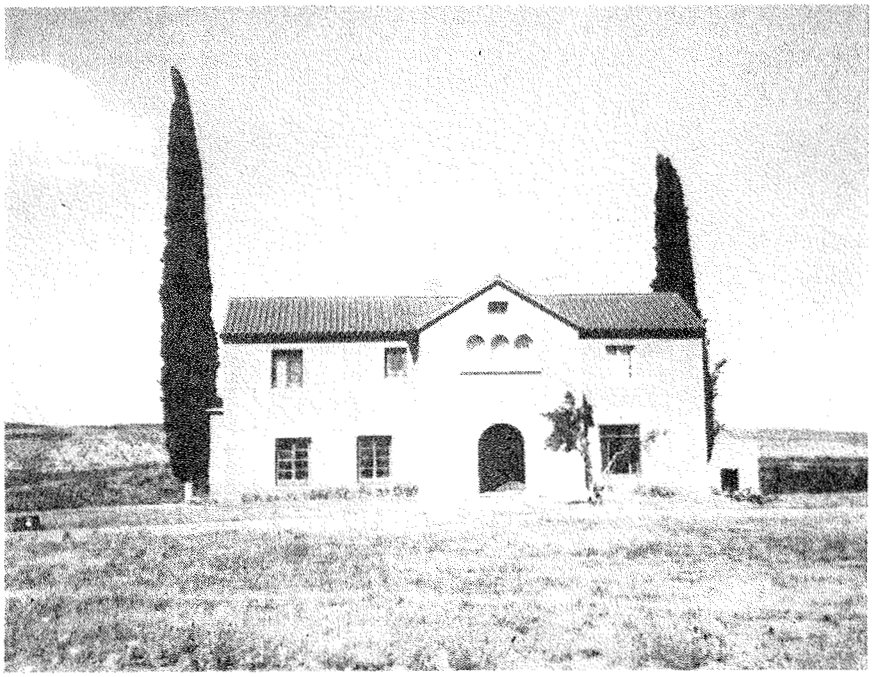
The 38-mile length of standard gauge track from Clarkdale to Drake was built in 1912 to serve the needs of the mining industry in Jerome and Clarkdale. It wasn't the first railway in the Verde Valley. There were other narrow gauge lines that preceded it — such as the United Verde and Pacific, built in the 1880's. The UVP ran a serpentine and hazardous grade from Jerome over Mingus Mountain to the main line Santa Fe near Chino Valley. As copper mining boom times hit around the turn of the century, it became obvious that quicker and more efficient means were needed to get the ore to market.

In 1911-1912, the illustrious and visionary William A. Clark financed the construction of the Verde Valley Railroad that rendered the narrow gauge lines virtually obsolete. The new line allowed increased tonnage to be shipped up to the junction at Drake and also helped secure ample supplies of coal, coke and lime, etc., on return runs that would keep the smelters fired and the whole mining operation producing at peak output. Another added benefit of Clark's railroad was that less labor and time were required to switch the products from narrow gauge to standard gauge at the junction points.

Considering the times, it is remarkable that the railway was constructed in one year. Of all of Mr. Clark's accomplishments this was perhaps his greatest. It is a true testament to the incredible effort, ingenuity and willpower that people can put forth — especially with economic gains as the rewards. Look to the river log for two of the most vivid examples of these efforts at SOB Canyon and the tunnel.

The mining industry would experience periods of boom and bust like EKG strips during the World War times, but the trains kept up a steady pace of activity.

By the time the copper market hit rock bottom after the Second World War, and the Clarkdale Smelter closed for good in 1953, this line, having now acquired the name "The Verde Mix," stayed quietly



~ William A. Clark's Mansion - near Mile 49.0 ~

profitable because of diversification. More passengers and more general freight helped ease the loss of the copper mining industry. Also, in the early 1950's, the Phoenix Cement Plant began operations in Clarkdale, and the Verde Mix contracted to haul their coal and cement to and from Drake. Trucks, the culprits in the general demise of the entire rail freight industry, now do most of the hauling; but this uniquely successful little train still makes about four freight runs per week.

In 1988, the railway was purchased from Santa Fe Railroad by The Western Group from Utah. In short time, this astute outfit built a business that has become one of the greatest boons to the local economy in four decades. The maiden voyage of the Verde River Canyon Excursion Train was on November 23, 1990. By one year's end, 40,000 people had ridden the train, and now ticket sales will likely top 100,000 per year!

The Western Group discovered yet one more gold mine; but unlike the others in the nearby mountains,

~ Forty-Acre Slag Heap Near Mile 48.0 ~

it's unlikely this one will get played out.

~ Mile 42.7 - SOB Drop and Trestle ~

Despite the intrusion of the trains, this stretch is, in my opinion, the most scenic of the Verde's 199 miles. There is just no other place where such sheer formations of sandstone, limestone and basalt so closely border, embrace and envelop the shores of the river. For sheer colorful neck-craning wonderment, this stretch stands unique.

There is a high likelihood that if it weren't for the railway this Perkinsville to Sycamore section (and perhaps the Box Canyon below) would be included in the Federal listings of Wild and Scenic Rivers. The effort failed in its first attempt, but another try is under way.

Wildlife seems to have adapted well, and I would have to agree that the railroad is a far sight better than road roads when it comes to preserving delicate areas from heavy impact. The railroad owners and operators do stress respect for the canyons and their inhabitants. They want to protect their investment as

well as our natural heritage. I can't help but be optimistic that if there are any future plans for increased human presence or development along this treasured Verde Canyon, they will be laid with preservation as the top priority.

Now, back to floating . . . .

Please take a lot of time checking the flow and researching the conditions before you head down here — even if it means taking a day hike along the tracks just before you plan to put-in. The whitewater classification can change dramatically. During flooding or unusually high flows, the run from Perkinsville to Sycamore will jump to Class III or more and should be attempted only by experienced Verde floaters. The 20+ average per-mile drop, obstructed and tricky rapids, distance from help (despite the train) and

~ Mile 30 - Railroad Tunnel ~

~ Mile 30.3 - Blasted Tunnel Falls ~

~ Notes ~

strainers combine to make this run very challenging and hazardous.

Experienced boaters love the song and dance of the constant maneuvers, but beginners likely will find hardship, potential pins and problems with every turn. Come down here well prepared and well schooled in the Verde's ways and you'll have the scenic ride of your life during those rare periods of plentiful flow.

Even during the usual prime-times of late February to early April, this stretch is normally low — Class I+ rock-knocking low! In fact, most floaters eschew it in favor of the more popular runs in and below the Verde Valley where the major rim runoff tribs of Sycamore, Oak Creek, Beaver and Clear Creeks have contributed and provided for a more predictable and full ride.

The flow from Perkinsville to Sycamore is just not predictable, so you must be prepared for whatever. Like the run above Perkinsville, you are advised to take your durable and battle-worn gear during all but high flow times. Furthermore, numerous drops will require you to count on your experience and exercise the low water cautions covered in the last chapter.

Take your time during this run and please don't count on covering too many miles in a day! I speak from experience.

~ Mile 32.6 ~

During my first run through here from Morgan Ranch, I made the mistake of leaving too many miles to paddle and pole on my final day. I had to get from mile 33 to TAPCO (mile 46) by mid-afternoon in order to meet my shuttle schedule. It was a torturous and exhausting day that allowed me little time to appreciate the surroundings.

Since then, I have never tried to paddle more than ten miles a day, and I have usually arranged trips that are more in the seven or eight miles per day range. There is just too much to do and see down here to allow rocky drops and drag-throughs to get you down during a hurried day.

~ Mile 29.7 - The Old "Horseshoe Drop" ~

These canyons are prime bald eagle habitat. The best months for viewing coincide with those for floating. I've heard that there are between two and five pairs that make the Verde Canyon their home. What a rare thrill it is to watch the young eagles yapping and flapping to and from as they practice their skills of work and play.

There were great concerns in 1990 that the increased train traffic and human presence would adversely effect the eagles and make the canyons less attractive for new breeding pairs. The concerns have not been completely laid to rest, but it does seem that the eagles are prospering. Their needs for secure nests upon cliff sides or trees and ample fish supplies perhaps have taken priority over living in a quiet neighborhood? Time will tell.

~ Mile 30.1 ~

Down here, you'll also likely see the Verde guardian Great Blue Herons; the noisy and territorial Kingfishers; the guide bird Mergansers, who frequently precede you down the river in the anxious game of "I'll fly and you catch up"; and many more avian friends.

Larger animals such as deer, javelina, fox, coyote, mountain lion, beaver, racoons, otter and perhaps a rare bear from the Sycamore region are sighted occasionally along this stretch. Be especially watchful during the early and late hours for your best chances of spotting the canyon's residents.

Stories tell that somewhere around M. 30 a lost gold mine is awaiting some lucky explorer. The legend of the Sierra Azul dates to the 1760's, and it has been a source of speculation and allure ever since. Reportedly, a group of Apaches were the first to come upon the rich and pure gold vein. Wandering Spaniards on their appointed task of seeking riches in the New World encountered the Apaches and temporarily seized the mine. The Apaches would not relent and bloodshed prevailed. In the end, only two Spaniards survived, and they hightailed it south with no booty but with plenty of stories that perhaps have grown bigger with time. In 1767, King Charles of Spain put a stop to all further exploits in the New World, and the natives, who possessed a lesser lust for material wealth, evidently let it be.

~ Mile 31.0 ~

~ Mile 41.0 ~

If you've a lust for legends of this nature, put a geiger counter in your gear and see if you can add to the stories of the Sierra Azul . . . . Yet another reason to stay awhile in these magnificent and magnetic reaches of the Upper Verde.

Mile 25.1 - Elevation 3,810 - Perkinsville RAP - Your first mile will be low and sluggish as the river braids through the flats. The original Perkins Ranch homestead is on the high ground on the right bank near M. 25.6. One of the largest of the Upper Verde beaver lodges was located near the left bank at this spot before the floods of '93. Look for them making their return?

Mile 26.0 - Elevation 3,800 - Be careful here because of the strainers and fences at M. 26.0 and 26.2. If you must, walk the inside of bends to avoid any deceptively dangerous encounters with the debris and undercut banks.

The grove of cottonwoods on the right hosts a community of great blue herons. It is one of the most densely populated rookeries of the entire Verde. Due north of here is the Perkins Ranch and Perkinsville Depot and southeast is the P6 Ranch (so named for Mr. and Mrs. Nick Perkins and their four boys). More than once I've seen the owners on both shores admonishing intruders for ignoring their posted signs. Floaters should stay with their boats until well past the rail bridge.

~ Mile 29.6 ~

Mile 26.5 - Orchard Draw enters from the right, and it has created a long low riffle that terminates into a deep pool at the base of the wall just up from the trestle. Orchard Draw was named by the Perkins because of their once bountiful fruit orchards in the vicinity.

Mile 27.0 - Elevation 3,780 - Mile 27 is the gateway into the depths of the "Train Run." You'll notice how the canyon steadily begins to

TUZIGOOT (M.49.5) TO CAMP VERDE (M.79.0)

- **Total River Miles - 29.5**
- **Elevation Drop - 3,350 - 3,060**
- **Average Drop - 10 feet per mile**
- **Class - Class I (Please see the Cautions section.)**
- **Topo Maps - Clarkdale, Page Springs, Cottonwood, Cornville, Middle Verde and Camp Verde**
- **Shuttle Time - 1 hour**
- **Days Needed - Two (except during low flows) to four**

~ Mile 72.5 ~

RIVER ACCESS POINTS ~RAPS~

Clarkdale - Tuzigoot Bridge (M 49.5) - Please refer to the previous chapter.

Dead Horse Ranch State Park (M. 52.6) - This increasingly popular jewel of a park provides easy access for floaters and visitors. Dead Horse is near Old Town Cottonwood and accessed by taking 5th Street north off Main. Signs show you the way. The floods of '93 completely destroyed the old low water road to Dead Horse. A new bridge was scheduled for completion by the Fall of 1993. Dead Horse can also be reached by taking the back road from Tuzigoot.

Bridgeport Bridge (M. 56.7) - From the busy intersection of Highways 279 and 89A in Cottonwood, take 89A west (toward Sedona) for less than a mile to the bridge. At this time, floaters' access is permitted river left and upstream from the bridge at the White Horse Inn parking lot.

Bignotti Beach (M. 62.3) - Take highway 279 either six miles south from Cottonwood or eight miles north from I-17 until you see the Thousand Trails RV Park sign. Follow this road for a short distance until you see the left turn to Bignotti. The RAP is about a mile and a half down the road.

Bignotti is suffering from heavy use and abuse. Many illegal roads have been carved by vehicles through the delicate beaches and beautiful mesquite bosques since the floods of 1993. To allow for the natural regeneration of Bignotti's flood plain, the Forest Service has attempted to close off all roads but the main one into the area. Please comply with the closures — it may cost you a hefty fine if you don't!

Sheep Crossing/Oak Creek Confluence (M. 64.2) - This RAP is located off the Thousand Trails road as well. Continue past the Bignotti turnoff until you reach the guard house for Thousand Trails (there's no access through there unless you are a card-carrying member). Turn left on the dirt road and proceed for about a mile to the Sheep Crossing public area. You'll have to carry your gear a couple hundred yards

~ verde-Oak Creek Confluence - Mile 64 ~

to the river. Near this spot, sheep herders used to cross their flocks during drives to and from winter and summer pastures.

Middle Verde Road/Camp Verde North Bridge (M. 76.6) - From Camp Verde, take the Middle Verde/Montezuma Castle Road north for half a mile. Just before you reach the bridge, there is a dirt road on the right that provides your easiest access.

General Crook Highway 260/Camp Verde South Bridge (M. 79.0) - From Camp Verde, take the General Crook Highway 260 southeast for less than a half mile to the "White Bridge." People commonly access the river via the paved road to the salvage yard, but this is posted and private. It is best to go across the bridge to the dirt road on the downstream side.

Prescott National Forest is planning to upgrade this RAP and provide picnic sites and toilets. Its name-to-be is White Bridge River Park.

FURTHER NOTES ON RAPS FOR THE "VALLEY RUN"

The seven RAPS listed above are but a sampling. There are around fifteen current and proposed public access points between miles 49 and 79. The Forest Service Headquarters in Camp Verde can provide you with up-to-date information and brochures.

A good rule of RAPS in the Valley is this — unless you possess special dispensation, or a local's knowledge, access no RAPS nor camp anywhere unless it is obviously public domain. Residential areas, reservation lands, gravel operations, commercial properties, ranches, farms, campgrounds and other restricted properties dominate the character of this heavily accessible run. With advanced planning and respect for private boundaries in mind, you'll still find virtually unlimited options to choose from whether you wish to paddle thirty minutes or all thirty miles.

GENERAL DESCRIPTIONS, HIGHLIGHTS AND CAUTIONS

As with every stretch of the Verde River, this Valley Run contains its serious hazards and all floaters should be aware of how to deal with them. The first and foremost is high water. Regardless of your skill level, this stretch should positively not be run during flooding or peak runoff. Resist the temptation to embark on a trip during these rare times because the consequences of a mishap are just too severe. Ask around about the events of Spring 1993, and you'll know just what I mean!

The next caution is the ever present strainer. These devils that usually lurk on the outside of bends and in narrow choked channels are responsible for most of the boating casualties on the Verde. They are common during all flows, and they can snare you unexpectedly if ever you let down your guard.

Some unnatural hazards exist in this run that are accidents just waiting to happen. There are several places

~ '93 Flooding - Oak Creek Confluence ~

where boaters will have to deal with metallic and concrete garbage in diversion dams and spots where junk has been dumped to prevent erosion and undercutting of banks. The river mile log notes these places. All should be negotiated with the utmost caution.

Always look well ahead and be absolutely certain that you have the time and room to maneuver well away or safely by these natural and manmade obstacles. Walk, line, wade or portage any place that looks the least bit suspicious or treacherous.

There are only two rapids of note in this entire stretch. One is a nifty little Class I+ affair just below Cherry Creek at M. 68, and the other was a dandy Class II below the I-17 bridge. In pre '93 good volume runs, I ran it several times, swamped once and usually had a "gas" maneuvering between rocks and bridge supports. All evidence of "I-17 Drop" was scoured away during the flooding.

Brisk head winds are common along here, especially in the afternoon hours. Combine them with sluggish flow and occasional walk-throughs and you may be reduced to about a two-mile-per-hour pace . . . some things to consider in your trip planning.

With these cautions in mind, outright beginners are advised to get familiar with their canoe, kayak or inflatable on lake water before taking their first river float. Once you've tuned up and become accustomed to your craft's tippy ways, you will find great novice runs in this stretch during normal and low flows. In fact, the miles between Dead Horse and Oak Creek may be among the best and safest novice miles of the entire Verde. There are enough small riffles and obstacles to give you a feel for the Verde's wily ways.

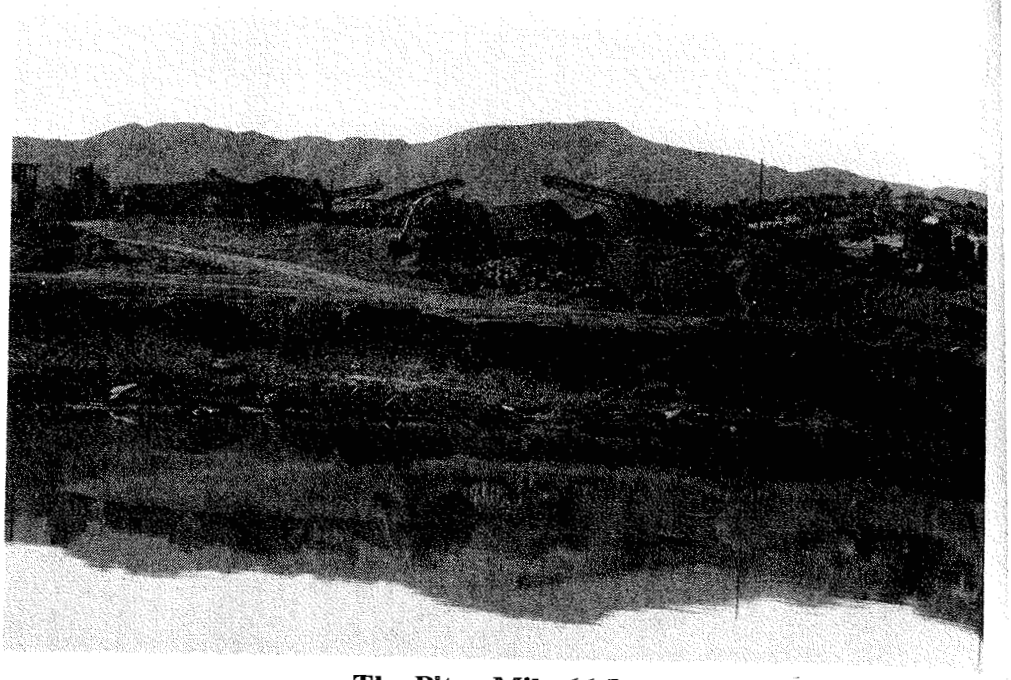
This "Valley Run" is certainly a region of contrasts. In between sections of near pristine scenery, you'll witness a lot of habitat destruction — some of it controlled and incidental and some of it flagrant and irreversible — testaments to capital gains!

There are, however, efforts underway to preserve some of the rare and delicate cottonwood-willow ecosystem from overuse and development along this

~ Pre '93 - "I-17 Rapid" - M. 74.5 ~

populated stretch.

One of the most notable efforts is the Verde River Greenway (or Greenbelt) located around Dead Horse and managed by Arizona State Parks. This project was initiated in the 1970's, but given its big boost in 1986 when then-Governor Bruce Babbitt sent out a mandate to Arizona to increase funding and plans for protecting more natural lands (especially our dwindling riparian zones).



~ The Pits - Mile 66.5 ~

The vision is to establish a greenway corridor that allows recreational access, but limits damaging motorized and/or developmental impacts. Although the plan is still a long way from completion (due in part to mother nature's fury as well as legal and financial limitations), the vision of this project stands intact as quite a model for others to follow. There are ways to bridge the gaps between private and public interests in the complex discussion of preservation versus development. It will be interesting to watch the progress of the Greenway/Greenbelt plan. For more information, you can contact the Arizona State Parks folks at Dead Horse.

~ Mile 55.8 ~

A note to all of you ardent Verde floaters who regularly stick to the lower wild and scenic stretches . . . . Sure, the usually low and slow flow, lack of rapids, diversion dams, ugly wreckage, gravel operations, proximity to occupation and the all-around heavily impacted character are all good reasons to skip the "Valley Run." It may not be continuously pretty, much of a challenge nor a lot like a wilderness experience, but it does have its highlights! For instance, I've had runs where I've tallied more wildlife sightings (including the biggest beaver I have ever seen right below the I-17 bridge!) between miles 49 and 79 than during many lower runs. This section deserves your enthusiasm, too.

I'd urge anyone who loves this river to taste the contrasts at least once. Between its use and abuse, the "Valley Run" struggles to maintain the gracious and embracing riparian beauty and richness that attracted man here in the first place.

This leads to one final diversion before we get to the river mile log: In your reverie upon the "Valley Run," you may wish to envision what it must have been like for the "ones who have gone before" during those untold eons preceding this past century of meteoric growth and development. Their stories are fascinating and mysterious. Below is a small riffle of human history in the Verde Valley from the dawn of man to the dawn of the industrial mining era.

~ Beaver below I-17 Bridge ~

~ Notes~

A BRIEF VALLEY RUN TIMELINE — 8,000 B.C. TO 1876

? - 8,000 B.C. - Although evidence is scant, it is a generally accepted hypothesis that Paleo-Indian people of the "Clovis Culture" roamed and hunted horse- and elephant-like big game throughout the valley during this dawning age of human habitation in the New World.

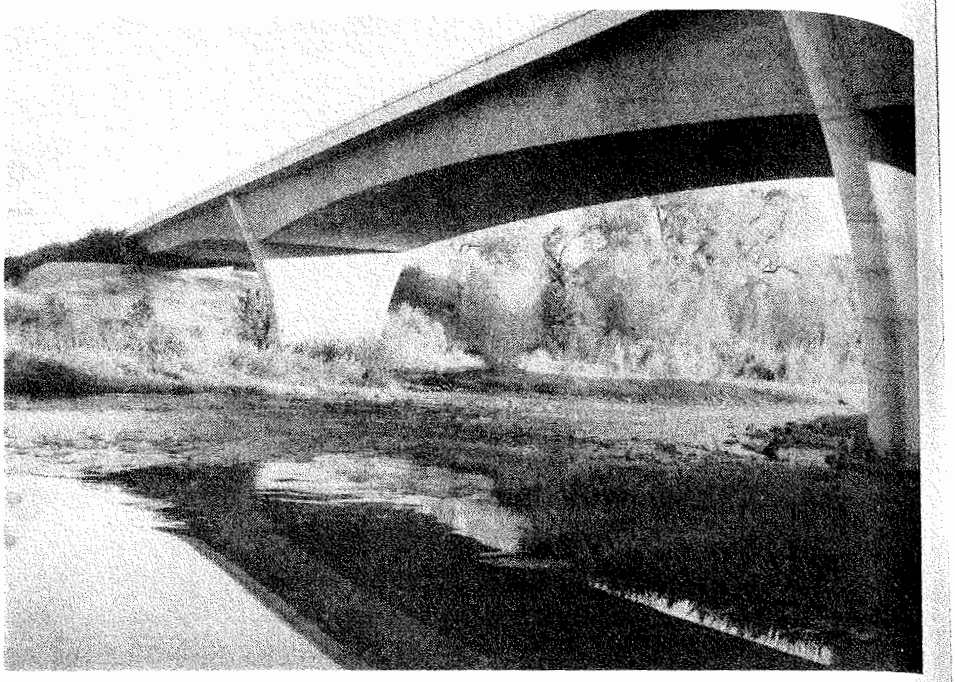
8,000 B.C. - 1 A.D. - "The Dry Creek Phase" - The first confirmed dwellers were likely foragers as well as nomadic hunters as indicated by the varied flakes, tools and projectile points found along several "Dry Creeks" of the Valley. Interestingly, most of these clues of the past originated from rocks not found in the vicinity. This fact raises many questions for researchers and provides ample grist for the mill of future studies.

1 A.D. to 600 A.D. - Permanent settlement begins in this period as agriculture takes hold as the new primary means of survival. The Southern Sinagua (Spanish for "without water") were likely a mixed blend of many archaic peoples who migrated from the north to dry farm this region of gentle climate, fertile land and abundant water.

600 A.D. to 1,000 A.D. - An incredible mingling of

CAMP VERDE (M. 79.0) TO BEASLEY FLATS (M. 89.0)

- **Total River Miles - 10 Miles**
- **Elevation Drop - 3,060 to 2,960**
- **Average Drop - 10 feet per mile**
- **Class - Class I - It should be rated higher (1+ to 2) during high water.**
- **Topo Maps - Camp Verde and Horner Mountain**
- **Shuttle Time - One hour**
- **Days Needed - Two hours to two days. During normal flow (+-200 cfs), this will take the better part of the day.**

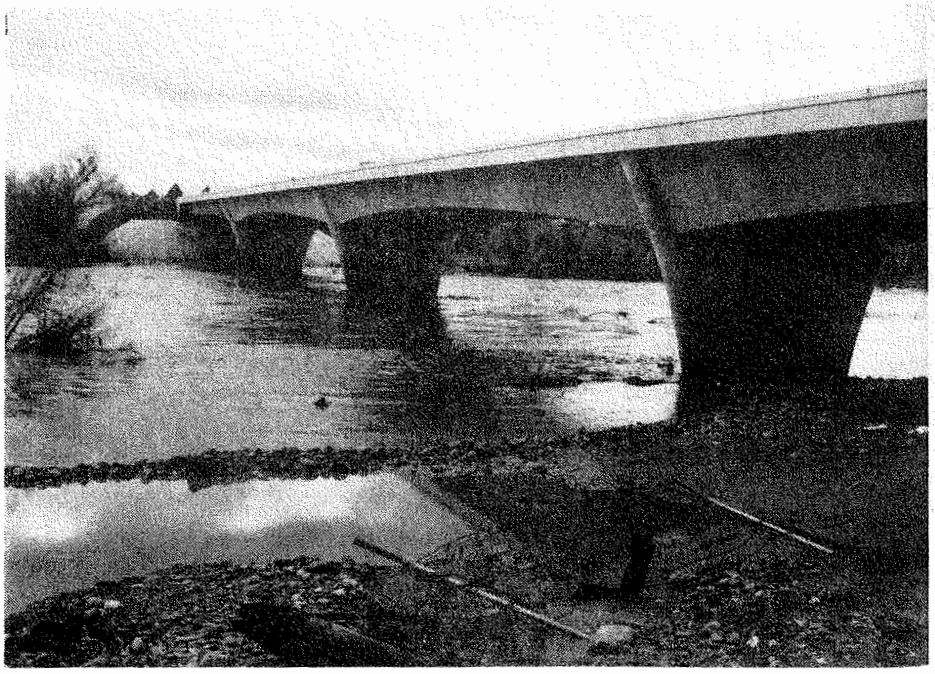


~ Mile 79 - Pre-February, 1993 Floods ~

RIVER ACCESS POINTS ~RAPS~

Camp Verde (M. 79) - Please refer to the preceding chapter.

FR 574 - Proposed Clear Creek RAP (M. 84.5) - At M. 84.5, 6.3 miles from highway 260, there is a small RAP on public lands. This is just up from the confluence with Clear Creek. In 1995, the Forest Service, in conjunction with other agencies, completed the development of two primitive canoe-in campsites at this spot, providing a dandy layover for the rare overnighters on this stretch.



~Mile 79 - February, 1993 - Receding Floodwaters ~

Beasley Flats Recreation Area (M. 89) - Take the General Crook Highway 260 South from Camp Verde for about a quarter mile until you see Salt Mine Road on the right. Take Salt Mine Road, FR 574 and FR 334 for 11.5 miles to Beasley. Small signs and Forest Service signs should help you along the way. The dirt portions can be very sloppy when wet, but normally passable by two-wheel vehicles.

Other RAPS - Most of the other RAPS are on private land and should therefore only be used for emergency purposes or with the consent of the property owners.

GENERAL DESCRIPTIONS, HIGHLIGHTS AND CAUTIONS

~ Mile 79 - Post Flooding Rebound ~

So much of this run has changed since the destructive rampage of early 1993, so floaters are wise to trust more upon their judgment than the notes upon these pages. Channels have changed – as they will forever be prone to do – and natural obstacles awaiting to mishap the unaware can rear their presence in changing places as well. Trust in only what you see while on the run, and not on what you've heard from others or experienced yourself on previous trips. Through these soft floodplains, the Verde is like a craftsman who from day to day never quite creates the exact same piece.

High water strainers can turn this rather calm, popular run into a beginner's problem. Be Careful! Only experienced floaters should run this stretch during elevated flows (+ -1,000 cfs).

Wrapping on a midstream strainer is a real possibility. High water will also make scouting channels difficult as the Verde flows widely among the trees and brush. Be cautious and hug the insides of bends whenever you may be doubtful about your course.

The only rapids to speak of may be found at Clay Banks (M. 81.2) and at Roller Uno (M. 88.3). Please see the River Mile Log.

~ Mile 81.3 - 3,000 cfs - Highwater Labyrinth ~

~Notes~

~ Mile 81.2 - Clay Banks Rock Garden ~

Below Clear Creek, you may encounter a potentially dangerous undercut bank at M. 85.8. Again, please see the Log.

With few exceptions, private lands dominate the shores from M. 79 to M. 88. If you plan to camp before Beasley, try to find a relatively remote spot, leave with more garbage than you came with, and go in peace. Then chances are you will quietly contribute to keeping the goodwill flowing freely between floaters and owners on this increasingly popular and populated stretch of the Verde.

One must-see stop is the confluence of West Clear Creek. It is indeed the natural highlight of this section. A lot of water may join force with the Verde as Spring run-off and periodic thunderstorms cascade from the Rim country. It is a lush and enticing spot for reverie and exploration. Be aware, however, that both banks of Clear Creek are, you guessed it, privately owned ranch lands.

All of the Camp Verde and Verde Valley region is brimming with cultural, natural, pioneer and military history. Try to set some time aside to take it in.

All in all, this ten-mile section is a Class I float. However, don't be misled by the rating. The Verde is a squirrely river even though it carries a relatively civilized posture through here. The Camp Verde to Beasley run attracts many inexperienced paddlers because it is a floater-friendly place most of the time.

Please call ahead about the flow or inquire locally with the Forest Service, be ultra cautious with kids, wear your PFDS, don't overload your boat, know the basic strokes, get an early start, watch the weather, bring extra clothing in dry bags, stay together, hold off the juice and know when to say "uncle" if you are in over your head. Be careful and enjoy!

~RIVER MILE LOG~

Mile 79 - Elevation 3,060 - As soon as you put in, you'll run a little split channel riffle that can have strainers and some noteworthy waves during elevated

~ Mile 85.0 - West Clear Creek ~

BEASLEY FLATS (M. 89) TO CHILDS CAMPGROUND (M. 106.5)

- **Total River Miles - 17.5**
- **Elevation Drop - 2,960 to 2,620**
- **Average Drop - 20 feet per mile**
- **Class II/III+ - The Falls area is classed higher during flows above 1,000 cfs**
- **Topo Maps - Horner Mountain, Hackberry Mountain, Tule Mesa, and Verde Hot Springs**
- **Shuttle Time - 4 to 6 hours**
- **Days Needed - One to two or more.**

~The Falls - Mile 91.4 - 2,000 cfs ~

From the river, floaters are free to explore around here only from June 15 to December 1st. Check the River Mile Log for more on The Falls area.

RIVER ACCESS POINTS ~RAPS~

Beasley Flats (M. 89) - FR 574 - Please refer to the previous section.

Falls Road (M. 91) - Take the Crook Highway 260 seven miles from Camp Verde to the Childs/Fossil Creek (FR 708) on your right. Travel down the road for one mile and turn right on FR 500. If you see the Forest Service bulletin board, you have the correct turnoff. Take the road for 2.5 miles until you reach a wash and a gate on the far side. This gate is locked from December to June. Proceed for 1.5 miles until you reach The Falls overlook. There is no vehicle access past here. This RAP should be used by vehicles for emergency purposes only. It is imperative that river runners rise above others who would use and abuse protected areas like this. The eagles are nesting, and guardians prepared to cite you are watching.

Gap Creek - Brown Springs Ranch (M. 97) - From Camp Verde, take Salt Mine Road (FR 574). Follow it the same as you would to Beasley. At the left turn to Beasley (and Forest sign), continue straight on FR

~ Falls Road Notice ~

574 for 7 miles. When you cross Gap Creek itself, you are very close to the parking spot. You'll see a locked gate and buildings belonging to Brown Springs Ranch. This is private, and you don't need to add your presence to their long list of intruders.

The Verde is one-half mile below. You must carry all of your gear from here. It is impossible and illegal to do otherwise. Note: FR 574 is slow and rough in places. In poor weather, even four-wheelers will have sloppy travels.

Mile 105.2 - Private.

Verde Hot Springs - No vehicular access.

Childs Community - FR 502 - Private. Bother them only in emergency situations.

Childs Campground (M. 106.5) - Take the Crook Highway 260 from Camp Verde for 7 miles to the Childs/Fossil Creek Road. It is 23 miles to the River. The road is good during clear weather. However, rains can make this scenic and sometimes steep road sloppy and scary. Inquire with locals if you are shuttling during iffy weather.

~Looking Downriver to Brown Springs and Pine Mountain - Mile 96.2 ~

~ Verde Hot Springs - Mile 105.6 ~

GENERAL DESCRIPTIONS, HIGHLIGHTS AND CAUTIONS

This is the whitewater run of the Verde. This is the beginning of the designated Wild and Scenic stretch. This is where the Verde Falls are found. This is where the river gorge deepens again. This is where eagles dare. This is the place many floaters get hooked by the Verde magic. This is a magnificent 18 miles in the heart of arid Central Arizona that reels in riverrunners from everywhere when spring thaws peak. This is where the Verde shakes its bondage and reasserts its desire for peace. This is where we are humbled. This is where the Verde asks us to be quiet and appreciative guests.

~ Ed and Jeff in "Two-Rock Drop" - Mile 93.5 ~

On the other paddle, this is not a stretch for novices. Please choose a Verde Valley run to cut your teeth on moving water. I have seen many wrecked boats, witnessed inflating concerns and fear and heard many stories of hardship and emergency. Down here, one must be prepared and in the company of other knowledgeable boaters.

The Verde Falls area will be discussed in the River Mile Log section at Mile 91.

From December 1st to June 15th, all camping, exploring, traffic, noise, foolishness, etc., is restricted from miles 91 to 93 due to federally protected bald eagles. Perhaps this should be in effect all year! Floaters are allowed only routine scouting, lining and portaging where necessary.

After floods and prolonged high flows, trees and debris can be found lodged in very inopportune places.

Multiple drops and rapids require scouting, so all in all, this is not recommended as a day run except for those very acquainted with the Verde.

If in doubt, please scout!

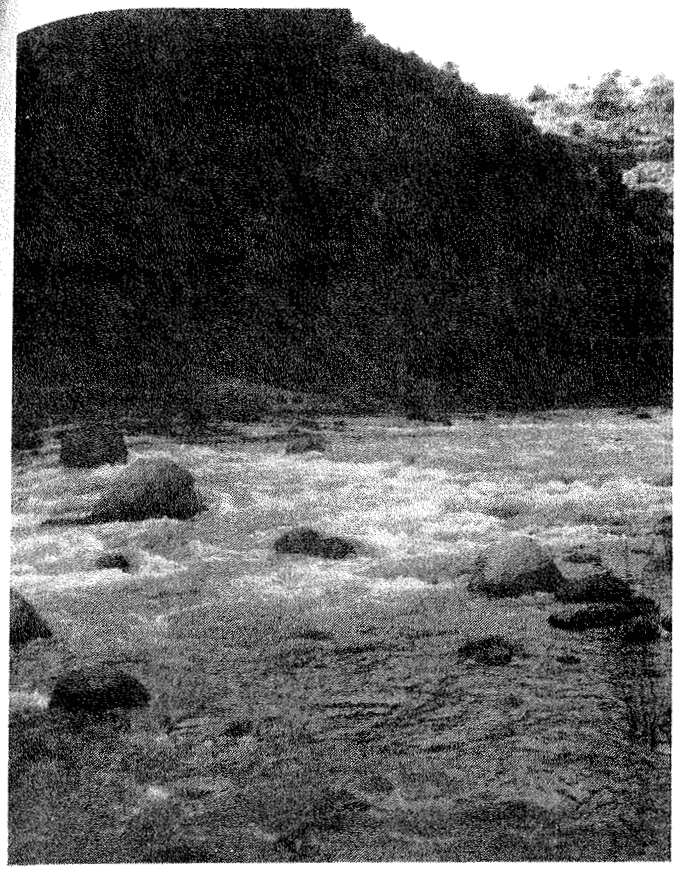
Happily, the only private lands you will encounter are small parcels at Gap Creek, a homestead at M. 105.2 and Childs Community.

Sycamore is one of the several beautiful canyons that terminate at the Verde along this run. Below Sycamore and the closure boundary, you'll find plentiful camping on the left shore.

The Pine Mountain Wilderness area and the Verde Rim dominate the western skyline for much of this run. Views are magnificent, and many creeks flowing down the opposite slope of the rim beckon to be hiked (including yet another Sycamore). Access to the Wilderness Region is off I-17 and Dugas/Orme Interchange between Cordes Junction and Cherry Road. It is 25 miles to the Pine Mountain trailhead. Most of the miles are rugged and dang near impassable when wet. The rim serves as a continental or regional divide, if you will. All waters east flow to the Verde, and all waters west flow eventually to the Agua Fria. A good spring season provides scenery unmatched as creeks cascade, flowers bloom and grasses reach for the skies.

Below White Flash Rapid are a couple of splendid river miles with turns, walls, color, character, and

~ The Falls at 4,000 cfs ~



~ Mile 93.2 - Near Sycamore Canyon ~

some nifty attention-getting drops.

Ruins can be found by those floaters who take time to explore the numerous side canyons.

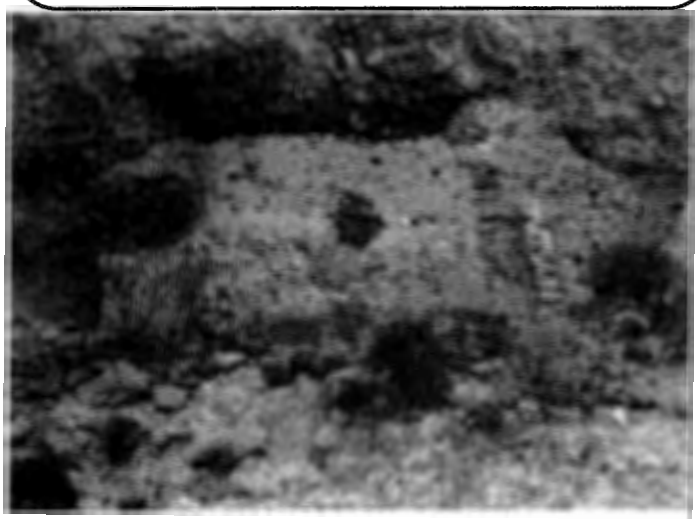
Common headwinds between miles 101 and 106 can slow you and tire you near the end of your trip.

Verde Hot Springs is a must-do at least once. See the River Mile Log for more about expecting the unexpected here.

What floaters will encounter down here depends entirely on the flow of the Wild and Scenic Verde. It can come up and go down in a matter of hours, or less! So the common question of "what is the c.f.s.?" may be met with close approximations at best even from river rats and SRP gauge guardians. The following are only roughed-out descriptions based on personal experience and excessive calls to the Flowline.

Up to 100 cfs - Rocks surface everywhere but in the pools. Drag-overs are common, and getting hung up midway through drops such as Off-The-Wall, Punk Rock and Bushman is highly probable. Just plan to line over Prefalls and the Falls. Running with this

~ Notes ~



~ A Cliff Dwelling -- best left uncharted ~

~ Prefalls at about 150 cfs ~

flow can be frustrating and tiring, but also fascinating as the river exposes its bed and bowels for the viewing pleasure of the off-season floater.

100 to 200 cfs - Still too many rocks to avoid even for shallow draft crafts. However, there are fewer drag-overs. Tandem or heavily loaded canoes can run at this flow, but expect slow going. Prefalls can be run with a scrape or two, but come back later to hit The Falls unless you like gouges and possibly pointless problems. This is the average off-season flow.

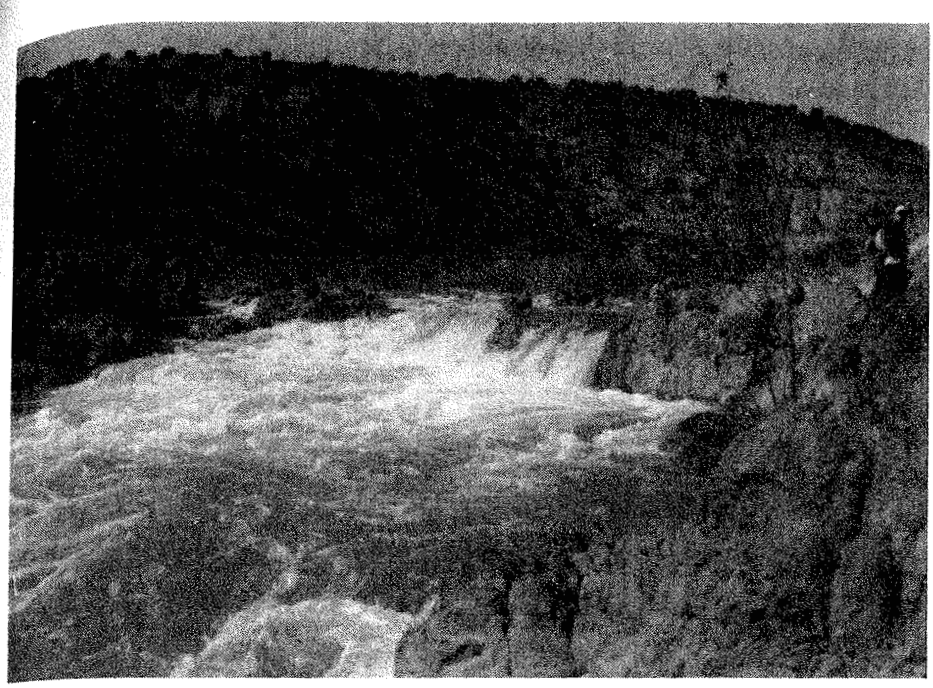
200 - 400 cfs - Here is a nifty range for your first run down here. More rocks are buried, but the river has yet to gain the push that could cause pause with greenhorns. Prefalls can be run with lightened boats and better odds of clean going. Prefalls and The Falls should be done only by experienced paddlers and with companions at the ready from this cfs and higher. All of the named rapids still have their share of rocks that could blow set-ups or kick you over, so scout them well if you are new to this stretch.

400 - 600 cfs - Now we're getting close to the volume where rafts can share the flow. Those little troublesome rocks get washed and some river force and hydraulics appear. Decent paddling skill becomes a necessity. Learning by doing is great philosophy, but it shouldn't be applied by learners down here from this cfs on up the gauge.

600 - 1,000 cfs - Larger rafts can now consider the Verde fun and runnable. Canoes should expect a swift and wet ride. Powerful hydraulics, sizable waves, and required maneuvers in current make this a nifty level for seasoned paddlers. If you choose to run Prefalls, have companions below to help prevent a wrong-side-up entrance into The Falls. The right channel of Prefalls is clear and fun in and of itself. The Falls can be run flush. All named drops should be scouted. Mid river wraps present more serious prospects at these higher flows.

1,000 - 3,000 cfs - The Verde is now bank wide on the flats and very pushy in the drops and chutes. All but heavier rafts will have smooth going. Open boaters can expect to get very wet. The width of the Verde in this high water stage gives boaters more options for "cheating" some rapids. Most small boat floaters

~Upper Bushman -- Around 150 cfs ~



~ The Falls -- Around 350 cfs ~

should consider skipping The Falls and Punk Rock, and opting for the right channels of Prefalls and Bushman. Be careful at S-Curve and Rocky Split because of the strainers and pushy currents. Wide rocky drops like Sycamore and Childs provide pure dancing enjoyment. Please remember when planning a trip that these increased flows do quicken your pace, but more time is required for scouts and bails, and ports or lines.

4,000+ cfs - Now you and the Verde are in flood stage. Many guide books simply state as a rule that rivers, and especially desert rivers, should not be floated during floods. This is true, but all rules can have exceptions. There are, however, no exceptions to this rule for the inexperienced, or those possessing an over-inflated notion of their abilities.

For those who truly know this river and themselves, floating in extremely high flows can be an awe inspiring and humbling experience. The Verde asks you, beckons you and requires you to be cautious, competent, observant, prepared and appreciative, and among company and friends of equal ilk.

RIVER MILE LOG

Mile 89 - Elevation 2,960 - Beasley Flats RAP.

Mile 89.5 - The river gives you a little time to adjust your trim before you hit the first little drop at 89.5. This riffle turns you abruptly left into a lovely pool.

Mile 90 - Elevation 2,940 - In the vicinity of Mile 90, the Verde begins to leave the flats and approach its canyon country. Some small riffles and strainer-dodging loosen you up for Off-The-Wall.

Mile 90.4 - Cottonwood Creek enters left.

Mile 90.5 - Paddle over near the right shore as the Verde starts to make a wide right turn. When you hear the rush of rapid, pull over and scout. Here is the Verde's first significant drop in quite a while. If you don't like what you see, consider paddling back to Beasley because Off-The-Wall is an easy Class II compared to many rapids below. The common approach is river right. The flow over the rock bar on

~ Punk Rock -- Around 2,000 cfs (boaters unknown) ~

CHILDS (M. 106.6)
TO HORSESHOE DAM (M. 149)

~ Mile 125.1 - Mule Shoe Bend ~

- **Total River Miles - 42.4**
- **Elevation Drop - 2,620 to 1,920**
- **Average Drop - 16 feet per mile**
- **Class - Class II with some II+ at high flows**
- **Topo Maps - Verde Hot Springs, Wet Bottom Mesa, Chalk Mountain and Horseshoe Dam**
- **Shuttle Time - 6 to 8 hours**
- **Days Needed - 3 (absolute minimum) to a lifetime! (It would take you that to see it all.)**

Red Creek for about 7 miles until it reaches the RAP. You are advised to have your Tonto Forest Map and the Wet Bottom Mesa and Bloody Basin topos with you when you motor or hike down here. A run from Red Creek to Sheep Bridge would make a dandy day trip or leisurely overnighter.

Sheep Bridge (M. 139.1) - Although this chapter ends at Horseshoe, Sheep Bridge is the more commonly used exit RAP, especially for inflatable trips. For most paddlers, there is little allure to ending a run with a pull and grind across a windswept lake.

RIVER ACCESS POINTS ~RAPS~

Childs Campground (M. 106.6) - Please refer to the previous chapter.

Red Creek (M.129.3) - This RAP marks the southern boundary of the designated Wild and Scenic portion of the Verde. It is accessed by taking the Bloody Basin FR 269 (see below) to FR 18. FR 18 is a 4-wheel only jeep trail that runs in and out of

~ FR269 Overlook into Sheep Bridge area ~

right for FR 205 to Horseshoe and Bartlett. Drive about 7 more miles until you see the left to turn to Horseshoe. The Horseshoe Road (FR 205) is 11 miles of improved dirt easily passable by two-wheel drive. Wet weather will make it very slick, so use caution on the washboarded slopes and turns to avoid fishtailing vehicles and boat trailers.

A mile or so before you reach the boat ramp, you'll pass Horseshoe and Mesquite Recreation/Camping Areas–good RAPS for the float trip covered in the following chapter.

CAUTION: Be sure you call SRP before planning a Horseshoe take-out. If the lake is low, it may be impossible to reach the boat ramp due to the muck and sand flats.

~ Mile 107.0 - Upstream look from the northern boundary ~

GENERAL DESCRIPTIONS, HIGHLIGHTS AND CAUTIONS

From M. 107 to Red Creek (M. 129.3), the Verde is Federally designated and protected as a "Wild" River. As you'll recall, the upstream stretch from Beasley to Childs is designated as "Scenic." Wild and Scenic do most aptly describe this entire section. Except for Sheep Bridge and Horseshoe Lake, you are unlikely to encounter any other people except fellow floaters.

This is as remote as the Verde gets. Be prepared! Outside help may be days away.

Although there are fewer technical and steep rapids down here compared to the Beasley to Childs run, boaters will still be treated to enough Class II water to wet their thrill-seeking whistles.

~ Mile 126.5 - Beautifully remote ~

During higher flows (500+ cfs), most of the more challenging spots of this run are found in the first five miles. I have seen several boaters paddling, tracking and dejectedly walking back to Childs because the big water, inexperience and, perhaps, bad advice had found them with splashed and dashed hopes for a safe journey. One of these parties had hopelessly wrapped their canoe less than a mile into their trip at "Rock n' Middle" rapid.

Before casting off from Childs, take the time to scout the rapid immediately below. It is a narrow

and rocky Class II with most of the characteristics of drops that you'll encounter for 30 or more miles. Countless heavily loaded and unsteady crews have lost it here in the "Child's Play" or "Game and Fish" rapid. Not the way any of us would envision beginning a wilderness trip!

If you scout "Child's Play" and decide to line or portage it, you should not even begin this trip!

The Verde's channels and character are constantly changing. I'll try to note some of the more remarkable changes (e.g. from the floods of '93) in the River Log. It is simply amazing to witness the workings and reworkings of this wild and unimpeded River.

You've heard it before, but it requires a repeat: What you run and how you run it will greatly depend upon the level of flow. The following are some rudimentary safety reminders especially pertinent to boating in healthy cfs: Always scout if you are unfamiliar with what lies ahead, hug the inside bends of blind turns, stay away from strainers as though they were masses of slithering diamondbacks, be prepared to brace and lean in powerful eddies, lighten your bow and ride slower in the waves, always secure your gear, know how to ferry and avoid any broadside maneuvers, line or port when in doubt and always be properly dressed for a swim. It happens to all of us sometime, sooner or later.

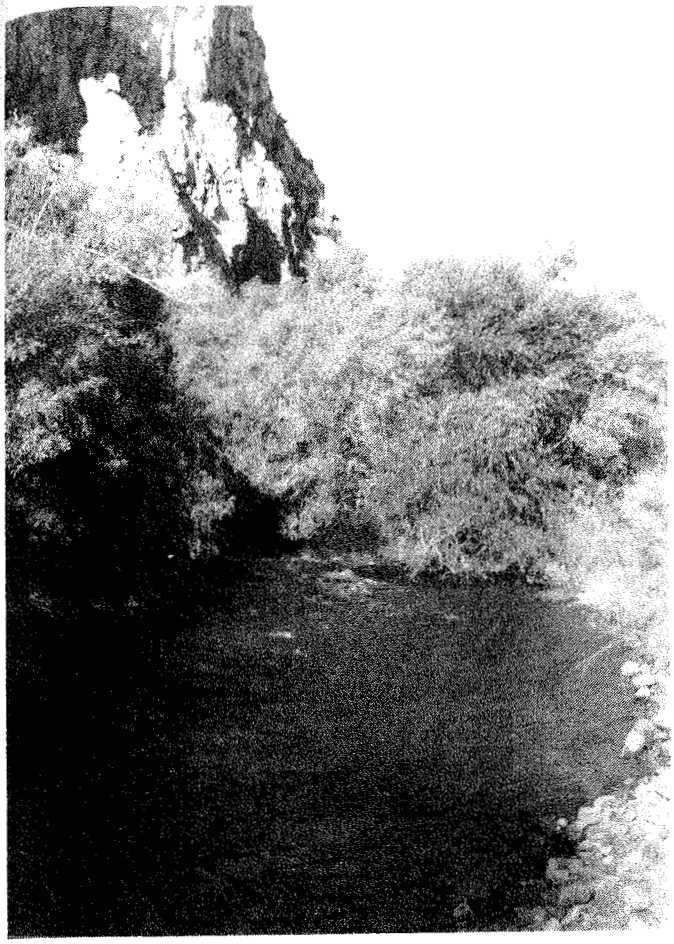
~ Mile 130.7 - "Split Shoot" - 300 cfs ~

~ Mile 130.7 - "Split Shoot" - 3,000 cfs ~

There are cautions that pertain particularly to low water as well. More boulders are showing that could kick you broadside into a pin. Even slow flow can cause irretrievable wraps, so remember your downstream lean if ever you come upon a rock or strainer. Also, with less water comes more limited options for choosing a course. There are numerous places along this stretch where the only deep channel will be the one that heads into the trees of an undercut bank. Whenever you are unsure about being able to safely negotiate any debris-choked channel, it is advisable to walk or line your gear down the inside shore.

Slower currents, brilliant sun and superb scenery can easily put any boater into a less guarded frame of mind! Always be alert in any volume of flow.

The Mazatzal (pronounced "mad as hell!") Wilderness Area sprawls to the east from the power lines (M. 107) to just above Sheep Bridge, roughly encompass-



~ Mile 125.5 - Looking upstream at a severe low water hazard spot. ~

ing the Federally protected miles of the Verde. In fact, the Mazatzal Wilderness contributed mightily to the Verde attaining its "Wild" status. This 200,000 plus acre area is about as close as Arizona comes to having true and widespread wilderness. While you are here, you can easily access the Mazatzals via many creeks and drainages that enter the Verde from miles 110 to 140.

Fossil Creek and the East Verde River enter within the first seven miles, adding considerable water especially during springtime thawing and summer monsoons. These two major tributaries are great exploration areas and decent camping spots.

Fossil Creek originates from the Fossil Springs Wilderness Area north of Strawberry, and the East Verde grows from multiple drainages off the Mogollon Rim north of Payson. Both enter the Verde on the left in a usually humble fashion that belies their importance as economic, recreational and natural resources for people well upstream.

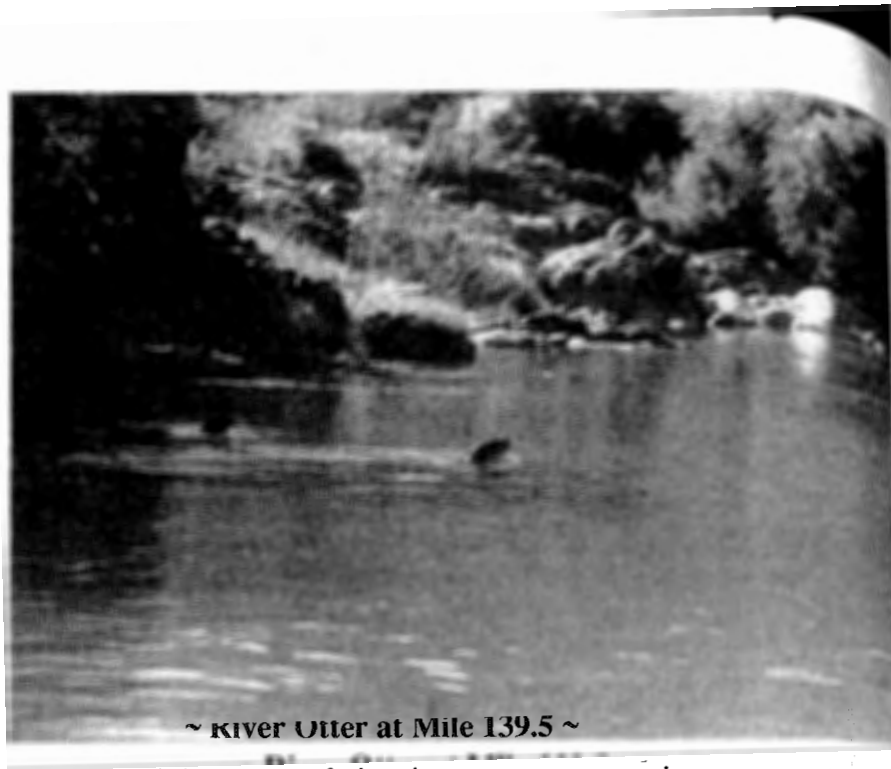
The Muleshoe Bend region around M. 125 is one of my favorites. There are many great camping and day hiking places, and the upstream and downstream views are spectacular. It is similar in feel and allure to the Gospel Hollow area (around M. 100).

Have your binocs at the ready, coast quietly in the pools, rise early and you are likely to observe an incredible array of wildlife. This is a birder's paradise! Bald and golden eagles, osprey, herons, hawks, ducks, kingfishers, mergansers, doves, cormorants, coots, and falcons are just a few of the avian friends of the River that I have observed on almost all of my trips. With luck you may spot deer, javelina, fox, coyote, bobcat, mountain lion, beaver, and, my favorite, the gregarious and personable river otter.

It really is futile to try to describe the highlights of this beautiful and remote run in such limited space. The River, the season, the flora, the fauna, the rocks and landscapes, the vistas, the weather, the sky and moon and stars, the solitude, the unpredictables, the intangibles and the people will all create for you your own highlights when you run down the "Wild"

~ Mile 110 - Looking upstream at Ike's Backbone and the entrance of Fossil Creek - 3,000 cfs ~

stretch. It is an awe inspiring place to be sure . . . so close to home, yet so far, far away!



~ River Otter at Mile 139.5 ~

RIVER MILE LOG

Mile 106.6 - The Childs RAP.

Mile 106.7 - Game and Fish or Child's Play rapid. Please refer back to the Cautions portion of this chapter. Heavily bloated tubers and heavily loaded canoes have had troubles here. Scout it down the left shore. Once you pass the narrow top opening, it is usually best to run it slightly right of center. Child's Play continues until about M. 106.8.

Mile 107.0 - Elevation 2,600 - You'll run a noteworthy Class I+ drop, go beneath the power line, zig to the right shore, hit a small riffle and then reach a truly significant and symbolic spot at M. 107.2. Here is the northern boundary of the "Wild" Verde. In all of Arizona, the Grand Canyon State, there is only one little sign like that one on the right. The Verde was added to the National List in 1988. Efforts are underway to get many more Arizona streams and rivers earmarked for protection, but as of 1996, this is it. Advocates of riparian area preservation must pull together, both literally and figuratively, to help this sign continue to be the beacon of hope for increased efforts for adding more waterways to the National Wild and Scenic Rivers System.

The Wild and Scenic Rivers Act of 1968: "Wild River Areas - Those rivers or sections of rivers that are free of impoundments and generally inaccessible except by trail, with watersheds or shorelines essentially primitive and waters unpolluted. These represent vestiges of primitive America." Amen! Now, on down Arizona's one-of-a-kind . . . .

~ Mile 106.7 - "Game and Fish " or "Child's Play" Rapid ~

Mile 107.5 - Rock 'n Middle Rapid. This tricky Class II rapid has claimed more than its share of victims because or the narrow and rocky top portion and the big rock itself. This rapid is one of those that is more technical in moderate to low flows (500 cfs or less). It takes some slick paddle work to avoid the rocks at the beginning, some of which could easily veer you broadside at a bad time. If you have the faintest doubts about getting safely down the upper lip, you should consider lining down the right side. If all goes well in the top, you'll want to immediately start to draw hard right to

HORSESHOE DAM (M. 149) TO BARTLETT LAKE (M. 169)

~ Horseshoe Dam ~

- Total River Miles - 20 miles
- Elevation Drop - 1,920 to 1,620
- Average Drop - 15 feet per mile. Of course, much of this "drop" is below Bartlett.
- Class - Class I and II. See the Cautions section.
- Topo Maps - Horseshoe Dam, Lion Mtn., Maverick Mtn., and Bartlett Dam
- Shuttle Time - 2 hours
- Days Needed - 1 to 2 days

RIVER ACCESS POINTS ~ RAPS ~

Horseshoe Dam (M. 149) - From the town of Cave Creek, take Cave Creek Road (FR 205) east for seven miles until you see the signs for the lakes. Hang right and proceed for six miles to the Horseshoe turnoff. Now you are in for 10+ miles of washboard. Be watchful for boat trailers and speeders fishtailing on the slopes and turns.

A mile or so past Mesquite Recreation Area, you'll see FR 205A and access to Horseshoe Recreation Area. Follow 205A for a mile and you'll be at the base of Horseshoe Dam.

Horseshoe and Mesquite Recreation Areas (M. 150 - 151) - These two riverside areas offer easy access and ample camping spots. Port-A-Johns are the only "facilities." Bring your own firewood. Too many trees have been tortured already.

~ Devil's Hole RAP - Mile 156.4 ~

~ Mile 153.2 ~

No gas or supplies are currently available at Bartlett, so stock up in Carefree or Cave Creek before you start your trip.

GENERAL DESCRIPTIONS, HIGHLIGHTS AND CAUTIONS

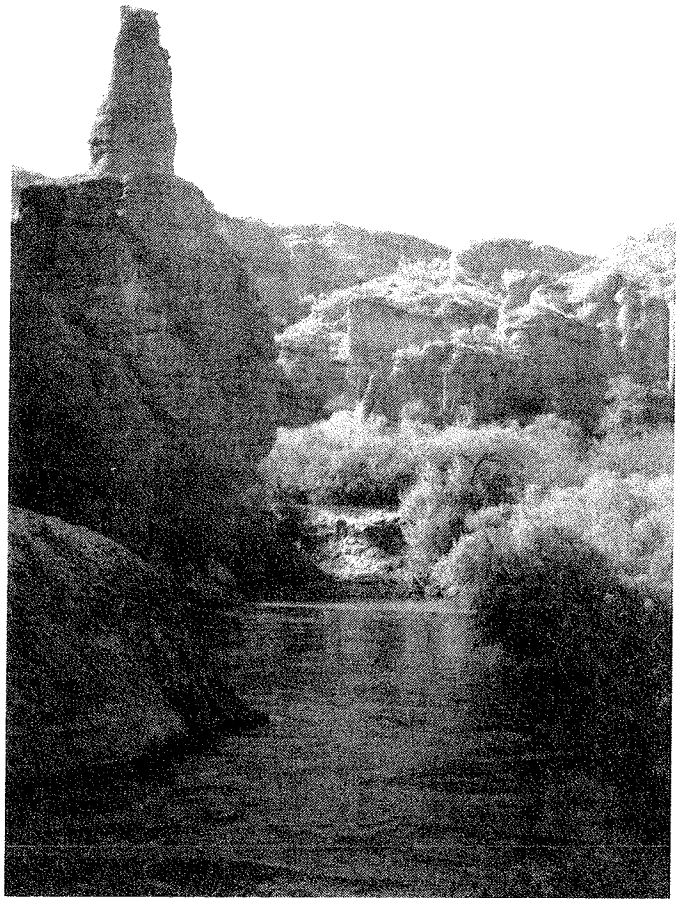
The story of Horseshoe Dam is a classic story of water "trade off" and "compromise" – two concepts so common in the history of Arizona's water resource management. The story begins in the 1940's. World War II brought about a dire need for increased copper supplies. Phelps Dodge Corporation, a giant in copper mining then and to this day, was in the call to up its production by virtually any means possible. Increasing their output of copper required securing additional sources of water. So, a complicated agreement was expeditiously struck between Phelps Dodge/Morenci Mine and the Salt River Project. Phelps Dodge was allowed to divert water from the nearby Black River. The Black is a major tributary of the Salt and therefore a large contributor to SRP's customers. In return, Phelps Dodge had to construct a dam on SRP's other major source of river water – the Verde. That dam, completed in 1947, is Horseshoe.

Standing to this day, Horseshoe Dam holds in its bowels, bowels equally owned by SRP and Phelps Dodge, a history and statement of the complicated "rights" and wrongs of Verde River resource management.

A bit of Bartlett Dam history will be covered in the next chapter.

In the 1980's, the Verde damn near suffered more "water storage projects." One of those was to be on this stretch and the other 40 miles down near the Salt/Verde confluence. In the vicinity of mile 154, a

~ Notes ~



~ Mile 154.2 ~

dam called Cliff was proposed as a component of the notorious and controversial "Plan 6." Space won't permit a detailed account of the plot and characters of "Plan 6." Suffice to say that all of the heavy hitters from every quarter of federal, state, municipal, tribal, intergovernmental, private, public, corporate, environmental, etc., interests embroiled themselves in a perplexing fray over Colorado, Agua Fria, Gila, Salt and Verde waters. The fray continues to this day.

Portions of "Plan 6," such as Central Arizona Project Colorado River agreements, and enlarged and/or reconstructed dam sites on the Agua Fria and Salt have happened. But Cliff on the Verde has been shelved. As each year passes, it gathers more appreciative dust.

Contributing mightily to the demise of Cliff was nature's own heavy hitter, the endangered bald eagle.

A sign at M. 153.2 announces your entry into this prime eagle nesting habitat. It is a splendid area relatively free from the heavy impact so obvious above and below. In fact, the miles between 153 and 158 are not unlike portions of the Wild and Scenic Verde. Critics of public policies that protect our dwindling natural riparian regions should float through here and imagine the scene had it been inundated by Cliff.

As with everywhere in the entire Verde watershed, Indian ruins and relics, above reservoir waterlines, can be found. Happening upon a site of untouched ancient history is a rare thrill these days, but it can happen even throughout this widely traveled region. All finds must be left exactly as they lie.

In 1992, a major dig began just off the road between Horseshoe and Mesquite Recreation areas. You can't miss it. It will be intriguing to watch the progress of this excavation as it will no doubt shed more light on the rich history of settlements along the lower Verde.

~ Excavation Begins in 1992 ~

~ Mile 157.4 - Bartlett at 90% ~

~ Notes ~

~ Mile 149.4 - 400 cfs ~

This run could be called the "Dam Run" of the Verde. Pinched between Horseshoe and Bartlett, the Verde's flow is entirely dependent upon SRP releases from above and the lake level below. If Bartlett is at or near capacity, the Verde turns to lake just seven miles down from Horseshoe Dam. When Bartlett is down, you may have a dozen or so miles of flow.

A call to the SRP flow line and live discussions with SRP hydrologists are mandatory precautions during your trip planning. Releases from Horseshoe have ranged from an unfloatable nil to tens of thousands of cfs. Talk to them and try to pin them down on projected releases for your days on the river.

During wholesale releases from the dam, the upper part of this run should be considered hazardous and off limits to all except highly experienced desert river boatmen.

The decades of absence of nature's scouring floods have left this dam-controlled stretch a sadly confused affair. Riverside growth has flourished and crept into the braided channels just waiting to seriously snag boats and boaters. Be extremely cautious during all flows. Most mishaps happen between the dam and Mile 152, so putting on at the KA RAP is your safest choice.

During normal releases, this run has several Class I and perhaps some Class II rapids at miles 149.3, 153.1 and 155.4. The elevation drop is significant enough to give you a nice swift ride for most of the first third of this run. Again, it is the dastardly

~ Mile 150.9 - 400 cfs ~

strainers that provide the challenge. Because of them, the Class II rating for the whole of this run is very well-deserved.

The Verde's channels are constantly changing and presenting boaters with new obstacles and challenges. Trust your eyes and ears and be careful.

All in all, this pinch of the dams run is well worth your time. Late fall and winter floats are especially rewarding; fewer people congregate, the weather is cool and the beautiful wildlife and scenery seem at greater peace with the river.

RIVER MILE LOG

Mile 149.3 - Elevation 1,920 - Horseshoe Dam RAP and pool.

Mile 149.3 - The pool ends at mile 149.3 with a potential Class II rapid. It definitely has enough rocks and current into trees to dump you just as you've started out. Depending upon the flow, it would be wise to scout it for danger points.

Mile 149.4 - After "Dam Pool Drop," you'll run a lengthy low level rapid with some swivel to it.

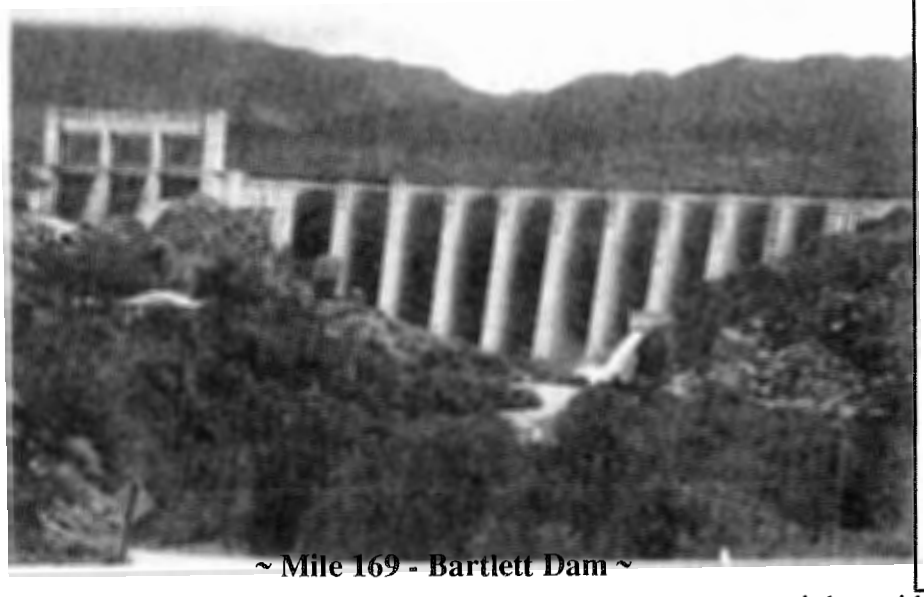
Mile 149.7 - Horseshoe Recreation Area. When upon the main channel, you'll likely not see this RAP. It is bordered by a small and slack braid heavily used by anglers.

Mile 150.0 - Elevation 1,900 - The Verde pools up to M. 150.5. Here you may see what appears like a river-wide levee. Now the Verde splits and braids into a myriad of rivulets. I've found the best luck by cutting right at the earliest offering. This is a region that is notorious for strainers, so look well ahead and keep to the inside of any blind turn. A broadside into a strainer even at slow flow can cause an irretrievable pin! The right channel contains several small riffles during its passage by the Mesquite RAP at mile 150.6. The left channels, I've found, contain more strainers and debris. You're also farther from help if the need should arise. Again, because of the unpredictable nature of miles 150 to 152, you should consider putting on at KA RAP.

~ Mile 149.3 - Dam Pool Drop ~

BARTLETT DAM (M. 169) TO THE SALT RIVER CONFLUENCE (M. 195) "THE LAST GASP OF THE VERDE"

- **Total River Miles - 26 miles**
- **Elevation Drop - 1,600 to 1,320**
- **Average Drop - 10 feet per mile**
- **Class - Class I with one Class II rapid at "Last Gasp"**
- **Topo Maps - Bartlett Dam, Fort McDowell and Granite Reef Dam**
- **Shuttle Time - Three to four hours**
- **Days Needed - Two or more. A long day trip is possible for strong paddlers who have healthy flow (500 or more cfs).**



~ Mile 169 - Bartlett Dam ~

RIVER ACCESS POINTS ~ RAP ~

Riverside Campground M. 169.5 - Please see the previous section for directions to Bartlett Lake. Just before you reach the parking and boat ramps for the lake, take a right at the sign for Riverside Campground. It is a couple of miles down FR 162 to the multiple RAPS below the dam. Getting right to the river's edge may require a four-wheel drive vehicle because of the sand and wide expanses of river rock.

Mile 171.0 - Contrary to the topo maps, there is no motorized access here due to the protected wildlife breeding area. As you'll see, this spot suffers severe abuse nonetheless from boon docking litterbugs – creating a sorry sight amidst such splendid desert scenery.

Needle Rock - (M. 175.5) - From your put-in at the dam, proceed back out the Bartlett Road to Cave

~ Mile 171.0 ~

~ Upriver from Needle Rock RAP - Mile 176 ~

GENERAL DESCRIPTIONS, HIGHLIGHTS AND CAUTIONS

First, a small grain of Bartlett Dam history: Although economic and legal battles for Verde River water storage projects had raged since before World War I, it took until 1935 for the Paradise Water Users Association (primarily an agricultural group and dovetail of the SRP) and the Federal Government to come to terms and enact contracts to construct Bartlett. When the first of the two major dams of the Verde was completed in 1939, Bartlett provided an extra 180,000 acre feet of storage for the 13,000 square mile Verde-Salt watershed, and it had the distinction of being the world's highest multiple arch dam.

Like the Horseshoe run, the flow of the Verde here is almost entirely dependent upon SRP's releases for their customers in the Valley. Mother Nature, economics and contracts, rather than floatworthy flow, dictate how much green gold goes down. At times, the releases from Stewart Mountain Dam on the Salt may be enough to fill the bill, so flow from Bartlett may be choked to 100 cfs or less. It is a mandatory caution not only to call the flow line, but also to talk with SRP hydrologists just prior to your trip.

The 1993 floods befuddled the Verde's course here (especially from Needle Rock to the bridge) perhaps more than any other stretch. They cut such a wide swath of channel destruction that it may be decades before the Verde regains some semblance of unity. The poor river meanders, fans out and becomes paper thin like peeling skin in so many places that even between 100 and 200 cfs you really have to pay attention to keep from poling and walking too much. You've got to be a dedicated and patient low-water enthusiast if you float here during meager releases.

Needless to say, severe damage was done as well to the trees, shrubs and delicate desert shorelines in 1993, so floaters should always be aware of undercut banks and strainers. Debris has been deposited in several places that may require you to walk or line. By whatever means possible, avoid broaching on any strainers or debris. At best you may flush free, but at

~ Mile 174.2 ~

~ Mile 181.3 ~

worst you may have a wrapped boat and entrapped boaters.

Alcohol is involved in almost all of the boating, tubing and swimming accidents upon this heavily used stretch. Moderate your consumption, drink a lot of fresh water and wear protective clothing to avoid dehydration and impaired judgment.

The Class II rapid at "Last Gasp" about a mile from the confluence is the one and only noteworthy drop. In elevated flows, however, there are many chutes and rock bars that can have some push and waves. The floods created new riffles and washed some away, but surprisingly most remain in close proximity to their pre-flood locations. All hell can break loose, but elevation drop remains generally the same.

From the dam to Needle Rock, you'll be treated to some of the most gorgeous desert scenery anywhere. People who dismiss this stretch from their to-float lists have probably visited only the flattened and abused areas of the lower reaches. Mile 169 to Mile 175 is a dandy of a day trip.

What the whole of this run may be lacking in eye-catching topography, it more than compensates with its rich array of wildlife. Winter birding counts can exceed a hundred species and it is not uncommon to see beaver, coyote, deer, javelina and enormous bass and catfish. Bald eagles are making a fine comeback here, especially where you'll see signs for protected habitat around Mile 181.3 and Mile 171.0.

History buffs will find points of interest on the Fort McDowell Reservation. The Fort McDowell site shown on the topo near M. 187.8 was an important military post established for protection of settlers throughout central Arizona during the wars against the Tonto and Pinal Apache tribes from 1865 to 1886. Its function as a post ended in 1890, and by Executive Order it was established as a reservation in 1903 for the Yavapai and Mohave Apaches.

Camp Reno, a small outpost of Fort McDowell from 1866 to 1868, was located near the junction of Beeline Highway and the reservation road. Near that spot as well is the burial site for the famed Apache physician, Dr. Carlos Montezuma. Historical markers for Camp

~ Near Mile 187.8 ~

Reno and Dr. Montezuma stood near the junction prior to the ADOT road construction in the early 1990's. I hope they reappear.

If you plan to camp, hunt, fish, gather wood or travel off-road anywhere between M. 181 and the confluence, you must request a permit. Check at the store near the junction or contact tribal offices for more information.

Now, on down the last glimpses and "Last Gasp" of the Verde River . . . .

RIVER MILE LOG

Mile 169 - Elevation 1,620 - Putting in right below the dam is pretty well off limits now.

Mile 169.3 - Riverside Camp Areas and floaters' access begins. For the next half mile or so, you'll have numerous choices for put-ins. You may be wise

~ Mile 169 ~

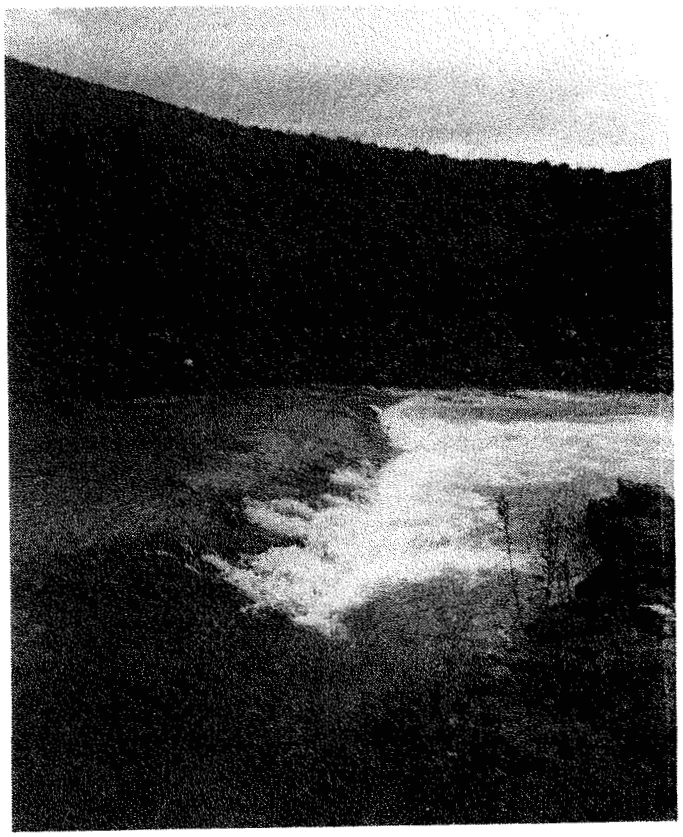
to scout your RAP on foot before driving down unless you have a high-clearance four-wheel drive vehicle.

Mile 169.5 - The current can be pretty swift here during high flows. Around 169.5 you'll hit some small rock bar riffles very characteristic of what you'll see all the way to Needle Rock.

Mile 170.0 - Elevation 1,590 - Lots of folks and lots of impact at the hub of Riverside Recreation area on the right. Most casual floaters and tubers choose this spot for their put-in.

Mile 170.2 - The river pools a bit behind the small riffle at M. 170.2. Contrary to the topos, there is only one channel to the right here now. Later years? Who knows?

Mile 170.4 - Below the house on the right at M. 170.4, low water boaters should beware of a small ledge with surprising recirculating power. Running far left is pretty clear. This is a wash in higher flows.



~ Mile 170.4 ~

ATTACHMENT C

Historic Accounts of the Verde River

EXPLORATIONS AND SURVEYS FOR A RAILROAD ROUTE FROM THE MISSISSIPPI RIVER TO THE PACIFIC OCEAN.
WAR DEPARTMENT.

ROUTE NEAR THE THIRTY-FIFTH PARALLEL, UNDER THE COMMAND OF LIEUT. A. W. WHIPPLE,
TOPOGRAPHICAL ENGINEERS, IN 1853 AND 1854.

REPORT

UPON

THE INDIAN TRIBES,

BY

LIEUT. A. W. WHIPPLE, THOMAS EWBANK, ESQ., AND PROF. WM. W. TURNER.

WASHINGTON, D. C.,
1855.

Between the Colorado Chiquito and Rio Gila roam two bands of Apaches, called Coyoteros and Pinal Leñas, consisting probably of 300 warriors, or 1,500 persons each. They live among the mountains, and occasionally cultivate patches of soil, producing wheat, corn, and squashes. In one instance a field of cotton was discovered near their rancherias. However, not being fond of quiet pursuits, they subsist partly upon roasted mescal and piñon nuts, which they find in their wanderings, and place their main dependence for support upon forays into Sonora, proving a great scourge to the Mexican frontier. They are not wanting in native shrewdness, and, though generally hostile to parties of white men whom they may meet, they have been known to receive Americans into their country with kindness and hospitality. There are some fine valleys and many fertile spots within their limits, and, if they were willing to work, they well know how to subsist without plunder.

We now reach the San Francisco mountains, and enter the hunting-grounds of the Cosninos. They are said to roam northward to the big bend of the Colorado. The vast region toward the south, lying between Rio Verde and the Aztec range of mountains, is occupied by Tontos; while west and northwest of that range, to the mouth of Rio Virgen, are found a tribe calling themselves Yabipais, or, as sometimes written, Yampais. Their numbers are estimated at 2,000 each. Leroux and Savedra believe these three to be allied tribes; but there exists some doubt upon the subject. The language of the latter proves that they have an affinity with the Mojaves and Cuchans of Rio Colorado; while, according to Don José Cortez, the Tontos belong to the Apache nation. I have myself found Tonto villages intermingled with those of Pinal Leñas, north of Rio Gila, with whom they lived on friendly terms, with like customs and habits; except that they subsisted almost exclusively upon mescal and piñones,* and possessed none of the fruits of agriculture. Yet the country they now occupy shows traces of ancient acequias, and has extensive valleys of great fertility, which might again be cultivated.

Mr. Leroux, on his return from California to New Mexico in May 1854, followed the river Gila from its mouth to the Pima village; and thence crossing over to the junction of the Salinas with Rio Verde, ascended the latter stream for some distance, and crossed from it to our trail upon Flax river.† He represents Rio Verde‡ as a fine large stream; in some cases rapid and deep, in others spreading out into wide lagoons. The ascent was by gradual steppes, which, stretching into plains, abounded in timber—pine, oak, ash, and walnut. The river banks were covered with ruins of stone houses and regular fortifications; which, he says, appeared to have been the work of civilized men, but had not been occupied for centuries. They were built upon the most fertile tracts of the valley, where were signs of acequias and of cultivation. The walls were of solid masonry, of rectangular form, some twenty to thirty paces in length, and yet remaining ten or fifteen feet in height. The buildings were of two stories, with small apertures or loop-holes for defence when besieged. From his description, the style of building seems to be simi-

* Piñones are edible nuts, from a species of pine tree which grows abundantly in this region.

† Rio Colorado Chiquito.

‡ This river is called by Mr. Antoine Leroux, Rio San Francisco. He passed along it with a small party in the summer of 1854. The following description of the country and the rivers referred to has been kindly furnished to accompany this report:

Extract from Leroux's Journal, on his last trip from Pueblo de los Angeles, California, to New Mexico.

"*May* 16, 1854.—This morning left Rio Gila, and camped on Rio Salado.

"*May* 17.—Camp on Rio San Francisco. From last camp here, road hilly and stony; wood, grass, and water plenty. During the day we saw and examined the ruins of some abandoned Indian villages.

"*May* 18.—Camp on San Francisco. To-day, tolerably good road, wood plenty, splendid water, and grass rich. Woods are the walnut, cotton, locust, sycamore and willow trees.

"*May* 19.—Camp on San Francisco. Road pretty good, but we were obliged to ford the river about ten times. Wood, water, and grass in abundance.

"*May* 20.—Camp on San Francisco. Road hilly and stony, but still easy enough to travel. Water splendid; grass plenty; cotton-wood, ash, sycamore, &c., in quantities.

"*May* 21.—Camp on San Francisco. While nooning in the morning, we were struck by the beauty of some ruins, very likely those of some Indian town, and being in the centre of an open valley. The walls of the principal building, forming

lar to the chichiticale, or red house, above the Pimas, rather than like the Indian towns of New Mexico. In other respects, however, Leroux says that they reminded him of the great pueblos of the Moquinos. The large stones of which those structures were built, were often transported from a great distance. At another place he saw a well-built town and fortification about eight or ten miles from the nearest water. He believes that, since they were built, the conformation of the country has been changed, so as to convert springs and a fertile soil into a dry and barren waste. The idea is not a new one; Capt. Simpson advances something like it. This conforms to the Indian traditions of the Montezuma era, attributing to the high mesas an arable soil; and also partially accounts for the desertion of some of the more recent pueblos of New Mexico.

Upon the Colorado Chiquito (Flax river) were extensive traces of ancient ruins, some of which have been well represented in a report by Captain Sitgreaves. The Cosnino caves had been plastered with mortar, showing more artistic skill than is practised by the present occupants of the country. At Pueblo creek were found remains of towns and of fortifications crowning the surrounding heights, and overlooking Aztec Pass there are similar ruins. Westward, down Williams river to Rio Colorado and thence to the Pacific, no vestige of such ruins was seen. Yet means of subsistence are not wanting. There are fertile spots and permanent water in the valleys.

In the vicinity of Williams river, game is abundant; the rocky cliffs and barren-looking hills produce maguey plants; multitudes of the fruit-bearing *cereus gigantius* and mezquites grow in the valley; affording a sufficient supply of the usual Indian food. The inference, therefore, seems to be, that the belt of country previously crossed was indeed the track of the ancient pueblo builders; and that, according to tradition, they proceeded from the northwest to the upper waters of Rio Colorado. There they divided; portions ascended by the San Juan, Cañon de Chelle, or the more easterly branches of that stream, toward the centre of New Mexico; others, passing over to the waters of "Rio Verde," descended its valley to Rio Gila, and thence continued, perhaps, to the present city of Mexico. This theory of migration is considered nearly obselete, and ought not to be revived, provided another, more probable, may be suggested for the desertion of the ruins in the regions referred to. Upon the lower part of Rio Colorado no traces of permanent dwellings have been discovered. The same remark is applicable to Rio Gila below the junction of the Salinas, although upon the rocks there are many inscriptions similar to those found near Zuñi and at Rocky Dell creek.

The tribe that now occupies the region from Pueblo creek to the junction of Rio Verde with the Salinas is called Tonto. The word in Spanish signifies *stupid*, but Mexicans do not apply that signification to these Indians; on the contrary, they consider them rather sharp, particularly at stealing. Therefore, as it is not a term of reproach, we may reasonably suppose that, as is frequently the case, it is the Indian name corrupted, perhaps, by Spanish spelling. It is

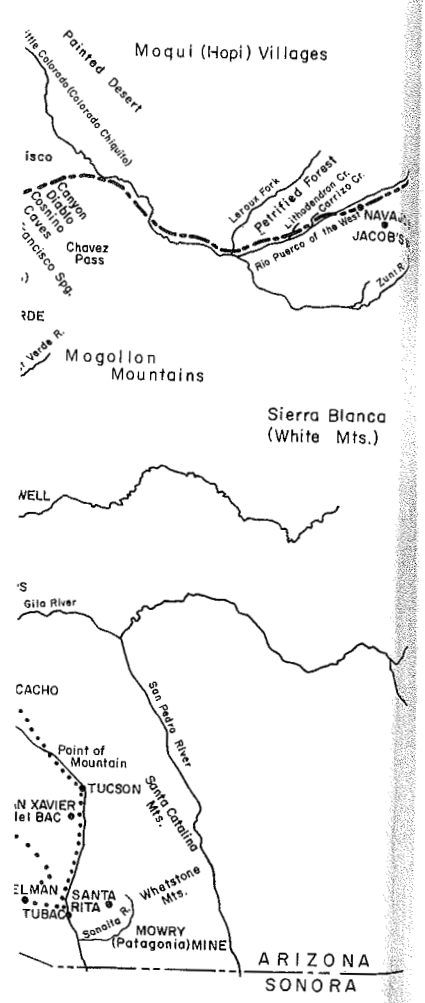
a long square, are in some places twenty feet high and three feet thick, and have in many places loop-holes like those of a fortress. The walls were as regularly built as those of any building erected by civilized nations; to judge by the decay of the stones, these ruins might be several centuries old, (maybe those of some Montezuma town.) Heaps of broken and petrified vessels are strewn in all directions. Near camp are the ruins of another Indian village. These ruins show that this country was once under cultivation; who were its inhabitants, and what became of them, is hard to tell. Road hilly, but of easy access everywhere. Grass and water in abundance.

"*May* 22.—Camp on San Francisco. Road very hilly, but practicable; plenty of wood and water. To-day we ascended and descended two high mountains (*à pied*) which looked just like the crossing of the Alps. Our camp is on a ridge of a most delightful valley, having the river to our left, gigantic rocky mountains on both sides, and under centenary trees.

"*May* 22 *and* 23.—Camp on San Francisco. Road good, grass plenty, and wood in abundance as well as water. On the night of the 22d we had an attack from some Indians, called the Tontos of the Yampais nation. Although a quantity of arrows were shot into camp, still neither men nor animals were wounded.

"*May* 24.—Camp on a small creek. Left Rio San Francisco this morning. The creek we are camped on runs between two chains of very steep and rocky mountains. In the afternoon we crossed a mountain about 1,500 feet high; the crossing was performed in two hours.

"The creek we are camped on is a tributary of the Rio San Francisco, and runs into it from the east. Road tolerably good, grass plenty, and water and wood in abundance. The district passed over is mostly covered with old ruins."



The Arizona of JOSEPH PRATT ALLYN

Letters From a Pioneer Judge: Observations and Travels, 1863–1866

JOHN NICOLSON
editor

THE UNIVERSITY OF ARIZONA PRESS
TUCSON · ARIZONA

About the Editor . . .

JOHN ALLAN NICOLSON's studies of the American West have centered on its intellectual history, focusing on such diverse areas as the cultural impact of Chinese immigrants and motion pictures on American life. A holder of a Ph.D. from Claremont Graduate School, he has taught on various California campuses, at Prescott College in Arizona, and at Northern Arizona University. He also has made contributions to scholarly journals.

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Territory and the only real government there, pending the arrival of Goodwin. At a council meeting twenty miles from the fort, it was decided by the officials and the general that the expedition would proceed not to Tucson but, instead, to a new fort to be built at Whipple in northern Arizona. This location was already reputed to have hordes of miners working the placers in the nearby hills.[57] Tucson was considered by some to be too Confederate and Mexican in sentiment and influence — factors which might prove hazardous for the fledgling Union government.

Two of the three companies of Missouri escort cavalry[58] were now detached from the rest of the train, and they regretfully headed back to their base at Fort Leavenworth in the dead of winter. The remainder of the party, with General Carleton guiding, proceeded to Santa Fe, passing the battlefield of Pigeon's Ranch[59] where Confederate Texans had recently gone down in defeat.

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more effectively against hostile Indians and protect the all-important Santa Fe Trail. In 1861 a second and more rugged fort was built to use as a base for the defense of New Mexico against Confederate forces coming up from El Paso under the fort's pre-war commander, General Henry H. Sibley. After the defeat of the Southerners, a third fort was constructed, beginning in 1863 under orders of the new Union commander, General James H. Carleton. Most of the adobe ruins at the site are those of this third fort, under construction when Allyn passed through. (National Park Service, U.S. Department of the Interior, *Fort Union National Monument, New Mexico;* Ray C. Colton, *The Civil War in the Western Territories.*)

[57] *Hartford Evening Press,* December 21, 1863. For the mining situation around Prescott at this time see Harwood A. Hinton, "Frontier Speculation: A Study of the Walker Mining Districts."

[58] The Fort Union post returns for November 1863 state that 124 men of Companies A and H of the Eleventh Missouri Volunteer Cavalry under Major James A. Philips, arrived on November 9 and left for Leavenworth the following day. (*Returns from U.S. Military Posts 1800–1916.*) No mention is made in the Fort Union records of a third company. However, it is clear that a company of Missouri cavalry remained as part of the Allyn party's escort. The Fort Whipple post returns for January 1864 mention Company H of the Eleventh Missouri Volunteer Cavalry as having arrived with Governor Goodwin. (*Returns from U.S. Military Posts 1800–1916.*) The *Miner* (March 9, 1864) states that Company H of the Eleventh Missouri Volunteer Cavalry continued on to Prescott and that Company I of the Fourth Militia Cavalry and Company A of the Eleventh Volunteer Cavalry had returned to Leavenworth under Major Philips. This disagrees with the Fort Union post records but is probably correct.

[59] *Hartford Evening Press,* December 21, 1863. A battle between Union and Confederate forces took place at Pigeon's or Pidgin's Ranch March 28, 1862. After the destruction of their supply base, the Southerners were forced to retreat to Santa Fe. (Joseph Miller, Henry G. Alsberg, eds., *New Mexico, A Guide to a Colorful State,* pp. 76, 140–41; Martin Hardwick Hall, *Sibley's New Mexico Campaign,* pp. 141–60.)

Santa Fe was, initially, a disappointment to the New Englander used to the smooth, simple symmetry of Connecticut clapboard and brick. To Allyn the soft, tawny adobes were rather rude, shapeless, and undistinguished as architecture. The town square, unlike its eastern counterpart was adorned, he wryly noted, with a rickety fence and some half-dead trees. To top it all, the expedition was rather coolly received. There was no immediate official parade or reception, which is not surprising, considering Mexican reserve and the fact that the annexation was scarcely a score of years distant. Moreover, the Confederates had but recently ruled the city. Social relations with the women of the Mexican aristocracy were infrequent for Americans. The daughters of the great families were usually to be seen only at mass, since they rarely left the seclusion of their adobes. With its population of five thousand, including two hundred Anglos, Santa Fe was a strangely silent, peaceful place. In fact, the only sound heard as Allyn walked about the streets was the "crack of billiards."[60]

But one local institution helped to ameliorate the social disappointments of the expedition members: after months of plain and mountain, the female society provided by the local *baile* or fandango was distinctly appealing. These entertainments took place in narrow *salas* lined with benches. Two or three musicians performed at one end of the room, but the most interesting feature of all was the coterie of ladies known as the "Santa Fe Sixteen." Their number included a handsome Mormon woman who, it was said, had been an original member of the "famous hegira" to Utah.[61] She had later run away with an army detachment on its way to Santa Fe. Allyn was charmed, and observed that she dressed in style, was a brilliant dancer and conversationalist, and was obviously the belle of this "demimonde." The female entertainers danced and sang without vulgar word or gesture. They did not flirt with the guests, and Allyn was told that the reason for such discretion was the fear of reprisal by their lovers.

Reluctantly leaving the "unequaled" climate of Santa Fe and its lavish farewell entertainments, the train headed south and west, enjoying additional Mexican hospitality in ranchos and villages along the way. Allyn and the Americans particularly savored the entertainment given by the families of Albuquerque on the Rio Grande,

[60] *Hartford Evening Press,* December 24, 1863. Quotations and descriptions in the following two paragraphs are from this same source.

[61] The "famous hegira" to Utah took place from 1846 to 1851.

but the wagon train lost a week of good weather, which was sorely regretted later. The territorial party was joined in its final stages by Lieutenant Colonel José Francisco Chaves,[62] stepson of Governor Connolly[63] of New Mexico and a member of the famed Kit Carson regiment. Chaves was a veteran of the 1860–61 Navajo campaigns, and his intimate knowledge of the territorial terrain was to expedite the column's passage through the wilds of northern Arizona. Chaves now commanded, in addition to the one remaining company of Missouri cavalry, a detachment of the First New Mexico Volunteer Cavalry and a few soldiers of the First California Infantry Volunteers.[64] The officials of the party were assigned three army ambulances to ride, while the official baggage and provisions and animal fodder were carried in a train of sixty-six mule-drawn wagons.[65]

The expedition was to follow the westward route from Albuquerque which had been pioneered in 1853 by Amiel W. Whipple.[66] It would take Allyn west to Fort Wingate, south to Zuni, and thence

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[62] Lieutenant Colonel José Francisco Chaves (Chávez) was born in 1833. A native of New Mexico, he was a member of a noted family which had produced many leaders in the territory. As an officer of the First New Mexico Cavalry, he commanded the joint Missouri and New Mexican units which accompanied the governor's party from Santa Fe to Whipple. Leaving July 6, 1864, he pioneered the military and wagon road through the pass, which was later named for him. This route saved some eighty miles over the Whipple route. It began at modern Camp Verde, paralleled West Clear Creek to Long Valley, and from thence traveled northeast through Chavez Pass near Soldier Lakes and on to the Little Colorado beyond Winslow. (Arizona Historical Society Biographical File; *Arizona Miner,* July 6, 1864.)

[63] Henry C. Conolly (Connelly) was an intermediary between Manuel Armijo, the Mexican governor of New Mexico, and General Stephen Watts Kearney during the Mexican War. He was later elected governor of New Mexico in 1850 and was again governor at the time of the Confederate invasion in 1862. He died in office. (Bancroft, *Arizona and New Mexico,* pp. 413–16, 448, 633, 690, 705.)

[64] James H. McClintock, *Arizona: Prehistoric, Aboriginal, Pioneer, Modern* 2:315; Thomas Farish, *History of Arizona* 3:68. McClintock says that Chávez had ten men of Troop E of the New Mexico Volunteer Cavalry, Farish says thirty men. McClintock says possibly two companies of the First California Infantry had preceded the governor's party west. Farish says that nine California soldiers wanted to go to Fort Whipple and so joined the party at Wingate.

[65] McClintock, *Arizona* 2:315.

[66] Grant Foreman, ed., *A Pathfinder in the Southwest: The Itinerary of Lieutenant A. W. Whipple During his Explorations for a Railway Route from Fort Smith to Los Angeles in the Years 1853 & 1854,* pp. 112–97. Amiel Weeks Whipple was a graduate of West Point assigned to the topographical engineers. He participated as chief astronomer in the Mexican-U.S. boundary survey in 1851. From 1853 to 1856 he was employed in locating the railroad route to the Pacific, which he graphically described in his *Explorations and*

west again across the Arizona line to Navajo Springs and the Little Colorado. Following this river westerly to the vicinity of the San Francisco Peaks near present-day Flagstaff, Allyn's party was to swing around the northern slope of Bill Williams Mountain and south across Hell's Canyon to the headwaters of the Verde River, where Fort Whipple had been established and garrisoned by troops of the California Column.[67]

Danger from possible Navajo attack and scarcity of water urged the wagons along at a steady clip. The marching day often began at 2:00 A.M. instead of the usual 6:00, the trek broken only by monotonous dinners of sardines, buffalo tongue, and water. On one occasion a colorful Indian funeral dance was observed, following which the deceased was buried in a grave packed with bread. Sandy and stony trails slowed the caravan's pace toward Fort Wingate.[68] At the Mexican village of Cubero[69] they danced their last fandango. Closing the festivities, the Americans sang "When this Cruel War is Over."

Wingate was the final outpost of civilization until Whipple. Here the territorial party came face to face with the Navajo tragedy. Allyn had already noted that along the party's route the former pastures of the tribe were now empty of stock. Numbers of Navajo captives, utterly destitute and forlorn, were being readied for transfer to a reservation established by General Carleton near Fort Sumner in eastern New Mexico.[70] After leaving Fort Wingate, the official party crossed the 109th meridian and entered the new territory of Arizona.

Allyn began his Arizona correspondence with a letter mailed

Surveys for a Railroad Route from the Mississippi River to the Pacific Ocean. He became a brigadier general in 1862 and was mortally wounded in 1863 at Chancellorsville. (Ibid. pp. 7–9.)

[67] The place names and locations mentioned in this paragraph are identified as encountered in Allyn's letters.

[68] Fort Wingate was established in October 1862 about twenty miles southwest of Mount Taylor, New Mexico. In July 1868 it was moved to a location just east of Gallup. (Prucha, *Guide to Military Posts,* p. 177.)

[69] *Hartford Evening Press,* February 12, 1864. Cubero lies some fifty miles west of Albuquerque.

[70] *Hartford Evening Press,* February 12, 1864. Fort Sumner was established by Colonel Kit Carson at Bosque Redondo on the Pecos River in eastern New Mexico. Some 7000 to 9000 Navajos were held there from 1863 for five years before being permitted to return to their old reservation. (Lynn R. Bailey, *Bosque Redondo: An American Concentration Camp,* pp. 4, 5, 31, 75–76, 141.)

Letter 4

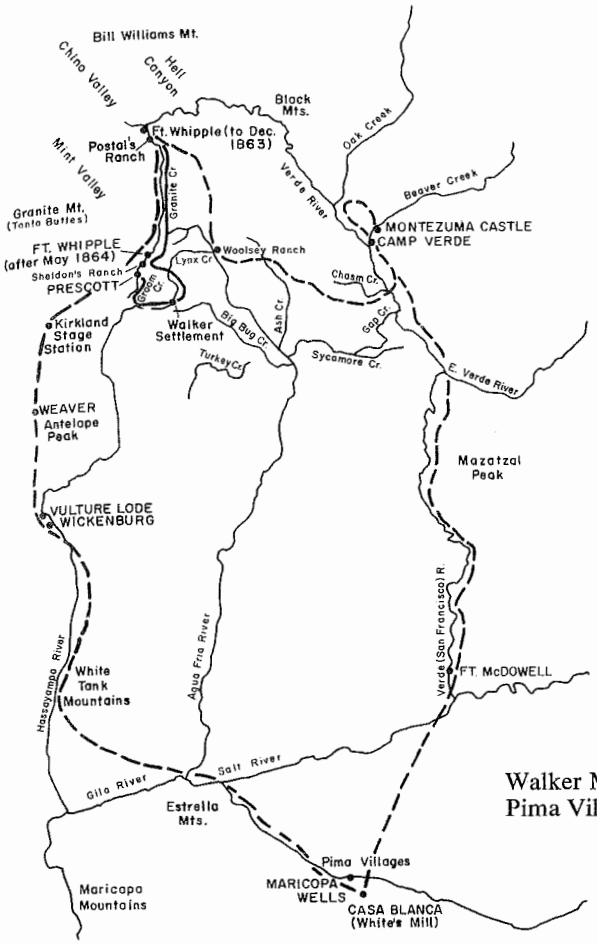
DELIGHTFUL WINTER WEATHER — GAME PLENTY — PURE ATMOSPHERE — EXTERMINATING INDIANS — VISIT TO THE MINES — THE CELEBRATED CAPT. WALKER

Fort Whipple, Arizona, Feb. 6
[Published April 12, 1864; April 18, 1864]

Two weeks of rest, of idleness, save in reading up old newspapers, and writing letters, two weeks of superb weather in an incomparable winter climate, a climate where simple existence becomes luxury; a winter climate where one needs constantly to refer to the almanac to reassure himself that it is indeed winter. The nights are cold enough to make three or four blankets comfortable, and a moderate fire is pleasant until 9 or 10 o'clock in the morning, and in the evening; at mid-day it is warm enough to drive one to the shade, and make a tent hot, and yet there is uniformly a gentle breeze. In these two weeks there has been one slight flurry of snow, that disappeared in a few hours. The northern slopes of the neighboring mountains still are white with the heavier fall there.

This post[1] is only temporarily located at this point, which is about 25 miles north of the gold mines, 140 miles southeast of Fort Mohave on the Colorado, and about 400 miles west of the Rio Grande at Albuquerque. It is very near mid-way between the Rio Grande and the Pacific Ocean at Los Angeles. There is an abundance of water, the richest grass in every direction, timber some twenty miles away, and firewood within a mile or two. At present the post

[1]The first territorial capital was established temporarily at Del Rio Springs in the Chino valley. It does not seem to have been called Fort Whipple, although it was referred to as such in the *Arizona Miner*. In 1864, when the government and the military moved to Prescott, Robert Postle, an officer, remained at this site. The Postle Ranch was well known to travelers and later was acquired by the Fred Harvey interests. (Byrd H. Granger, *Arizona Place Names*, p. 342; *Arizona Miner*, March 9, 1864.)



Tours, Early 1864: Walker Mining Districts (Feb.) & Pima Villages (March)

is little more than a permanent camp; quite a respectable building is finished for the company storehouse, and a corral for the stock.

Deer and antelope are very plenty in every direction, and within three miles is the head of one of the branches of the San Francisco river, where beaver dams form a succession of ponds that are literally filled with fish. On the maps this valley is called Val de Chine; here it is called Cienaga.[2] It is so pure in this country that there is no such thing as decomposition; dead animals and the offal that surrounds camps here simply dry up without offensive smell. The air is so transparent that you are continually deceived as to distances; mountains a hundred miles away seem close at hand, and seem draped with a rich purple haze that conceals their ragged barren sides. About

[2]Val de Chine or the Chino valley was named by Whipple because of its lush grama grass, which the Mexicans called *de china*. The name *Cienga* (Marsh) was later applied to another ranch and creek located between Camp Verde and Prescott. (Granger, *Arizona Place Names*, p. 338.)

fifteen miles from the post is an isolated pile of red granite, perhaps a thousand feet high, that from here is a most beautiful warmly-tinted mountain, apparently only three or four miles away; when near it, it appears barren, rough, and really a great deal lower than it seems here.

The permanent garrison of the post consists of two companies of California infantry and a detachment of cavalry, which with the escort that came through with us makes quite a formidable array of force, at least the Indians think so. The Indians immediately about here are the Tontos, or fool Apaches, the meanest and dirtiest Indians I have seen yet. Soon after my arrival a hundred or more of them came in to hold a council with Major Willis, the commanding officer, and I think I never saw a more miserable set of human beings. In addition to the Tontos, the surrounding country is swept by the war-like Apaches of the country east. Stock is not safe anywhere, either in the mines or on the ranches; it has to be watched carefully in the day-time, and corraled at night. These repeated depredations have so thoroughly aroused the animosity of the settlers that a war of extermination has in fact already begun. Indians are shot wherever seen, and quite recently a party of whites went into the country east on a scout, and failing to find the Indians at a safely accessible place, invited them in to a council, gave them food, and while they were eating, at a given time fired on them, killing some thirty. But one white man was killed, he having missed his Indian, the Indian killed him with a lance. This Indian, however did not escape, being almost instantly killed.

It will readily be imagined that this sort of a warfare is not likely to make the country very safe for white men at present. Perhaps it is the only way to deal with Indians; at any rate the settlers think so, and once begun it is too late to go back.

I have spent several days in the mines[3] this week. We started with a couple of ambulances last Tuesday, taking our bedding, a few provisions, arms, &c. A fine road leads over the rolling prairie

[3]These mines were those of Lynx Creek, Big Bug, Turkey, Agua Fria, Groom Creek, and the Hassayampa. Placer gold mining had developed there in 1863. Deposits were discovered by the Joseph Reddeford Walker party and others in the Prescott area. The surface placers were largely exhausted by 1864, although deep shaft mining continued for many years. These mines were a primary reason for the location of the capital at Prescott. (Harwood Hinton, "Frontier Speculation; The Walker Mining Districts," pp. 245–53; Otis E. Young, *Western Mining*, pp. 144–45.)

country for about twenty miles when we came to the first settlement, on Granite creek. The log cabin was not quite finished, and the three or four men here were living in their wagon bodies. Some five miles up the creek, through a beautiful valley, brought us to Sheldon's ranche,[4] where we remained for the night. This is so far as wagons go at present. Sheldon has a large roomy cabin, with a grand, large fire place, one table, two rough beds and some seats; a large strong *corral* of logs set on end with a huge gate immediately adjoining the cabin door, so that if the Indians try to run off the stock they have to come right in front of the cabin. Saddles, bridles, rifles, pistols, and venison were hung all over the walls inside and out; there was no window, the door and chimney letting in enough day light.

It was near sundown and the herd was just being driven in. The shadows of the mountains were stretching over the valley and the last rays of the sun played prettily in the tree tops on the opposite hills. A group of men stood near the door, tall, stalwart, symmetrical men, roughly dressed, with intelligent, handsome faces. We met a cordial welcome and eager inquiries passed for the news. Had the mail got in at the post? Heard anything from California? What about the Indians? See any sign on the road? Sign is footprints or other indications of red-skin presence. These and other queries are rapidly put, while you are getting in by the fire. Meanwhile fresh wood is heaped on, and the coffee-pot is put on the coals. As the water boils and the venison begins to fry, the conversation continues of horses stolen and tracked, new quartz lodes discovered, some rich crevice or pocket hit by a lucky placer miner.

By this time supper is nearly ready; the single table is moved into the center of the room, and the tin plates and cups spread out, two huge piles, one of bread and the other of fried venison, are the central figures on the table, and in less time than it takes to write it as many hungry men as there were plates are seated around. — What appetites you get, out in the open air. I used to have a foolish prejudice that it wasn't best to see cooking if you wanted to enjoy a dinner, but now I think, watching the slow process, for it always seems slow, only gives a keener zest to the appetite. Four times the table

[4]James G. Sheldon, a pioneer with the Walker party, established a cattle and farming ranch in 1861, located about a mile south of Whipple near Prescott. The house was a stout, windowless log affair with attached log corral. Sheldon was well known for his open-handed generosity to travelers. He was killed by Indians in 1869. (Pauline Henson, *Wilderness Capital: Prescott, A.T., 1864,* pp. 122–23, 152, 154, 162, 173–74n.)

was re-set before the entire number of persons who happened there for the night were fed, the plates and cups had to be washed each time, and the cook was busy all the time. I do not believe they required a single cent from any one, I know they refused to allow us to compensate them for our entertainment, and if this isn't hospitality, especially when you recollect that flour is worth thirty dollars per hundred and bacon from 50 to 60 cents a lb., payable in gold, I don't know what it is!

The Governor is meditating an exploring trip from the country east of here, reputed to be rich in minerals and agricultural resources. This is a portion of the country so infested with Apaches that prospecting has been impossible. During the evening persons were constantly coming in who wished to join the party, one and all believing and talking of nothing but killing Indians. It is difficult to convey to you an adequate idea of the intensity of this feeling. A miner seems to regard an Indian as he would a rattlesnake.

At bed time every one makes his own bed, either on the floor or the ground outside, and in a few minutes all were soundly asleep. Next morning we were up with the sun; the herd was driven out to graze, accompanied by an armed mounted man. So insecure is stock in the mines that the miners hire their animals herded at the ranches. Breakfast over, preparations for our further trip began. Very few of our mules had ever been under saddle, and none had been packed. We however made up the packs of our bedding, provisions, &c., and placed them on one who fortunately proved docile; indeed, she seemed to like carrying a load that way better than working in harness. This packing a mule is considerable of an art; to get the load properly balanced, sufficiently strongly lashed, &c., is very difficult for a tyro.

It was quite nine o'clock when we got under way, seven of us mounted on mules and the pack animal. A little Indian boy, a Navajo's captive, whose life Major Willis saved some four months ago, and who has remained with the Major ever since, refusing to return to his own people, whom we had determined to leave here until our return, looked so sorrowful and lonesome that the Major relented, and allowed him to get up behind him on his mule. So off we went, Indian file, on the trail, a light-hearted merry party; indeed it is difficult to be otherwise in such a climate as this; Annache, (I spell this as near to the sound as I can,) the Navajo, all beaming with pleasure.

These young Navajo captives are exceedingly interesting. You see a great many of them in New Mexico. I always took the story of their unwillingness to return with some grains of allowance, but in the present instance I know it. Maj. Willis says he has never known him to show any signs of homesickness, save once, when he was badly beaten by a little Mexican boy of the same age, some twelve years, at a foot race, and afterwards in wrestling; the truth being that Annache, from high living, had grown so fat that he couldn't run as he used to. He is the best natured boy I ever saw, and the most willing, but he can't learn English, although he tries hard. Dressed in a miniature suit of soldier clothes, you have to look twice to know he is an Indian. There is one little trait that he always retains, that of laughing at every accident, no matter how serious. If I hear him laughing, I am sure something has gone wrong, somebody's horse stumbled, the pack mule got stuck between trees, or an ambulance stuck. It seems as though he couldn't help it. He is most devotedly attached to the Major, and sticks to him like his shadow, watching every motion and noting the slightest wish indicated by a gesture.

The trail wound up a beautiful little valley sprinkled with timber, the wild grape vines growing luxuriantly on the side. About six miles of hilly road brought us to the gulch. A gulch is a rocky ravine or valley, or in this case something between the two. Here we struck our first miner's cabin. I rode over to it; there was a fire burning and a pot boiling on it. The cabin consisted of two upright poles supporting a ridge pole from which boughs and poles stretched to the ground on one side, the other being open; in front was a stone fire place. No person came in sight. I lighted my pipe and rode on. The trail winds along the sides of the gulch, rarely completely leaving the creek, in which was a moderate supply of running water. It passes over steep and craggy hills, covered with timber. Miners were at work down on the edges of the stream, and cabins made of logs and quite roomy became more frequent. Six miles of the climbing brought us to Captain Walker's camp, as it is called, being a collection of log houses with one store, on the site of the original camp made by the first party led to this country by Capt. Walker,[5] about

[5]Captain Walker or Joseph Reddeford Walker (1798–1872) was one of the most famed of the mountain men. His first trapping expedition was made about 1820 to the Rockies and the Southwest. It was on this trip that he gained the title Captain, the result of aid given to the Mexicans against the Indians. In the 1820s and 1830s he helped to pioneer many of the emi-

a year ago. We rode up to the store, unsaddled, deposited our arms and other traps within, picketed our mules on the mountain side, shook hands with all the people about, answered and asked questions. The Governor's arrival created some little sensation of course.

After resting a few minutes, we started to call on Capt. Walker, whose cabin was across the creek a short distance. I had met the old gentleman before at the post when I first arrived, and he greeted me kindly. Presenting the rest of our party to him, we entered his cabin, and after a toddy the conversation became brisk.

Leaving the party here, a brief, very brief, resumé of the adventures of the Walker party in finding the place may not be out of place. Capt. Walker is over sixty, and is getting somewhat infirm; in personal appearance he reminds me more of the secretary of the navy than any man I have ever seen; he has the same beard, wears glasses, and his height and build is that of Mr. Welles.[6] In manner he is not unlike him. Capt. W. has spent his life on the mountains, and knows them as well, if not better, than any man living. His memory is wonderful of the geography and topography of portions of the country he has not seen for thirty years. Very recently this has been markedly tested. It seems that nearly thirty years ago he was leading a party toward the Little Colorado; they had been some time out of water, and after dark they came suddenly upon a chasm that when descended proved to contain running water. With great difficulty the animals were got down and watered. When morning came it proved they were within one-quarter of a mile of the falls of the Little Colorado, above which they could have crossed easily. At the falls the river plunges into a canon, from which it is not known to emerge. In '49, when gold first began to be found in California,

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grant trails, ventured into California, and made the first Anglo discovery of Yosemite (1833). His initial visit to Arizona occurred in 1837–38, and in the 1850s he served as a guide and railroad surveyor. In 1863 he led the well known Walker party to Hassayampa Creek and discovered gold. (Hinton, "Walker Mining Districts," pp. 245–53.) Walker was described as six feet tall, "strong built . . . dark complexioned . . . brave in spirit." (Le Roy Reuben Hafen, *The Mountain Men and the Fur Trade of the Far West* 5:363. See also Donald J. Berthrong and Odessa Davenport, *Joseph Reddeford Walker and the Arizona Adventure.*)

[6]Gideon Welles was Allyn's Hartford friend and secretary of the navy, who later recommended Allyn for the governorship of Arizona.

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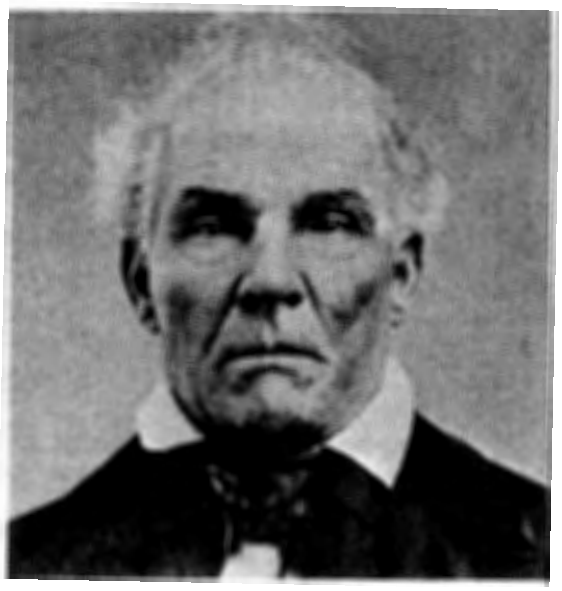

Arizona Historical Society

Allyn's obvious regard for Joseph Reddeford Walker may have been partially due to the fact that the mountain man reminded him of his good friend Secretary of the Navy Gideon Welles.

some specimens were shown to one of the men[7] who happened to be with the party which stumbled into the canon. If that's gold, said he, I can show you where you can load mules with it. He believed that he had seen gold in that canon. Various attempts were made to organize parties under his lead to go to this point, and two actually got under way, but some of the accidents peculiar to gold countries prevented their success. At last this man died, and, dying, particularly charged that this attempt should be renewed, and recommended Walker as the person to lead them.

Two years and a half ago Capt. W. and a party started for the falls. They reached the place without serious mishap and found there was no gold, the men having been probably deceived by copper. Capt. W. was sanguine there was gold farther south and wished to try and find it. They had not provisions enough, and the question

[7]This was probably Jack Ralston, who had been part of the Walker party, which had penetrated the area of the Little Colorado. Ralston convinced George Lount that the Little Colorado was rich in gold after seeing some specimens of California ores. An 1858 expedition was abortive, then in 1861 Lount and other prospectors reached the area but found no gold. (Henson, *Wilderness Capital,* pp. 43–44.)

was whether to go back to California or forward to the Rio Grande. It was determined to go to Albuquerque and refit. They went to Albuquerque, over the same road we came out, the falls being about fifty miles on beyond where we left the river at Canon Diablo. They reached the Rio Grande just at the time the Texan advance was showing the imbecility of the military commander, the treason of the American population of New Mexico, and the general loyalty of the Mexicans.[8] Everybody fled north to Fort Union, the Texans taking Santa Fe. Capt. Walker went on to Denver, and most of the party went to work in the mines in Colorado Territory.

A year ago they again started and proceeded down the Rio Grande to the Mesilla valley,[9] thence they crossed the Gila, and overcoming all sorts of difficulties, dangers, and delays, got through to the Pima villages.[10] Here they turned north, penetrated these nameless mountains, and found the object of their long and weary pilgrimage. A journey of over two thousand miles, most of it through a country almost unknown, occupying nearly three years, can scarcely be paralleled in the annals of private enterprise, and when you recollect that there is no other than a voluntary obedience to the authority of the leader in such parties, it is certainly striking testimony to the ability of Walker that he kept it together.

Leaving Walker's cabin we returned to the store and dined. After dinner, spent the afternoon among the miners.[11] I hardly know

[8] The Confederate army of New Mexico advanced from Texas under Brigadier General H. H. Sibley in 1861 and 1862. The conquest of Union posts and territory was accomplished with embarrassing ease and notable federal incompetence. Fort Union, under Major Donaldson, however, was saved by the timely arrival of a northern expedition. In March 1862, Colorado Union volunteers bolstered General Canby's battered federal forces and decisively defeated the Confederates. (Martin Hardwick Hall, *Sibley's New Mexican Campaign,* pp. 29–160.) Arizona had been declared a Confederate territory in February 1862. (Rufus Kay Wyllys, *Arizona: The History of a Frontier State,* p. 143ff.)

[9] The Mesilla valley of New Mexico includes the area around Las Cruces. (T. M. Pearce, *New Mexico Place Names,* p. 100.)

[10] The Pima villages were a series of settlements inhabited by the farming Pima tribes. Some of the communities have survived on the Pima Indian reservation. Pima territory was concentrated along the Gila, just west, and about fifteen miles south of present-day Phoenix. The villages were well known to early travelers, owing to their extraordinary friendliness and hospitality to Americans. (Frank Russell, *The Pima Indians,* pp. 30–33.)

[11] This camp of Captain Walker's, also known as Walker's Gulch, was founded on Lynx Creek in 1863. The settlement later known as Walker is now a ghost town. (Granger, *Arizona Place Names,* p. 361.) Walker's first discoveries were on the eastern tributary of the Hassayampa known as Ookilsipava Creek. (Hinton, "Walker Mining Districts," pp. 246–49.)

what placer-mining is like; great square holes or shafts are sunk in or near the bed of the creek where there is water, ultimately down to the bedrock, and the miner is at work breaking the rock and throwing up the dirt from the bottom to where the rocker is; the rocker is a succession of sieves or boxes on rockers; the original dirt is thrown on top and the machine washes back and forth while water is poured on; the larger stones are left on top and the earth and dust works through and falls on to another sieve, where it is still further separated; finally the black sand plentifully sparkling with yellow is thrown into a pan. It is quite a matter of dexterity to work out a pan of earth; you dip it into water and keep shaking it so that the particles may be separated and the gold by its specific gravity sink to the bottom. One accustomed to it does it in a few minutes without losing any gold. Of course this is mining in its most primitive shape, altho' many here haven't even the rocker, panning the earth just as they dig it out.

Mining here as everywhere is uncertain business. You strike a crevice, or pocket, and you get a hundred dollars out of a single pan; the man alongside may be getting perhaps ten cents a pan. In California with plenty of water and machinery one cent a pan makes a very valuable claim. While we were here a man took sixty dollars out of a single pan from an abandoned claim right in front of the store, that he had paid forty dollars for. Afterwards I watched him panning out two pans on the same claim; the first paid twenty cents, the second a dollar and ten cents. While patience and industry bring their reward in mining as in everything else, the element of chance or luck plays a much more conspicuous part in it than in most of the other pursuits of life, and this is the real element that makes mining so fascinating. I should judge that the work was harder than that of the ordinary laborer at the east; it is certainly more disagreeable, down in mud and water, shut out from much sunlight. Even in the mild climate, only four or five hours a day are suitable for work. The water freezes hard at night and it is scarcely thawed out at eleven o'clock, and it gets too cold to work it before sundown. On this gulch one claim is pretty much like another in general appearance, only differing in the size of the shaft. There isn't water enough for the extensive works one hears of in California.

It is difficult to estimate the average results of mining labor here, but from the general tone of talk I think men who work make from ten to twenty dollars a day. The last claim taken on the gulch

has proved infinitely the richest; the owner, Mr. Coulter,[12] has already realized a handsome fortune and remitted it to California. We were at his cabin; he said most of his gold was cached where we wouldn't want him to get it; but he would show us some; just slipping his table one side, right under the leg, he poked aside the dirt and produced a little tin canister holding five or six hundred dollars; saying, that next time we came it wouldn't be there. There were some quite large lumps, as large as walnuts for instance, among what he showed us.

There are more prospecters than miners on the gulch, and large stories are told about the rich indications of quartz all about the country. The stock of flour and bacon on hand here is exceedingly small, and should not a train come in soon prices may go high; venison, beef, and mutton are plentiful and worth only 12½ cents a pound.

In the evening there was quite a gathering at the store, and the governor in a brief speech took all by storm by advocating the extermination of the Indians. King Woolsey,[13] the leader of the scout that resulted in the killing of the large number alluded to before, was present. He is a small, well-knit, handsome man, and the last person you would pick out for the hero of such an affair. He says the chief of the Apaches when he came in wanted him, Woolsey, to brush the dirt off for him to sit on, and that it was hard to control himself; he

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[12] George Wilson Coulter (1818–1901?), sometimes known as "General" was a native of Pennsylvania, married, and the father of five sons and a daughter. He served for a year with the Missouri Mounted Infantry in the Mexican War. After his discharge in Santa Fe, Coulter went to California, engaged in mining, and founded Coulterville. In 1863 he was a member of the Walker party and had several claims on Lynx Creek. (Arizona Historical Society Biographical File; *Arizona Miner,* June 19, 1866, June 12, 1869.)

[13] King S. Woolsey (1832–79), a native of Alabama, was a member of Captain Walker's party. He mined along Lynx Creek, and his ranch on the Agua Fria River was near the present-day town of Mayer. Woolsey led expeditions against the Indians in the Prescott area and elsewhere in January, March, and June of 1864. His most famous exploit involved the massacre in January of Tontos and other Apaches at "Bloody Tanks" near the modern town of Miami in Gila County. Apache mistrust of Anglos stemmed in part from this incident. Woolsey's policy toward the Indians is stated in a letter to General Carleton, "I fight on the broad platform of extermination." (Typescript of letter to General James H. Carleton from King S. Woolsey, Lt. Col., Arizona Volunteers, March 29, 1864, in the Arizona Historical Society Files.) Woolsey was also prominent in state politics. (Clara T. Woody, "The Woolsey Expedition of 1864"; James A. Barney, "Col. King S. Woolsey, Famous Arizona Pioneer.")

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gave the Indian a blanket to sit on but he never rose from it! Woolsey is the proprietor of a large rancho on the Agua Fria, about 14 miles from the mines. It is the very outpost of the line of settlement, and he has suffered much from depredations. There is much talk of a large party under Woolsey accompanying the governor's expedition east in order to fight the Indians. The only difficulty is rations and ammunition, but for this you would think every man would go, either to prospect or to hunt Indians.

The belief in the mineral wealth of the country east rises to the confidence of faith in every man I have seen. In general appearance these miners are a striking body of men. I think I never saw as many handsome men in the same number before; they are all fine specimens of the physical man, and with a single exception all were Americans. They are quick, intelligent, shrewd men, and very many had superior educations. I saw one woman in the creek; she was a Mexican and came out from the Rio Grande with Major Willis's party.

Next morning we started over the mountain to Hassayampa Creek under the guidance of a Mr. Smith, who told me he was once a clerk in Day, Griswold & Co. in Hartford.[14] He is a man of influence among the miners and interested in some valuable quartz lodes. The trail was very steep up the ascent; near the top we left it and climbed to the top on foot to get a view of the country. The view was an extensive panoramic one, swept to the San Francisco mountain on the north and to the range on the east that shuts out the valley of the San Francisco or the Rio Verde rivers.[15] The country is rugged and broken with occasional *cienagas* surrounded with rich

[14] Van C. Smith was at this time the recorder for the mining district. (See Henson, *Wilderness Capital,* pp. 59, 124.) The firm Allyn mentions was actually two companies — C. G. Day & Co. and H. Griswold & Co. Both were prominent textile-producing establishments in Hartford and Griswold respectively. Early in the Civil War, Connecticut's quartermaster and adjutant general were dismissed on charges of having favored these and other Baptist-owned firms with fat war contracts. (John Niven, *Connecticut for the Union,* p. 366n.)

[15] The Verde River was known as the King's River by the Spanish. It was called the San Francisco on the Disturnell map of 1847, the Bill Williams Fork by Whipple (1853). Indians called it the Green, due to malachite on its banks, and the name was translated to *Rio Verde* by the Spaniards and Mexicans. (Granger, *Arizona Place Names,* p. 361.) The range "that shuts out the valley of the San Francisco" was Mingus Mountain above the city of Jerome.

pasture land. It looks as though the trip east would be a rough one, but with pack animals you can go almost anywhere. A couple of hours slow riding over hills, and most charming scenery, brought us at last to the Hassayampa, in a deep gorge, where the sun shines but a few hours. The mountains south all had snow on the sides. Near where the trail debouched was a small cabin, the owner, however, absent. We camped here under some fine old trees and ate with great relish a cold lunch. There is more water here than at Walker's, and it was clear and cold.

After lunch we went up the creek a mile or two on foot, passing several cabins, and many unworked claims. On a hill to the right are the ruins[16] of an extensive stone house and corral; the walls are built in the same manner as those ruins on the top of Inscription Rock. These buildings have been so long in ruins that the earth fills up about halfway up the rooms, and large pine trees, one hundred and fifty feet high, are growing in the center. Near by are many piles of broken quartz, showing that somebody prospected there before the present parties were in the country, but whether twenty or two hundred years ago you cannot tell.

It is the universal opinion of the miners that the placers here have been worked before. There is no particular agricultural temptation for such a settlement as the ruins indicate, and I should think the balance of probability was that whoever built them was there for the precious metals. Yet I think the quartz was broken long since the buildings were in ruins, and very probably by some party from Sonora that we have never heard of.[17]

During the evening quite a number of miners came to our camp, and the universal testimony was that the placers were not worth working there; twenty miles below they said some parties were doing well, and that the quartz lodes were as rich as any in the world. Next

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[16]Anthropologist Robert Euler of Prescott College states that these nameless ruins have never been adequately examined but that they should probably be dated twelfth century or earlier and that they were probably abandoned in the fourteenth century. (Interview, November 26, 1971, Museum of Northern Arizona, Flagstaff.)

[17]Miners from northwestern Mexico had been active in Arizona, but the Apache menace tended to confine their mining activities to southern areas, where the Spanish and Mexican military presence could provide some protection. (James H. McClintock, *Arizona: Aboriginal, Pioneer, Prehistoric, Modern* I: 101–2.)

morning we crossed a spur of the mountain about three miles to a branch of the creek on which is the cabin of Mr. Croame,[18] the recorder of the district, who has quite an extensive cabinet of quartz specimens from the different lodes, which he believes to be rich in gold and silver; samples have been sent to San Francisco, but the returns have not come to hand. There is no question about the abundance of quartz in the mountains; it only remains to demonstrate its richness, and this country will be developed like magic.[19]

From this point we followed the trail back to Granite creek, about seven miles, over a hilly country, covered with timber, and came out at an embryo town called Granite City.[20] It is beautifully situated where the valley widens, there are three log stores owned by Mexicans, and three or four houses. Here we were treated to an abundance of champagne, in the usual Mexican style. I suppose they were not unwilling to have the first legislature called here. From thence a couple of miles brought us back to Sheldon's, where we spent the night, returning to the post in the morning.

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[18] "Croame" is Allyn's misspelling of the name Robert W. Groom, the first recorder of the Hassayampa Mining District established on December 6, 1863. (Henson, *Wilderness Capital,* p. 60.)

[19] The placers of the Hassayampa and Groom and Lynx creeks yielded fairly substantial treasure, although their development was dominated by speculators and later by some of the territorial officials, including the governor and McCormick. Allyn does not seem to have dabbled in the mines himself.

When the placers were worked out by the mid-1860s, miners turned to the more costly hard-rock lodes located on the slopes of Davis, Spruce, and Union southeast of Prescott. Many of these mines continued to be worked well into the twentieth century. They were profitable though not of bonanza quality. The value of their ores was depreciated by the high cost of transport and the scarcity of water. (Hinton, "Walker Mining Districts," p. 3; Henson, *Wilderness Capital,* pp. 124–25; Young, *Western Mining,* p. 144.)

[20] Granite City was an early name for Prescott suggested by the local granitic geology. (*Arizona Miner,* July 20, 1864; Granger, *Arizona Place Names,* p. 355.)

Letter 5

AN EXPEDITION OF DISCOVERY — TRIUMPH OF THE SPENCER RIFLE — INDIAN FIGHTING AND EXCITING ADVENTURES

Pima Villages, Arizona
March 16, 1864
[Published April 26, 1864; April 30, 1864]

My last, if it reached you, fully described a trip to a portion of the new gold fields, and informed you of a projected exploration of the country lying east of Fort Whipple, in the valleys of the Rio Verde or San Francisco and Salinas or Salt rivers, occupied by hostile Indians.[1] The object of the expedition being the finding of a more suitable place for the permanent location of Fort Whipple, the development of the mineral and agricultural resources of the country, and on the part of the citizens designing to accompany the party, the punishment of the Indians that had been committing depredations on the settlements. Our preparations were completed, and the 11th of February was designated as the day of departure from the post. For a day or two before it had been cloudy and windy, so that anyone else would have been certain a severe storm was gathering, but in this rainless country few of us feared it.

Just as the advance of the party was mounted, ready to start, it commenced raining smartly, and our departure was countermanded. It rained unceasingly two days and one night, and then turned to snow which fell to the depth of several inches. When it cleared off, the ground was so soft that animals mired at once, and in consequence we were detained until the 18th. It was hoped that

[1] This is the only letter of this series actually written while traveling. Letters 6, 7, 8, 9, and 10, describing the rest of the expedition, were written after Allyn's return to Fort Whipple.

the storm had commenced soon enough below to prevent the rendezvousing of the citizens at Woolsey's.[2]

On the 18th we started with some fifty soldiers as an escort, a dozen or so cavalry men, the rest infantry, and a train of pack mules. The command only made fifteen miles the first day, making a dry camp, the animals much exhausted, as the ground was not yet hard, and the American horses and mules were all those brought with us from the states, unacclimated, accustomed to corn; at the post there is nothing but grass, and that of course is poorer at this season of the year than at any other time.

Major Willis and myself rode through to Woolsey's that night, and found some dozen or fifteen citizens waiting, who had most of them been there the whole week. They were wearied with waiting, and cordially welcomed us. Thirty miles ride, part of it after sundown, usually sharpens appetites, and my impression is that I do not exaggerate when I say that a large quantity of venison was speedily consumed.

Woolsey's rancho is called the Agua Fria and is upon one of the bends of this waterless stream that runs to the Gila parallel to the Rio Verde; it is situated just above a deep-cut canon upon a *cienaga* and upon the site of an extensive Aztec ruin which furnishes the materials for the two large loop-holed houses, and wall breast-high that encircles them.[3] Water is reached easily by sinking wells, and one is dug within the enclosure. The land near the *cienaga,* Mr. W. believes, can be cultivated without irrigation, and it is now being plowed; the soil turned up looks very rich. Woolsey's is the outpost settlement, and the Indians have twice stripped him of stock.

[2]This party of citizens was representative of the human flotsam and jetsam common to mining camps of the time. Possibly some of the members had heard of the governor's expedition during the evening of conviviality at Sheldon's ranch described in Letter 4. Besides searching for Indians to kill, these men were out to find rich farmland, grassy range, or gold.

The expedition made its way across the Black Mountains and then very likely down what is now known as Chasm Canyon. The exploration of a month or so found Indians but no gold, although the area was to produce rich mines in later times. (Pauline Henson, *Wilderness Capital, Prescott, A.T., 1864,* pp. 127, 128, 132; Department of the Interior Geological Survey map of Prescott, Arizona.)

[3]The reference to Aztec ruins was in accord with the widely held view of the times that the Aztecs had originally come from this region. See Letter 10, note 7, for McCormick's views on this. Hubert Howe Bancroft, *History of Arizona and New Mexico, 1530–1888,* pp. 4–5; William H. Prescott, *History of the Conquest of Mexico and Peru,* p. 15.)

The new stone houses were covered with dirt roofs, admirable in a dry climate, but not calculated for long storms like the one of last week. Mrs. Woolsey gave me a most ludicrous account of their miseries, not alone that the roof leaked, but it leaked dirty water and mud, and was no respecter of persons or things in dropping either. The citizens were camped outside in some willows. Major Willis and myself slept on the stone floor of one of the houses, with an abundance of blankets, however. As the room we slept in was kitchen and dining room, we were roused by sunrise, and I had an opportunity of learning that castes and distinctions of social rank had quite as full play out here in the wilderness, as in the statelier mansions of Beacon Street or the 5th Avenue. Capt. Walker slept here with us, and the first thing he did was to concoct a toddy which, notwithstanding my New England Maine law education, I confess I relished. It was quite chilly, and lighting my pipe I sat down in the chimney corner, and chatted with the cook, a rough, blunt specimen of a mountain man, who evidently considered he was one of the main spokes in the wheel of this establishment.

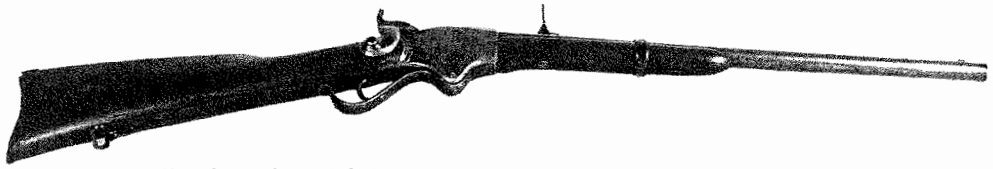
Said he, "The meal I got for you last night was the sixteenth time that table was set yesterday." I asked how that could be. How many there were on the place, etc.

"O, there's not many folks here," said he, "but they don't eat together. First, there's the black men, i.e. Mexicans, the herders; then there's the white men, i.e. the carpenters, masons, etc.; then there's Mr. King, i.e. Woolsey and his friends; and last, I and my family."

"What the deuce is your family?"

"O, my family is me, the Indian girl, an Apache captive, who is the personal attendant of Mrs. W., and the dogs."

By this time the chimney began to smoke, and listening to the maledictions of the cook on the boys who built the chimney too large, I escaped into the open air to see the sun creeping over the mountains, crimsoning the valley, the little smokes in the willows showing the citizens were stirring, the herd in the corral ready as soon as the herders got their breakfast to go out for the day, and the little Apache girl gathering wood to make her mistress's fire. The contrast between the temperature before day and during the day here is wonderful; water freezes almost solid in the night, and at 2 o'clock the thermometer will mark from 80 to 90.



Judge Allyn introduced Arizona frontiersmen to the Spencer seven-shot carbine rifle, a gun which was proving invaluable to the North in the Civil War. "I could have sold a dozen on the spot at very near a hundred dollars in gold apiece," the young judge comments.

Soon this little frontier establishment was all alive, the herd was moving afield, workingmen busy laying walls, and digging wells, the plough was moving through the soft soil, and a wagon was ready to go after fuel which has to be brought several miles. At noon Gov. Goodwin and the advance rode in, and by sundown the whole party was gathered in, and camped in the willows.

We rested the next day to arrange details, fit pack saddles, assort and equalize packs, etc. The note of preparation was heard everywhere, mules being shod, saddles and bridles repaired, balls cast and cartridges made. The citizens were trying their long rifles at a mark at about a hundred yards. It was a small board painted black, with a bit of white paper, an inch square, in the center. All frontiersmen are curious about new weapons, and at the same time prejudiced against them. The fame of my seven shooter, the Spencer, had got abroad, and they wanted to see it shoot.[4] I didn't much like to waste ammunition when no more can be got, and to tell the truth I had no great confidence in my marksmanship to do justice to the weapon. I never fired a rifle in my life until I left the Missouri, and I never fired anything but the Spencer. This last gave me great advantage, for the weight in the Spencer is very different from any other, and usually annoys a stranger in firing it at first. I advanced into the ring, and at the first shot had the good luck to hit the paper in the center and split the board. I concluded it was not best to try again, and others fired off the other shots.

As a weapon for fighting Indians the Spencer has no superior. Its seven shots can be loaded in less time than any other rifle can be

[4]The Spencer seven-shot carbine rifle was just coming into use in the Civil War. It brought a revolution in infantry tactics, for it proved to be murderous when used against the advancing close-ranked Confederates. It saved the day for Union units at Olustee in northern Florida and elsewhere on many occasions. (John Niven, *Connecticut for the Union,* pp. 180, 182, 358.)

loaded and capped, it can be fired more rapidly than a revolver, and re-loaded in a tenth of the time it would take to re-load a Colt; in fact, in an Indian fight, close quarters, I think a revolver never was re-loaded. The fixed ammunition has immense advantages, as soon as it can be easily obtained, say at San Francisco even, for it never wastes, and cannot be injured by transportation. So completely were the soldiers and citizens convinced of this that I could have sold a dozen on the spot with two or three hundred rounds of ammunition each, at very near a hundred dollars in gold pieces, if I had had them.

On Sunday, the 21st, we started about sunrise and made about fifteen miles over an Indian trail, upon which a portion, at least, of the stolen stock had been driven. There was no particularly difficult road this day, but our animals, unaccustomed to packing, were difficult to keep in order, some trotting furiously ahead, others hanging back, some shaking their packs off, or nearly so, for our soldiers were about as green at packing as the mules. The day was fine, everybody was in good spirits, and we hoped soon to get the machine in good working order. This travelling with pack animals is about the perfection of independence; you can go anywhere, and you can go rapidly; of course you have to dispense with tents, mattresses, and much crockery, or a great variety of cooking utensils, but in this climate you don't want the tent, and if you are luxuriously inclined there are boughs and grass enough to make soft beds. We camped quite early, and loafed away the afternoon under improvised shades of blankets, listening to the gossip of old mountaineers.

I have described Capt. Walker to you before: a cool, reticent, courteous man, careful what he says, and impatient of contradiction. Captain Weaver, from California, a man older than Walker, who led a party into the mines about the same time that Walker came from the Rio Grande and settled at Antelope and on the lower Hassayampa, is also with us; and he is the opposite of Walker in every respect; garrulous to a fault, tells large stories until he has the reputation of a sort of Arizona Münchhausen, impulsive, and with a failing memory.[5] Walker and Weaver are both old trappers, and had

[5]A famous mountaineer and onetime Hudson Bay trapper, Pauline Weaver was a discoverer of many of the gold regions, including Colorado River, La Paz, and Granite Creek. He does not seem to have become rich himself, however. He was considered to be the first settler and miner on the site of Prescott. Though he led parties of prospectors to Arizona in the early

both explored all the mountain streams for beaver twenty years ago, but neither know anything about the country between them. They looked for beaver, not gold or silver of rich valleys. Then there is Woolsey, in the prime of life, brave as a lion, quick eyed as an Indian, and thirsting for revenge. In his party are men from Washoe, now Nevada, who prospected the rich silver lodes there before they were famous;[6] from the head waters of the Columbia in Idaho, who have worked in the rich placers near Bannock City, and disliking the fierce winters of the north, hope to find here equal mineral wealth, that can be got out all the year; old Californians with yarns of '49 and '50, when the pistol and bowie-knife were judge and jury.

Next day we followed the tract farther and camped at Ash Spring.[7] We were now in a country where no white man is known to have been before. We made some ten miles today, about half of it up a rocky canon. At night the wind blew fiercely, but we slept soundly under the shelter of bushes. Directly to the east of us was apparently a low pass in the mountains that would take us directly to the Rio Verde.[8] On Tuesday we went a mile or two on the trail and messed at the mouth of a canon. We bore south to cross and expected to find an easy path to the river. We crossed two canons, working south, and striking one heading north, followed it up to water, one mule giving out. Woolsey had been north of us on a scout on the Indian trail, found a practical road for wagons and had seen the sign of a large body of Indians going in toward the settlements. There was some excitement. Had the Indians seen us? Would they turn back if they had? Or would they think it more favorable for an

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1860s, Weaver had visited the area as early as 1832. Late in his life he farmed and was a military pensioner. Tradition has it that he was an ex-army officer and was given a military burial by the Whipple detachment in the late 1860s. His grave is located on the grounds of the governor's mansion at Prescott. (Alpheus B. Favour, *Old Bill Williams, Mountain Man;* Sharlot M. Hall, *First Citizen of Prescott: Pauline Weaver, Trapper and Mountain Man.*)

[6] Washoe County, Nevada, was the setting for the Comstock Lode silver discoveries after 1859. Prospectors pushed up the slopes of Sun Peak and discovered first gold and then enormous quantities of silver. This became one of the greatest silver strikes in history and provided substantial financial aid to the Union cause in the Civil War. (Otis E. Young, *Western Mining,* pp. 234ff.)

[7] A number of places were so named because of the presence of ash trees, which were used for the making of bows and arrows by the Indians. Allyn was probably somewhere on Ash Creek, which flows near Mayer.

[8] This "low pass" can be seen today by looking east from the Mayer area toward Gap Peak.

assault and keep on? Conjecture was useless. Next morning we went up the canon a half mile to where we could climb the side to the top, where we saw the divide, being shaped like a horse shoe, smooth, sloping toward us. We passed up on a clearly defined Indian trail that had no sign of animals; a bad sign for us, for an Indian foot trail almost invariably leads to jumps that an animal cannot make.

Over the divide the waters plunge into a canon more ragged and precipitate than any we had yet seen — the trail led along the north side about halfway up the mountain. On we went, barely getting footing to keep the animals from rolling headlong into the gulf below. The rock was crumbling lava like that which is worked up into jewelry at Naples, and of rich fawn colors. On one side was a ragged mountain touching almost your elbow as you led your mule along; on the other, from your feet almost perpendicular was a chasm, the bottom you could not see, save in the tops of the tall trees that fringed the stream whose rich music, as it plunged along, echoes melodiously through the gorge.

Grand points of projecting mountains we would wind; what a place for an assault; fifty Apaches could have annihilated us by rattling down stones, for we had scarcely footing enough to take an aim up. Suddenly, halt! rang along the line; every man and every animal stopped where he was. The poor pack mules stood, the crumbling lava under their feet giving way. Fortunately, I was near the advance and right at the point of a projecting spur whence I could see the whole party. I sat down, lighted the unfailing pipe, looked at the fine specimens of lava, cut some with my penknife. From the front word soon came that Woolsey and the advance had reached one of their jumping-off places, a perfect *cul de sac*. They had turned and worked down to the bottom, where they found the stream so filled with driftwood, fallen trees, etc., that they could not get over, and had sent back for an axe, which was passed on to them. The pack animals had stood still an hour; something must be done; turn round we could not. It was determined to try to climb to the top diagonally, perhaps a way to get on would then be visible. We got up with the train and had to go back to the head of the canon and camp.

We hoped to hear from Woolsey if he got through. No word coming in several hours, scouts were sent to the north. Weaver went south, and a couple of citizens were sent on Woolsey's trail. From the north they reported no route out. Weaver saw the sign of a large

body of Indians passing into the settlements. This added to our apprehension about the safety of the miners. The two men who went down into the canon did not get through to Woolsey, but found a way by which with some labor a trail could be made to the bottom, whence there appeared no further serious difficulty.

It was determined in the morning to try to go through. His party had no provisions, and it was evident they supposed we were coming on after them, or they would have sent back. Next morning we started and reached the bottom of the canon, over a trail made by a fatigue party ahead, without serious accident, and yet if mules were not immortal, or, at least, like cats, endowed with any number of lives, it could not have been done.

Those of us in advance led our animals to the bottom without much trouble, and there waited the descent of the train. Such a sight, mules stumbling and recovering themselves, mules with heavy packs rolling two or three hundred feet, first heels up, then packs, over and over, until they landed plump against a tree; stones following them seemingly large enough to crush them, which never happened to hit; one came so near doing it that it lodged like a shelf over a mule's head, and she could not get up until it was removed; and it took hard lifting of several men to do that.

At last all were gathered on the bed of the canon and we started on, crossing and recrossing the stream, over fallen trees, huge boulders, rolling stones; under branches of trees that threatened to serve us as Absalom once was; vast palisades of lava and granite piled up for hundreds of feet above us; the stream leaping from rock to rock until at last it plunged near a hundred feet, forming a beautiful cascade. Before reaching the river, the trail left the canon which turned south, and crossing a spur of mountains we came upon the camp of our pioneer party. Exhausted and hungry, they had caught a fish or two the night before, but had no salt to cook them with.

This camp was some little distance from the river. We proceeded to the bank and camped. The Verde here is a fine rushing stream, some fifty yards wide, and not fordable; it is dammed just below with drift wood. We have struck the river in the canon between the upper and lower valleys, and it will be difficult to get out.[9]

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[9]Allyn's party appears to have descended either Gap Creek or Chasm Creek canyon. This was a pioneering expedition into the Verde, and Woolsey and the others were obviously unfamiliar with the terrain or they might have chosen to follow a more northerly route down the canyon.

Off to the south the country is volcanic, broken into canons and gulches, barren and desolate. A good many fish were caught today, tolerably good-sized and of good flavor.

To get out of the canon we had to go back to the hills, and in an hour we reached a point whence the upper country could be seen spread out as far as the eye could reach toward the San Francisco mountain. But intervening canons made it take us three hours more to reach the river at the lower end of the valley. We saw fresh Indian signs as we crossed the hills, and before we reached the valleys, signal smokes, on the hills around, were telegraphing our arrival. We unpacked when we struck the river and rested a few hours, and then went on to good grass a few miles farther up the stream. The terrible floods of two or three years ago have furrowed this valley with channels, paved it with smooth round stones, and strewn it with drift wood. The volume of water must have been immense, the stream there perhaps a mile wide. There is an abundance of cottonwood trees and mesquite bushes.

Near our camp that night an Indian came on the hills and hallooed at the guard; toward morning one was caught crawling through the bushes, near Lieut. Robinson's[10] bivouac; but both escaped. In the morning the tracks of several others were seen, that had been prowling around.

On Saturday, the 27th, Woolsey and a party crossed the river to look for trails east, and scout up the bank to join us in camp. The main party had gone on without much to note for some eight miles, when looking ahead, I was very near the advance. I saw Col. Chavez and Major Willis both spurring furiously ahead with drawn pistols and unslung rifles. I started as fast as I could after them, and was perhaps thirty or forty yards behind when they commenced firing at something. I had seen nothing. I rode up.

"Got your rifle?" I had lent it to cross the river.

"For God's sake get under cover, you'll get hit."

An arrow took Maj. Willis's horse right through the ear, and I saw a large stalwart Indian just falling back from the bank of the stream facing us, and discharging his arrows. Chavez had fired his rifle and was down in the willows firing his pistols. When they first came up, the Indian was on this side of the river and his squaw

[10] First Lieutenant Frank Robinson commanded a detachment of Company K, Eleventh Missouri Volunteer Cavalry, which was serving as escort. (*Returns from U.S. Military Posts 1800–1916*, Fort Whipple, February 1864.)

with an infant was on the other side. The Indian made a brave, noble fight to give her time to get away.

By this time others came up and the scene beggars description. Chavez and Willis crossed the river, followed by a half dozen soldiers. Everybody saw Indians, shots were flying thick and fast. I didn't see any, other than the one I have described. Not having a rifle I waited till one of the footmen handed me a Sharps'.[11] Just then someone on the other side hallooed for some men to follow up the west bank as the Indians were on that side. A half dozen of us galloped for a mile up without seeing anything. Then there came a cry for more horsemen to cross, and three of us crossed the river. Riding a half mile toward the voice, we found private Fisher of the California cavalry badly wounded with an arrow under the arm.[12] He was very much excited, and the wound bled copiously.

We dared not open the coat to get at the wound lest the sight of it would make him faint. This Fisher started from the post, as I learned afterward, with a presentiment he was to die; he dreamed about it, and had talked wildly about it. A litter of a blanket was made, and he was carried to the river. The force we had could not get him across, and I started back for help, and, unluckily, plunged right into a quicksand, the mule up to her belly in the sand and on one of my legs, which her struggles soon released. I then got off, and being very strong, she worked herself out. The sand closed half up to my knees as I waded. In the excitement, I forgot the rifle which was just thrust through a socket attached to the saddle. On shore I found it was gone; wading back for it, there was just one little ring of it visible above the sand. I pulled it out, cocked it, and to my surprise fired it, as well as though it had not been buried under water and sand ten minutes.

Riding on to camp, we sent help back for Fisher, and began to gather particulars of the fight; there had been three Indians killed, besides the squaw and child, who were killed with the same shot by a soldier who mistook her for a man; there is little difference in

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[11] The Sharps was the first successful breechloader and the most popular shoulder arm in the West during the 1850s. In calibers from .36 to .52, this single-shot carbine and rifle was used extensively for buffalo hunting. (Robert Easton, "Guns of the American West," pp. 385–86.)

[12] Private Joseph Fisher could not be saved; he died of his wound before reaching Fort Whipple. A native of Germany, he was only twenty-four when buried at the fort. His death was the first at Whipple. (*Arizona Miner,* April 6, 1864; Henson, *Wilderness Capital,* p. 139.)

dress. Two, and perhaps three, others were seen to get away. Woolsey and his party came in; had seen a trail east with signs of stock on it, some very extensive ruins, and an ancient burying ground.[13]

This evening two Mexican boys came in, having been two days in coming from the Agua Fria Rancho, over our trail every step of the way, with the news that the Indians had again stripped Woolsey of every hoof, except the oxen ploughing near the house. About sixty Indians made a rush on the herd at mid-day; the guard fired at them, but did not kill any, and they drove the stock off.

We followed this upper valley up some twenty miles to where it forks, one stream coming from Bill Williams, the other from San Francisco mountain.[14] The general characteristics of the valley are similar to those of the Rio Grande and there is nearly as much water in the river as there was in that stream when I first struck it coming from Santa Fe. With irrigation it would yield as the Rio Grande does. There is grama grass on the mesas on the west side, and large timber at both San Francisco and Bill Williams mountains, within from 20 to 40 miles. The bluffs on the east bank are all white lava, and the country is generally a lava country.[15] There is not the slightest sign of minerals of any kind on the river thus far.[16]

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[13] Woolsey's group probably saw the ruins later known as Montezuma's Castle National Monument, on the north side of Beaver Creek. There are, however, other large ruins in the general area, including a sixty-room stone pueblo on the east side of the Verde on the M. Talbot ranch and a somewhat smaller structure with thick stone walls on private land some fifteen miles west of Camp Verde. (Department of the Interior Geological Survey map of Congress Quadrangle, Yavapai County; Arizona State Museum Archaeological Survey map of site nos. 0:5:11; 0:5:13;0:5:14.)

[14] This was very likely the junction of the Verde River and Oak Creek just below present-day Bridgeport.

[15] Allyn's "white lava" bluffs were not volcanic rock but eroded limestone. There are, however, many darker lava formations in the area.

[16] Allyn was unaware of the vast copper deposits at the nearby site which would later become Jerome.

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Letter 6

EXPLORATIONS — AZTEC TOMBS — TRACES OF GOLD — PETRIFACTIONS

Fort Whipple, April 5, 1864
[Published June 3, 1864]

My last from the Pima Villages brought the resumé of our trip to the Rio Verde up to the point where the skirmish with the Indians took place. It was the original intention when we left the post to have gone east from the point to strike the upper waters of the Salinas river, thence to follow either that valley or the divide between the two rivers, as was most practicable, to the junction of the two, and then to return in the most direct way to the post. This would have led us into the heart of the country of the Pinal Apaches, and into a country that the traditions of hundreds of years have uniformly pointed out as the El Dorado of the country. Few white men have penetrated its mysteries, and they have uniformly been driven out by the Indians. It was here that the Indians used gold bullets and exchanged them with Mr. Aubrey.[1] All the streams that empty into the Gila from the north, east of the Rio Verde, are known to be rich in minerals, and they all head into this country, and rise in the neighborhood of the Mogollon and Sierra Blanca mountains.[2]

A consultation held at the time of the skirmish alluded to showed that the unfortunate delays in reaching the upper valley of the Rio Verde had so far exhausted our provisions and our animals that to make the trip designed was simply impossible. It was therefore determined reluctantly to cross the river, strike southeast, see as much of the country between the two streams as we could, turn

[1]Felix Aubrey was the first to explore the feasibility of a wagon route over the thirty-fifth parallel. He drove his wagon from San Jose, California, to Santa Fe, New Mexico, and was prominently identified with the Santa Fe trade and early Arizona history. (Thomas E. Farrish, *History of Arizona* 1: 353.

[2]The Mogollon Mountains refer to that portion of the rim of the Mogollon Plateau which lies east of Camp Verde, extending through the area of Strawberry and Pine. The Sierra Blanca later became known as the White Mountains.

southwest, visit the lower valley of the Rio Verde and return home. This decision created much dissatisfaction among the citizens, who, furnishing their own provisions and animals, had accompanied us in the hope of prospecting in some small degree this unknown gold region, or at least of having a fight with the ruthless savages whose forays made their homes unsafe, and that we knew were even now behind us, on the warpath among the comparatively defenseless settlements.

On the 29th of February we crossed the river and traveled down the east bank of the trail leading along under the shadow of the white, chalky-looking lava bluffs that form the wall of the Mesa above, on which were very extensive ruins of masonry fortifications, like those seen on our route from Albuquerque, at Inscription Rock, for instance. In the bluffs about midway were many caves externally resembling those we saw at Canino caves; they were the same size, and the projecting lava roofs were supported by the same regularly laid walls.[3] Time seems to have destroyed the trail leading to them, and no one climbed up to see what was inside of them. We camped as we supposed near the Aztec burying ground, passed by Woolsey on the scout several days before, and intending with pick and shovel to invade the mysteries hidden for centuries beneath those trenches. After dinner the party started out, but somehow they had mistaken landmarks, and after walking four or five miles and not finding it, most of us returned to camp. Two or three who had seen it before persevered and at last found it, but not until after sundown, when it was too late to explore it. So nobody's sleep was haunted that night by visits from indignant Aztec spirits disturbed from the slumbers of a thousand years. Science and curiosity lost the possible additions to our knowledge this vandalism might have furnished, and these individuals of the Montezuma race still sleep in graves as dark and mysterious as the hieroglyph recorded story of the ancient magnificence and rapid downfall of that once imperial nationality.[4]

[3]Allyn is doubtless describing the ruins which later became Montezuma Castle National Monument, seen earlier by Woolsey's party (see Letter 5, note 13).

[4]Early American settlers assumed that such Indian ruins had been left by the Aztecs. This view was reinforced by Prescott's historical work. Later archaeological study was to discredit this view. The ruins referred to are doubtless those now known as Montezuma's Castle. Indians occupied them from the eleventh to early fifteenth century. (Harold S. Gladwin, *A History of the Ancient Southwest,* pp. 221–22; William H. Prescott, *History of the Conquest of Mexico and Peru,* pp. 13–15.)

Next day we started east, passing over a smooth bench of the valley that might easily be reached and irrigated by an acequia from farther up the stream, which is a rapid one, and would furnish considerable water power. In the afternoon we crossed a beautiful little valley well timbered with pine, oak and cottonwood, in which after a vain attempt to proceed farther south, which was barred by apparently impassable canons, we camped for the night. The next morning we followed a trail east that led up the valley and over a hill that opened a frightful canoned country, with very high mountains, but the trail proved easy down into the canon and along its course. Leaving this, passing over a small hill, we opened a view of the main eastern fork of the Rio Verde, lined with cottonwoods all leaved out, the first I had ever seen, and a most beautiful tree it is, symmetrical, and the leaves of rich bright green; the stream was rapid, leaping from rock to rock, with steep banks, and the valley was covered with fine grass. We stopped here for nooning, and it was in this stream that we found the color of gold, as it is called, which is when you wash out a pan of earth to find particles enough to show the existence of gold. This fact is a striking confirmation of the theory of extensive gold fields to the east, the first stream you find heading toward the Mogollon, and away from the streams of lava; the San Francisco mountain in its volcanic days deluged the country, which attests the presence of the precious metals.[5]

On the banks of this fork we found an abundance of curious petrifactions, dead leaves petrified, single and in bunches, as they had fallen in the autumn, every fibre, vein, and stem hardened to stone, and yet so thin that they broke at the touch, and it was impossible to carry them away. When we got under way we crossed this fork and wound up the mountain, not a bad trail but a long, long pull which made some of the mules give out, and one was shot to prevent the Indians getting him. We camped at the end of the ascent on the top of an extensive mesa covered with grass and small pines. There had been a large camp of Indians here recently, as shown by the trees cut, traces of fires and lodges.

We had quite an excitement in camp this evening. About sundown Col. Chavez' Mexican boy and three Californians stumbled on an Indian *rancheria* about two miles from camp. Instead of com-

[5]Allyn's estimate of rich gold deposits in the area of the east Verde River was not confirmed by later developments.

ing back to report the fact and get force sufficient to destroy or capture the whole body, they dashed in alone firing and killing nobody. The Indians turned on them and drove them off, in fact they did some tall running to get in. Off went a party of volunteers, mostly citizens, but it was too late and too dark; they found the fires, and gathered any quantity of baskets and other traps left in the hurried flight, but the prey had gone. There was cursing loud and deep that night on the poor unfortunate wights whose bravery had led them into the indiscretion of that fatal assault. Here was an opportunity to have redeemed our whole expedition, thus far a failure, and give us something to turn the sharp edge of ridicule when we got back, and it was lost.

From this Mesa by going northeast, we could have kept upon level ground and apparently could have turned the terrible canon that stretched athwart our path south, but this it was thought would interfere with the programme of working toward the lower valley of the Rio Verde. Several volunteered to go ahead and explore the canon, and see if we could get our pack train in and out of it again; they were to halloa to us and our course was to be determined by their decision. We packed up and went to the bank of the gorge, saw [Van C.] Smith waving his hat and shouting, but it was impossible to hear what he said, so a soldier was sent down to hear and report what he said. The soldier halloaed that Smith said there was a good trail out of the canon, come on! Down we plunged, the largest and steepest of the hills we have tried yet, having to lead our saddle animals.[6]

I was very near the advance of the long file, when my mule twitched back and lost footing, fell backwards upon my only free hand, right on to a "devil's pin-cushion,"[7] the meanest prickly arrangement of the cactus species, not excepting the Spanish bayonet or prickly pear, that I have yet seen; the little needles literally pinned

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[6]Allyn's party was descending into the canyon of the East Verde a short distance above its junction with the main fork of the Verde.

[7]The cactus generally known as "devil's pin cushion" or "stout needle," *Mammillaria robustispina,* occurs only in southeastern Arizona and does not grow on the Verde. Allyn apparently applied the name mistakenly to some other common "pin cushion." (Lyman Benson, *Cacti of Arizona,* pp. 112, 113.)

my leather glove to my hand, and when I pulled it off, the blood spurted. I lost a spur at the same time, and, to add to my intense disgust, while I was trying to pick the largest prickers out of my bleeding and smarting hand, the train had closed up behind me on the narrow trail, and someone behind yelled out, "What's that stopping for down there?" I pushed on and never stopped until I got to the bottom of the canon. That morning so many mules had given out that our mess had put everything on one pack animal, making a large, clumsy pack, our tin plates, cups and limited table furniture being rolled up in the bedding. The result was that the bedding, disgusted at our slow progress, rolled off and down the hill straight on its own hook, so far that after we reached camp for noon at the bottom, it took two men a couple of hours to find, and then a large bottle of ground red pepper was found crushed, everything else, however, safe.

At the bottom we found Smith, and *he had shouted to us not to come*. Here was a scrape; there was no trail for pack animals out of the atrocious *cul de sac* we were in. On both sides the mountain rises a thousand feet at least, and almost perpendicular. After consultation it was determined to work down the stream to the Rio Verde, probably not over seven or eight miles off, but such miles probably!

At half past two o'clock p.m. we started; had to make a trail, cross and recross the stream, creep under the low sweeping branches of living trees, climb over the debris of dead ones, force our way through tangled thickets of willows, every little while have to leave the stream and climb up on a bench or terrace, then down it again. The canon grew wilder and wilder. I saw places where I think the perpendicular rock was a thousand feet, and the canon fifteen hundred feet high. It has been reported that Indians had been seen while the men were out looking for our roll of bedding, and everybody was on the *qui vive,* and Indians were seen watching us out of range, probably wondering what consummate fools we were to be in such a place, what we were after, and where we were going.

There is no more comical spectacle than a pack train climbing one of these steep, rough, stony mountain trails. I had learned by experience that the safe place in such a party is to be either in front or clear behind, so today, being tired at this endless walking (for

you couldn't ride), and leading an obstinate brute of a mule, I stopped under the shadow of a big rock, lighted my pipe and watched the outfit defile by. I hadn't much more than got merely stretched out when a soldier leading a pack mule came plunging through the stream. I was right on the bank in an exceedingly picturesque spot. He caught sight of me, and with sincerest alarm depicted on his face, rushed toward me, saying, "Are you hurt? How did it happen?" I assured him nothing had happened. "Why," said he, "I thought you had been thrown against that rock," the poor innocent rock that was affording me a delightful shade. On the file went, occasionally a huge boulder loosened by the repeated tread would come crushing down, cutting right across the path below, and land with a splash in the stream, then a mule pack and all would get rolling, and never stop until it landed against some friendly tree, when it would lie just as though it was dead. Three or four men rush at it, lifting by the head, the tail, the pack, perhaps prying him up with a long timber if you can find one in this forsaken country, until at last he is on his feet and off he trots as though nothing had happened. I used to think a cat had more lives than any other animal, but it's a delusion, the mule decidedly gets the nearest to the frontier of immortality.

But the train is all by save a mule or two back that won't stir, and I suppose most likely will be shot; and it's not the safest thing to stay here moralizing in the Apache country, if you value your scalp. So up and on after the party. I soon overtook it at camp. We had traveled four hours, had not reached the river, and camped, perforce, because we couldn't go any farther. The sixth mule since we started was shot today. It's too bad. They are only tired and would bring a hundred dollars in gold, if red tape would let them be sold. Vegetation is quite far advanced, trees leaved out, new grass started, etc.

Next day we made the Rio Verde; the trail much better than yesterday; signs of spring abundant; tiny wild flowers were just peeping out under the stones. We followed down the stream three days, crossing and recrossing the river, following the trail on up to the mesa and down again, passing some extensive ruins on the mesas, one large building containing twenty or thirty rooms with extensive

stone corrals for stock.[8] Wild flowers increasing in variety and rare beauty. One day we passed a finely preserved ruin; the walls were twenty feet high, and at the top two and a half feet thick. It must have been several stories high once. The mesa upon which it is built strikes me as a richer soil than any above, and was doubtless cultivated when this building was inhabited. Col. Chavez left us this day, March 7th, for the post, not deeming it prudent to go farther with animals. He has to get back to the Rio Grande. We go with the Californians, under Major Willis, determined to reach the lower valley if possible.

[8]The party has been traversing the canyon of the Verde below the East Verde junction. The ruins observed by Allyn appear to be those left by the Pueblo Indians described by Gladwin: "At about A.D. 1350 . . . a few groups of evacuees worked their way westward to the Verde Valley, probably by way of the East Verde and Fossil Creek. . . . The Verde was literally the last ditch for any Pueblan refugees from the east, as the Yuman Yavapai, west of the Verde, strongly objected to any invasion of their domain." (Gladwin, *The Ancient Southwest,* p. 326.) Anthropologist Emil Haury says that these were probably the Limestone Ruins or nearby sites and that the structures in this area on both sides of the Verde River are definitely of pre-Spanish origin. The fourteenth century is the best approximate date. The evacuees could well have fled westward as a result of conflict with other Pueblo tribes to the east. (Interview, November 10, 1971, Tucson, Arizona.)

Letter 7

NOTES ON MULE-BACK — THE CACTUS — TRAVELING IN AN INDIAN COUNTRY — EXTENSIVE RUINS

Fort Whipple, April 5, 1864
[Published June 6, 1864]

March 8th — It grows warmer every day, the trail improves, the grass grows poorer and poorer, and the starving mules are ready to eat firewood. We are now upon a well-defined Maricopa[1] war trail, which leads straight through the valley we want to see to reach their villages; no more danger of impassable canons there, the Indian never goes that way. From the top of a high hill today we got a fine panoramic view of the mountains on the east bank of the Verde; they were barren, desolate, impassable enough; there was nothing to relieve the repulsive grandeur of the view, save in one place where the light green leaves of some cottonwood trees indicated that there a little sickly stream of water trickled. Cactus alone seems to find a congenial home there. Where anything grows the wild flowers peep out; many new and richly-tinted varieties showed themselves today. We were terribly annoyed by a new species of cactus called Choyas;[2] it grows two or three feet high, branching out into a sort

[1]The term "Maricopa" was used to designate all the Yuman-speaking peoples of the Gila and Salt river valleys. Ezell states that the term did not appear in any document until the records of the Kearney expedition in 1846. "Maricopa" refers to different populations with cultural similarities. (Paul H. Ezell, *The Maricopas: An Identification from Documentary Sources,* pp. 9–10.) According to Bancroft, the Maricopas numbered five hundred in 1858. They were honored with the Pimas in being given the first reservation and gifts in Arizona in 1859. Bitter foes of the Apache and other marauding tribes, they served in the Apache wars and were present at the Woolsey Bloody Tank massacre. (Hubert Howe Bancroft, *History of Arizona and New Mexico, 1530–1888,* pp. 501, 548.

[2]While there are several species of cholla ("choya") in Arizona, Allyn's description would indicate that he encountered *Cylindropuntia bigelovii,* commonly known as the "jumping" cactus. Benson's distribution maps show the jumping cactus range beginning barely north of Phoenix and extending south and west. (Lyman Benson, *The Cacti of Arizona,* pp. 32, 34.)

of bouquet, or perhaps more like a branching candlestick, forming at the end of each separate branch a ball exactly like a chestnut burr, only that the burrs are needles, both in sharpness and strength. The slightest jar sets these rolling off, and they are murderous if they happen to stick on to a poor beast. If you try to pull them off, if the animal will let you come near enough without kicking, the needles will break right off in the flesh, or rather pull off from the ball. Animals used to a cactus country avoid them with wonderful dexterity, but our American horses and mules must needs smell of them, get one or two of them in their nostrils, and then, frantic with pain, plunge right into an acre of them, sticking them into every part of the body. One poor horse accidentally got one lodged under the stirrup leather, broke from the person leading him, and plunged frantically down a trail, when the train was all strung out on a side-hill, dashing the whole length, fortunately not hitting anyone.

This country is the paradise of the cactus[3] in all its manifold shapes, and the fit home of the Apache, but even he won't stay in it. The cactus is manifold in its varieties, all alike nuisances. There is the towering Seguarro, the monarch of the family and grim sentinel of the desert, a tall, straight fluted column from one to two feet in diameter, and those I have seen, some thirty feet high, of a rich green color, all cased in a mail of needles. Sometimes at ten or fifteen feet high one or two branches start out the same size and shape as the parent column, and grow alike perpendicular and parallel to it. There is the "devil's pin cushion," I have feelingly alluded to before, the prickly pear, the Spanish bayonet, and the fishhook, as it is called, from the bent prickers that envelop it; this is about the size and shape of a bee-hive, and is the only variety I know of that is good for anything; inside is a white pulpy substance from which water can be squeezed to quench thirst, and of which,

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[3]Identification of cacti which have not previously been mentioned are as follows: The saguaro ("seguarro"), *Cereus giganteus,* grows in southern and western Arizona. There are several species of *Opuntia,* to which the name "prickly pear" is applied, that Allyn could have encountered in his northern Arizona travels. The Spanish bayonet, or yucca, is not a cactus but a lily, producing brilliant clusters of white blossoms on a tall candlelike stock. The "fishhook" cactus is doubtless *Ferocactus wislizenii,* the common barrel. Another species popularly called fishhook cactus is *Mammillaria microcarpa,* but this last is a southern and western Arizona species not found where Allyn was. (Benson, *Cacti,* pp. 72–76, 35–36, 95–99, 120–21.)

boiled with plenty of sugar for several hours, a splendid citron preserve can be made.

Still no signs of the lower valley; we hope to reach it to-morrow. Next day fourteen miles more of desolation and cactus brought us to the head of the famous long-sought lower valley; a valley all on the west side of the river with deep sandy bottoms, plenty of cottonwoods, mesquite, and elder, and not a blade of grass. After resting at the head a day or two we went on below to get to grass if possible, but there was no grass worth naming. It is time to be turning toward Fort Whipple, distant as near as we know, 120 miles. The poor mules grow weaker and weaker, the eleventh was shot today. The soldiers have burned up their extra clothing, broke up their ovens, almost invaluable here where they cannot be re-placed, to lighten the packs. As near as we can estimate it is between forty and fifty miles to the Pima villages on the Gila, right south, and from them there is a wagon road to the post, passing settlements. The train is to go back. Mr. [Van C.] Smith proposed to go with me to the Pima villages, rest there ourselves and animals, and then go home by way of Antelope[4] and Weaver. I agreed to go.

On March 11th we parted company, the Governor and entire party starting for the post, Mr. Smith and myself going toward the Gila. We had our riding animals and a burro, upon which was packed our blankets and a limited supply of provisions, consisting of flour, coffee, sugar and salt, and the smallest quantity of each, for provisions were so scarce we were unwilling to take the least thing from the main party, who had the longer and more difficult route. Ours was considered much the more dangerous, as it passed the trail of Apaches bound for the Gila. I do not however so regard it, for I think generally in an Indian country the small party is the safest. You can travel at night, are not under the necessity of seeking large quantities of water or grass, and it is the merest accident if an Indian sees you at all.

As this was my first experience in traveling as mountain men do, and the novel incidents are so fresh in my mind, I am sure they

[4]Antelope is Antelope Peak adjacent to the mining village of Weaver, which later became a ghost town. Weaver was situated about eighty-five miles northwest of present-day Phoenix. Rich deposits had been discovered there by Mexicans in Weaver's party in 1863. (Byrd H. Granger, *Arizona Place Names*, p. 331.)

will interest you. The usual cooking outfit in such trips consists of a tin quart cup tied to your saddle and a large hunting knife at the belt. I had neither, but Smith had both, and we thought we could get on two days, which was the time we expected to be in reaching Pima. We waited till they were all gone before we packed up, and then loading our donkey, strung out. We determined to follow the trail referred to before which passes down the valley. It led us down as far as some quite extensive ruins, parallel to the river, and then bore about south while the Verde bears to the east to join the Salinas[5] at the eastern base of a red granite mountain, to the west of which this trail passes. Directly opposite this valley towers up a great landmark of the Apache country, the Massassl [Mazatzal] mountain.[6] Behind it a great chief with the significant name of Big Rump,[7] lives in a fine valley where there is plenty of gold; at least captives say so. Neither the Maricopas or the Pimas in their campaigns have ever been able to reach it.

The trail passed an almost imperceptible divide and at 12½ o'clock we were on the banks of the Salinas, some seven or eight miles below the junction of it and the Verde. Here we rested, grazed our animals, caught a fine large fish, (fish were quite plenty in the Verde,) and when the sun was lower got our dinner. I made the

[5]There are a number of extensive ruins, including mounds, ball courts, and pueblos, in the area of the lower Verde River. Possibly Allyn was referring to an extensive mound site one-half mile south of old Fort McDowell. There is also a pueblo and mound site of large size located 2.2 miles south of the fort. (Department of the Interior Geological Survey map of Ft. McDowell Quadrangle, Maricopa County; Arizona State Museum Archaeological Survey map of site nos. U:6:9; U:6:10.)

The Salinas or Salt River is the Gila's largest tributary. Kino named it Salado, but it was known variously as the Matthew and the Asunción until 1852. After this date the name Salinas or Salado applied again. The brackish taste of the river water at low ebb was responsible for the name. (Granger, *Arizona Place Names*, p. 115.)

[6]"Massassl" or Mazatzal Peak (7,888 feet) does indeed dominate this region east of the lower Verde River. Pioneers said the name was of Apache origin meaning "bleak, barren." (Will C. Barnes, *Arizona Place Names*, p. 270.)

[7]Thrapp identifies Big Rump as follows: "Not only the white Indian fighters, but the more prominent Indians became widely known to the pioneers, and none was more famous at this time than Wah-poo-eta, or Big Rump, so named presumably for his most prominent feature. According to the early newspapers, Big Rump roamed an enormous portion of Apacheria, probably because almost any depredation was blamed on any Indian whose name was known, or could be spelled." (Dan L. Thrapp, *The Conquest of Apacheria*, p. 59.)

fire, put the tin cup filled with water on the coals and poured the coffee into it, while Smith was kneading the dough for our bread. This you draw out about as you would molasses candy and wind it round a stick an inch or two in diameter spirally and hold it over the coals, turning it round until it browns; or if you are lazy, sharpen the end of the stick and drive it slanting into the ground and leave it to bake. But there was the fish; we hadn't any nice bark like you have in northern woods to make a gridiron or rather grid-bark of, and we could not make it stay on a stick, so perforce it had to be thrown on the coals, and broiled. The cooking done I improvised a small tin yeast-powder box for my share of the coffee. We each had a stick of bread, a clean stone answered for a plate for the fish, and my pen knife and fingers for the rest of the outfit. It is useless to say that meal relished, if you don't believe it reader, try it yourself, with a trusty Spencer by your side and latent apprehension every time the wind stirs a bough that an Apache is near.

Just before sundown we started again, crossed the Salinas, a wide but rather shallow stream, and struck the same trail which in a short distance brought us to the remains of a great *acquia*[8] [acequia], which I had heard of before but regarded as a fable. It is really a work that must have rivalled all the old aqueducts, hardly excepting those that span the Campagna,[9] in the labor spent on it and the volume of water it carried. Recollect it is not a masonry work, and was a ruin before the first Spaniard reached the Gila, three hundred years ago. I rode across it as it is now, and I think it fifty feet at the top and twenty-five feet on the bottom. Wouldn't that float any canal boat on the Erie Canal? We rode along by its side, our animals' hoofs striking the ruins of the city near it two hours and a half, and could not have gone less than seven miles in a straight line.

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[8] *Acequia* is Spanish for *aqueduct*. Turney has published detailed maps and descriptions of this ancient irrigation system, showing its relationship to present-day Phoenix area canals which still use parts of the ancient routes. (Omar A. Turney, "Prehistoric Irrigation.") When Haury supervised the excavation of the great Pueblo ditch at Snaketown nearby on the Gila River, he estimated its beginnings at 300 B.C. or earlier. It was the basis of an agricultural system which flourished for some 1,500 years. For his account of the culture and illustrations of the excavated acequia, see Emil W. Haury, "The Hohokam, First Masters of the American Desert.")

[9] The Campagna di Roma is a low-lying area of wastelands about the city of Rome which was crossed by one of the great Roman aqueduct systems bringing water to the city. Allyn must have seen this during his travels in Italy.

What a population[10] must have been here once! Seven miles on one street! At this point the *acquia* turned to the left and I am told it has been traced thirty miles, then we left it, and in a short time reached the river again, having crossed a bend of it. We did not go to the water lest Indians might be lurking there, but turned away from it and the trail into a clump of mesquit a quarter of a mile off; tied our animals, there was no grass, made a fire of the smallest dimensions and some coffee, smoked our pipes in silence, spread down our blankets, rifles by our sides, in the moonlight and slept to the music of the distant murmur of the water and the tramping of the animals.

Next morning we were up at daybreak, led the animals to the river side to graze on the new grass among the stones on the edge, and prepared our breakfast. Same bill of fare as yesterday, lacking the fish. At about 8 o'clock we got under way, expecting to reach Casa Blanca,[11] the residence of the Indian agent at Pima, before sundown at farthest. We went on bravely for two or three hours when my mule gave out; just walking along and that was all. I blooded the spurs in the vain attempt to quicken her gait, and then got off and walked an hour; Smith laughing at me, and saying I didn't know how to make a mule go. The appearance of the animal was certainly on his side, for she was fat and in good condition. No signs of the Gila yet. We had been expecting to see its fringe of cottonwoods on the horizon for an hour. I said we must stop; he said he would ride my mule; so we exchanged. His was a slim, light Spanish mule, worth about half of the money mine was, but much better adapted to the saddle; mine was large, and had been in our ambulance team from Leavenworth, and was used to corn. The truth was, the grass filled her belly without giving her any strength. We went on bravely for a half hour, and looked behind to see Smith afoot, his long rowelled Spanish spurs in his hand, and he every little while digging them into the mule. The laugh was mine now, and I asked if we hadn't better stop. Yes, was the reply. So the first

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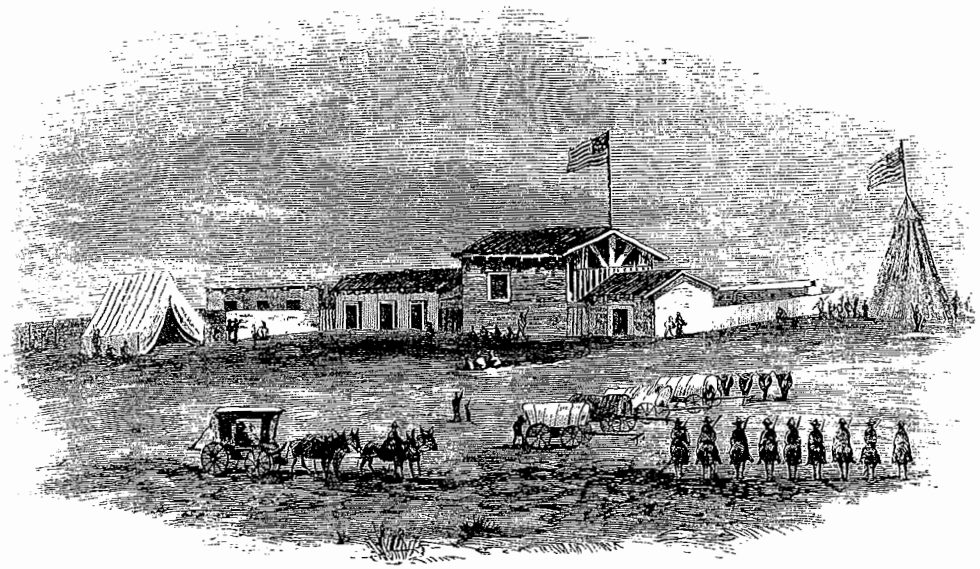
[10] This population was that of the Hohokam, a Pima term meaning "those who have gone." For a brief illustrated discussion of Hohokam culture see H. M. Wormington, *Prehistoric Indians of the Southwest,* pp. 118–47.

[11] Casa Blanca (White House) was a trading post in the Pima villages run by Ammi Mitchell White, a New Englander. He had a stage station there and later was said to have run the first steam flour mill in the area. (Granger, *Arizona Place Names,* p. 292; *U.S. Census,* 1864.)

patch of grass we came to we camped. Our canteen leaked and we had no water; it was pretty hot and we didn't know how far it was to the Gila; not a sign of it. We had used the last of our coffee this morning, so we lunched on bread baked this morning.

At sundown we got under way again, having transferred our pack from the burro to my mule; it only weighed some forty pounds; Smith agreeing to ride the burro if I would drive the pack mule. Armed with a long stick, wherewith to pound the animal if she was obstinate, I started; Smith in the lead, pack mule next, and I bringing up the rear. The mule seemed to think there was some joke about the pack, that it would shake off, or something, for she trotted a whole hour right smartly, and I began to think she was shamming in the morning. The moon rose in almost tropic brilliancy, the air was bland as Italy, and on the whole I felt quite jolly over my first experience in mule driving. But it is not safe to crow until you are out of the woods, for the pack got to be an old story, and the mule soon got at her old tricks, beginning to go so slowly that she seemed scarcely going at all, and at last deliberately laid down and tried to roll; but a pack saddle and a lot blankets are not the easiest to roll off.

Just at that moment a slight breeze wafted the unmistakable smell of a mesquit fire to me. Was it Apaches? Who else could it be? Smith was ahead, out of sight, trying to get a glimpse of that ever receding stream, the Gila, which I was beginning to think was a myth. I scanned the direction of the smell with eager eye, but could not see anything; a bad sign, if it were white men it was almost certain to be visible; still it might be Pimas or Maricopas. I dared not shout at the obstinate mule, and shouting is an essential part of a muleteer's business. By this time, however, she got up and refused to follow the trail. Off she would go to the right, through a thicket of mesquit, and then go to grazing; I after her, belaboring her with the stick; the next time she would go quite as far to the left, I after her, until I began to be apprehensive that we should lose the trail, not the easiest thing to follow by moonlight. Ever and anon that smell would sweep down on the breeze. At last, however, the mule concluded to go on, and a half hour brought us to an enclosure, a cultivated field, and a steer grazing outside of it; glad sign of the Pimas, but where is the Gila? The mule bolted off after the steer and went



From J. Ross Browne's *Adventures in the Apache Country*

Ammi M. White's settlement, centering around a flour mill, is portrayed by Allyn as an outpost of comfort and conviviality in the midst of an uncivilized desert country. After his intial visit to White's Mill in spring 1864, the judge returned the following winter to find the little establishment flourishing.

to grazing. While I was vainly trying to get her on, Smith came back, having found a camping place on an *acquia*. The Gila couldn't be far off, but it wasn't safe to go on, as the land was cut up with *acquias* and brush fences. We soon unpacked, built an Indian fire, viz. a small one, and baked bread. I nearly forgot to say that we drank two canteens of water before we did any thing else. We were very soon sound asleep.

Almost as soon as we were awake in the morning, a Pima stood noiselessly by our side; he was out with a pick axe to repair *acquias*. He said it was but little distance to Casa Blanca. About ten minutes brought us to the Gila; not a tree on it, the Pimas having cut them all down. We crossed, and had all sort of annoyance in getting across the cultivated fields fenced in by acquias and impassable bush fences. At last we hired a boy to show us to Casa Blanca, and it was a very welcome sight when we saw its hospitable adobe walls and the old flag floating over them. We were soon there and were cordially welcomed by Mr. White, the Indian agent for the Pimas and Maricopas, Col. Poston, superintendent of Indian affairs, Mr.

Ross Browne[12] the author and newspaper man, and some dozen other Americans.

The fatted calf was killed at once, or rather the fatted chickens, and we breakfasted on boiled eggs, boiled chickens, fried potatoes, coffee with milk in it, and other things you will laugh at as luxuries, that I assure were very pleasant to palates that hadn't enjoyed them for some six months. I will try to give you an idea of the Pimas in my next.

[12]John Ross Browne (1821–75) was born in Dublin, the son of an Irish publisher and editor who was exiled to the United States in 1833. Browne went to California in 1849. While there, he served as an official stenographer of the constitutional convention. Beginning in 1853, Browne was employed by the U.S. Treasury Department as customs house inspector and as inspector of Indian agencies. It was in the former post that he met Poston and was persuaded to join an expedition to Arizona, one result of which was a series of articles appearing in 1864 in *Harper's,* featuring Browne's original narrative and lithographs. A number of these illustrations appear in this book. (Lina Fergusson Browne, ed., *J. Ross Browne: His Letters, Journals and Writings,* pp. xiii–xvii, xx, 118ff, 182ff, 303ff; Arizona Historical Society Biographical File.)

ATTACHMENT D

Early Military Roads in the Region

msm-51

NAKED WINTER SWIM:
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It was a Tuesday, September 10, 1867, that a tornado ripped Camp McDowell. For half an hour the winds collapsed the tents of Companies D and F of the 14th U. S. Infantry and chewed up tarps temporarily covering the Quartermaster's grain and hay. Whatever the wind found unsecured was thrown hundreds of yards.[1] Some of the severest damage was sustained by the roofs of the two year old post's adobe buildings.[2] The buildings had been assembled from poorly cured bricks by soldiers, unskilled in adobe construction, who were, by nature, not known for quality workmanship.

Camp McDowell's adobe roofs had always leaked. Lieutenant C. C. C. Carr of Company E, First U. S. Cavalry, recalled how brown rain water first dribbled into one's quarters only to turn light yellow when it made contact with the horse manure used to seal the roofs.[3] The post needed to be rebuilt, but in addition to being too expensive, whatever lumber that was available was too heavy to transport in the quanities needed. This may have been why priority was placed on finding a useable wagon route to Camp Lincoln, where, fauther north, easier access would be available in Arizona's pine forests.[4]

Apparently George B. Sanford, Captain of Company E, First Cavalry, was unsuccessful in trying to locate such a route earlier in the year.[5] In Sanford's absence, (he had returned back home to New Haven for an extended leave), C. C. C. Carr took command of the troop. In January, 1868, Carr was given orders to locate a wagon route and not to molest any peaceful Indians with whom he might come into contact. Any Indians, however, that elected to remain hostile, Carr was instructed to attack.[6] Carr assembled 46 men of Company E, two citizen employees of the Quartermaster's Department,[7] a guide and a packer. C. H. Webber of the Engineering Department accompanied the expedition. He, like Carr, prepared a detailed report of the trip, as well as a map, which appears to have been executed in water colors.[8] The men were mounted on horseback, some of the horses having been brought into the post by Company D, 14th Infantry, under Second Lieutenant Patrick Hasson earlier in the month. Carr noted that the Hasson horses were in very poor shape, having been at the post for over a week without being fed grain. The men were rationed for ten days, four days of which was carried on their saddles[9] and the remainder packed on eight mules.

The party left the post during the morning of Monday, January 13, 1868, heading straight north. The recent rains made for slow going. They passed the long government farm on their right and traveled about 10 miles before running into an impassable canyon. Carr and Webber spent the afternoon exploring the area around the west bank of the Verde River. "The banks of the river are very steep and rocky and close to the water," Webber recorded. "The river is about 130 feet wide and very deep and shows signs of rising 40 feet."[11] They struck camp about 1:30 pm. Carr maintained the schedule of early afternoon camps so the animals could get in four hours of grazing before sunset.

As the expedition could no longer head north, on the second day they left camp at 9:00 am and turned west for 10 miles. Some of the small arroyos were running, but the watering spot that had served Sanford's August expedition was dry. Even digging failed to produce water. Carr headed for Chilson Creek,

about a mile away where water was known year around. They camped at the junction of Stony Brook and Chilson Creek.

It remained overcast. Rain had been experienced every day of the expedition, however a temporary break occurred during the third day. The command left camp at 9:00 am and traveled three and one half miles over what Carr called "a fine rolling country." They climbed a mountain from which the view close to the Verde was, in Carr's words, "one vast jumble of mountains and rocks." In the distance, the San Francisco Peaks were visible. Carr considered the possibility of a march by criss-crossing the river from side to side and advancing in that manner, but he discounted the idea, as the river was swollen. However, it would be a workable plan should it become necessary. They ascended Mount Beauford, rode its crest, which Carr called the "Divide," and about half way down struck camp in an area of sufficient water, grass and wood. The night brought rain mixed with snow.

Driving rain delayed the morning start until almost 9:30 am where the command continued to travel along the "Divide." The men descended about noon into Grass Valley where they stopped for an hour. "The weather was so cloudy and mists hung so low," Carr noted, "that scarcely any of the hilltops were visible, and I had to depend almost entirely upon the compass for guidance today." All the arroyos crossed were now running.

During the morning of the fifth day the command followed an Apache Trail which led into a seven mile long valley pocessing an attractive stream and blue limestone ledges. The valley was some 150 yards across with high mountains at both sides. Webber estimated that the stream was 15 feet wide and six inches deep, and would flood the entire valley during high water. Carr reported:

> I marched up the stream about five miles and camped at 2 P. M. As I was putting my command into camp some Apaches appeared upon the neighboring hills, built a fire and indulged in some demonstrations, the meaning of which was best known to themselves.

The horses began to wear down, with one horse being shot as it could no longer proceed. The cavalryman on foot would have had little effect on the group's speed, as the terrain required that each man lead his horse most of the time anyway. The Indians gave no trouble during the night.

Rain continued as the command encountered mud fetlock deep. The rain was very heavy as the group climbed the canyon side on Saturday, January 18th and located the remains of the Indian's fire the night before. In midmorning the men entered a valley fifteen miles long and six miles wide, through which two streams flowed. At 2:00 pm camp was set up at Grove Creek, which Webber reported to be six feet wide and six inches deep. The area was filled with ash, cottonwood, sycamore and willows. A second horse had given out during the day's march and was shot.

At 7:31 am, the sunrise Sunday morning revealed thick clouds with cold rain that quickly turned to snow. Carr's command climbed a flat topped mountain from which the Verde Valley was visible. They made six miles before camping in the early afternoon. Two more horses gave out and were shot.

Carr's report said that camp broke at 9:00 am Monday. Then fourty-five minutes later some Apaches appeared and began to yell in a "very loud and excited manner." Carr continued:

> About 15 minutes afterwards I discovered a Rancheria in the canyon in front of me, through which my route lay. The alarm had been given and the occupants had taken to flight, and I did not think it was necessary or proper that I should use any unusual exertion to capture what women and children might still be concealed in the vicinity, (I know the warriors were all beyond my reach,) as many of my men were barefooted[12] and my horses daily loosing strength, and I had I knew not how many days of hard marching still before me. While descending into the canyon I found an old squaw lying under a tree, and took possession of her, but as she was too old to travel far, and I had no transportation for her, I was obliged to abandon her.
>
> I destroyed the Rancheria, consisting of 4 huts[13] with a quanity of cooked mescal and found several baskets containing buckskins and tools for the manufacture of mocassins, which had been abandoned in the hasty flight.

The command traveled six miles during that day, finding plenty of wood, water and grass. Another worn out horse was shot. During the night it froze.

For Tuesday, January 21st, Carr made, in part, the following entry:

> Left camp in heavy snow storm at 9:15 and followed an old Apache trail which led me over a very good country. Crossed several fine streams, and at noon came in sight of the Verde. About twenty minutes after, I came in sight of a Rancheria consisting of 4 large huts capable of containing 50 Apaches which had been deserted by its occupants only the night previous, as the ashes were still warm in the huts. I saw some signs of the presence of horses in the village, a trail led down to the Verde about 1/2 mile distant.

Carr deceided not to continue following the trail he was on, and, instead, took a trail leading towards the northwest which led indirectly to the river. Webber observed that the Verde was impassable at the spot. They continued along the river bottom until they came to a place where the river filled the canyon. Carr climbed the canyon's side, where, about a mile fauther from the river, they pitched the ninth camp of the expedition.

Camp Lincoln was situated on the opposite side of the Verde.[14] Sooner or later the river would have to be crossed. Carr explained his decision under his entry for Wednesday, January 22, 1868:

> Left camp at 9 A. M. and finding it very difficult to get up on the mountain West of the Verde, I determined to cross the river opposite my camp and get on the shortest line to Camp Lincoln. After examining the river at various points for a ford without success, the command proceeded to construct a raft, a corporal and six men swam the river to assist in the management of it. One was made of logs obtained on the bank of the stream and five sets of horse equipment belonging to dismounted men, and four pack covers were placed upon it. The raft was carried too far downstream, (as there was only one rope attached to it) struck a rock, captized, threw the raftsmen and cargo overboard. The raftsmen were recovered but the cargo was lost.
>
> Another raft was soon constructed and guided by a rope at each end. Soon transfered all the men and baggage to the east side of the river without any further serious accidents.
>
> Camped for the night on the river bank. The horses were driven through the stream during the afternoon.

The next day the expedition continued mountain climbing to prevent having to recross the Verde. By noon, Camp Lincoln was in sight. They descended to Long's Ranch at 4:00 pm where grain was obtained for the exhausted horses. Another horse, however, had to be shot. The men and horses walked into Camp Lincoln at 2:00 pm on Friday, January 24th.

The trip had been conducted under unfavorable circumstances and the loss of six head of horses and five full sets of horse equipment was an expensive price to pay.[15] Either by arrangement or good luck, Webber's report was written at Camp Lincoln the day after Carr finished his report. Webber diplomatically concentrated on topography and geology. Webber elected to go into no more detail than we "crossed the Verde by means of a raft." As Camp McDowell's Quartermaster, Carr knew that the Army might consider deducting the losses out of his pay, just as they had done to Captain Guido Ilges, Camp McDowell's previous post commander, some six months earlier.[16] Carr's report had to say the right things.

Exactly twenty years later C. C. C. Carr was addressing members of the United States Cavalry Association at Fort Leavenworth, Kansas, where he was then stationed. He presented a rather lengthy talk, which one historian has called "a 'bridge' narrative--linking Daniel Ellis Conner's description of the early settlement of central Arizona and John Bourke's noted chronicles of the activities of General George Crook...."[17] During the presentation, Carr deceided to come clean, so to speak. The official report, it seems, may not have reflected what had happened. Here is the river crossing as Carr remembered it two decades later.

> Quite a number of the animals had already died of hunger and exhaustion,[18] when the Verde River was reached at a point where it must be crossed, but could not be forded. A raft of large size was made of dry cottonwood poles, and when put into the water floated as lightly as cork. The raft was partly laden with canvas pack covers and other buoyant articles, and two men started with it for the further bank. The water was as smooth as glass, not a ripple distrubing its surface, and the current apparently sluggish. When about from the middle of the stream there was a cry from the men, an opening in the surface

> of the water, and the raft went down bow foremost, never to be seen again. The men swam to shore, but neither the freight or a stick of the raft ever came to the surface, or was seen again, although the stream was carefully examined for some distance below the scene of the wreck. The disappearance of that raft is a mystery for which no rational explaination has ever been offered. Another was built, launched at a different place, and started upon its journey, but secured this time by guys made of lash ropes[19] which were carried to the farther bank by men who stripped to the buff, notwithstanding the falling snow, and waited, naked; on the other side until their clothing was brought over to them.[20]

Carr saw two problems in making out his report. Initially he might have been accused of not taking reasonable precautions in setting out the raft loaded with government equipment, so the official report blames the accident on using one guide rope, when, in fact, it appears that Carr didn't use any. But then, if Carr had explained what happened, how might he have accounted for the raft being swallowed by a "hole in the water." The truth would have raised too many eyebrows, and Carr had a promising career to look forward to.

When all was said and written, however, Carr's lengthy expedition yeilded no immediate results. True, new country was described, explored and mapped; two Apache Rancherias were destroyed; but Carr, like Captain Sanford's expedition before him, failed to locate a practiable wagon route between Camp McDowell and Camp Lincoln.

The men and the horses recuperated at Camp Lincoln for three weeks. They returned to Camp McDowell on February 26, 1868.[21]

--Jim Schreier
Phoenix, Arizona
June 3, 1987

--- N O T E S ---

1. National Archives, Returns from U. S. Military Posts, Fort McDowell Post Returns, September 10, 1867.

2. C. C. C. Carr, "Days of Empire--Arizona, 1866-1869", Journal of the United States Cavalry Association, vol. 2, no. 4, March, 1889, p 10.

3. National Archives, Record Group 94, holograph of De Witt, "Post Medical History," p 87.

4. Camp Lincoln was renamed Camp Verde (later Fort Verde) in November 1868.

5. Sanford's previous scout left Camp McDowell August 8th, returning August 23, 1867.

6. RG 94, holograph of De Witt, "Post Military History," under the year 1868.

7. Carr was Camp McDowell's Quartermaster at the time.

8. Both reports are found in the National Archives, Record Group 98, U. S. Army Commands. A copy of the map may be found in the extensive collection of period maps in the Arizona Historical Foundation, Tempe.

9. This is no mean feat if the First Cavalry were using model 1859 saddle bags, which, they probably were assigned. The bags are compact. Carrying a change of underwear and a few pair of wool socks is about all the off-side bag could handle. The on-side bag held required horse grooming aids. This exact term appears in other period scouting reports from Camp McDowell, however the exact manner of carrying rations "on the saddle" is not clear.

10. The road used by Company E at the time appears to be still in use. The government farm, which was in production in 1868, is today still being used.

11. Quotations have been edited for capitalization and puncutati

12. The issued military boot could not hold up to Arizona's conditions, which, according to Sidney B. Brinckerhoff, was caused because of poor quality leather, very poor fit and hand sewen threads holding the sole to the vamp were easily cut through, or wooden pegs, if used, simply worked out of the sole. See Boots and Shoes of the Frontier Soldier, 1865-1893, Tucson, Arizona Historical Society, 1976, p 3.

13. Webber notes that the huts destroyed were constructed of logs.

14. The site of Lincoln would be changed to the side of the river Carr was on in 1870, the current location of Fort Verde. See Constance Wynn Altshuler, Starting With Defiance, Tucson, Arizona Historical Society, 1983, p 60.

15. The Army was paying about $500.00 a head for horses about that time; and the bridle, saddle, halter, watering bridle, spurs and horse grooming equipment cost $36.10 in 1864. Carr lost about $3,180.50 worth of property, which would be about $63,000.00 in today's money.

16. Ilges went against orders and purchased $1,305.00 worth of lime to make cement to fix some of post's roofs. The Secretary of War then ordered $1,115.00 to come out of Ilges' $1,537.50 annual salary. See Constance Wynn Altshuler, Chains of Command, Tuscon, Arizona Historical Society, 1981, pp 87-88.

17. Dan L. Thrapp, editor, A Cavalryman in Indian Country, Ashland, Oregon, Press of Lewis Osborne, 1974, p 8. This book is based on the article by Carr originally published in the U. S. Cavalry Association Journal referenced in note #2.

18. This is an odd statement, as Carr went to great lengths to daily graze the animals on, according to both his and Webber's reports, abundant grass located at each camp site.

19. The lash ropes were probably those used to secure the pack mule's cargos.

20. "Days of Empire," p 21.

21. Post Returns, February 26, 1868. De Witt's post history, page 5, states that they returned on March 18th. De Witt's date is suspect.


N
1st Camp

ILLUSTRATIONS

1. Webber's map of the expedition

2. AHS photo #60530
   Parade ground at Fort McDowell, after March, 1877. To the right are the officer's quarters and to the rear, company quarters. The camera is located towards the southwest end of the parade grounds. Photo by W. H. Williscraft.

3. AHS photo #60380
   Camp Verde moved to the south side of the Verde River in 1870, about 7 years before this photograph was taken. Many of Verde's buildings were made of lumber, whereas Camp McDowell at the same time consisted of adobe construction, but with, at long last, wooden roofs. Photo by W. H. Williscraft.

4. AHS photo #60546
   Mountains between Camp McDowell and Verde. From a stereo photograph, about 1877, by W. H. Williscraft.

5. AHS photo #51090
   Owen Wister's photograph of army pack mules, about 1895. C. C. C. Carr later recalled that he and his men spent the better part of a day trying to figure out how to pack a mule when First Cavalry initially arrived in Arizona in 1866. Carr gave up and threw the mules' cargo into wagons. He contemplated doing worse to the mules, but time did not permit.

the Salt River and shipped it to Camp McDowell. (Smith's camp was situated near 40th Street and the Salt River in Phoenix.) That same year, Jack Swilling, an entrepreneur of questionable character, visited Smith and noticed that the Salt River could be channeled to irrigate the valley. He also discovered old canal beds that some ancient tribe (the Hohokam) had built before for the same purpose. The Swilling Irrigation Canal Company was formed with $10,000.00 raised from Henry Wickenburg, L. J. L. Jaeger and others. The company successfully channeled the water through the prehistoric Hohokam canals and had barley and pumpkin crops growing the next year. A small plaque at 24th Street and Washington commemorates the first farm and the occasion. Government surveyor W. H. Pierce began mapping and staking section lines in the Tonto Foothills at this time, also, while placer miners continued to search for claims in the Foothills. The military presence in the area increased its activities, too. In October, Camp McDowell's strength was cut in half when Lt. R. C. DuBois and members of the 14th and 32nd Infantry went into the field to build a new road from the camp to the Tonto Valley, over 30 miles away. Rens Road

D. THE FORT McDOWELL ROAD

Despite the ever-present Indian problem facing the military, road construction and maintenance would remain high on the agenda of the Arizona Military District Commander. Interlocking the military posts with a planned road network would benefit the military in areas of logistics, rapid deployment, and reinforcement.

Direct cross-country travel between Camp Date Creek on the La Paz Road and Camp McDowell, a distance of about 110 miles, was conducted over established paths based on the abundance of water, graze, and wood. The same conditions were present along the road between Whipple and McDowell, about 96 miles apart. So well defined was the Whipple-McDowell trail that the 1867 government surveyor W. H. Pierce noted: "at T5N R6E section 31, at 1,000 chains, trail from Ft. McDowell to Prescott, N 10 W." Neither of these paths could support the heavy army wagon traffic. All supplies being transported between Camp Date Creek and Whipple to Camp McDowell had to pass through Phoenix. From Phoenix to Camp McDowell was another 33 miles, or a hard day's travel, which made the total distance traveled 170 miles. Scottsdale City Limits

Therefore, to cut down travel time and distance, the District Commander wanted two more roads built in the region. One road was to connect Camp Verde (Lincoln) with Camp Whipple; the other would run directly between Whipple and Camp McDowell (see Figure 5).

In April 1869, Major D. R. Clendenin, 8th Cavalry, was ordered into the field for the purpose of locating a wagon road between Camps Whipple and McDowell. Due to its historical and geographical significance for the Tonto Foothills area, Major Clendenin's field report outlining the possible wagon road route is reproduced here in its entirety:

Ft. Whipple, A.T.
April 21, 1869

Adjutant Generals Office
District of Arizona
Camp McDowell, A.T.

Sir:

I have the honor to report that on the 4th [April] I left this post [Whipple] for the purpose of locating a wagon road between Ft. Whipple and Camp McDowell. Taking 25 men and two wagons. Following the Wagon Road to Dickerson's Ranch on the lower Agua Fria with part of the men, I sent Lt. Curlip [?] with a detachment to scout the country to meet me in Black Canyon. With wagons I found a good route to the lower end of Black Canyon which will not require any work of consequence, and 2000 lbs. can be easily carried in each team. The distance from Ft. Whipple is about 48 miles.

The next two and one half miles of descent from the mesa will require a considerable amount of work and bring the road to the Agua Fria - thence following the trail usually traveled, a road can be made to New River 8 miles distant without a great deal of labor. From New River to Cave Creek 12 miles, there is scarcely any work except at Cave Creek. From Cave Creek to McDowell 25 miles the principle labor will be to cut out the cactus, but no heavy grading will be required.

The distance over this route is about 95 miles and is well watered except between Cave Creek and Cp McDowell.

Ten miles south of Dickerson's Ranch, I found a good spring which I named Badger Spring, where I judge the water to be permanent. One mile east is the Agua Fria, and animals can be watered there in case the Spring should fail.

From Badger Spring I sent Lt. Curlip eastward through a gap near [illegible] Mts [laid down on Al Webbins Map] to see what prospects there was for a road, and also scout for Indians in that vicinity. Lt. Curlip reports a good route for a road through to the Rio Verde, and that by crossing the River twice there will be no heavy grading, also that the country is well watered with abundance of grass. By following this route the upper part of the road would start from the mouth of Big Bug Creek where it empties into the Agua Fria.

A careful examination of the lower part of this route from Camp McDowell may develop a road without having to cross the Verde.

This is evidently better for wood, water and grass, as the direct route is not well supplied with grass.

Signed
D. E. Clendenin
Major 8th Cav
Commanding

The decade of the 1870s would bring many changes to the existing life-styles in the Salt River valley and the Tonto Foothills. For the civilian settlements, it was a time of growth and prosperity. For the soldiers, it was a

period of outstanding military success against all hostile bands. For the Indian, it was the beginning of forced reservation life. In July of 1870, General Stoneman, fresh from a five-year tour of duty in California, took over as military commander of the District of Arizona. With Stoneman, the territory hoped for an end to Indian raiding. In October, Stoneman began a long cross-country tour of all the major garrisons under his command. Earlier, on September 12, Captain B. R. Perkins, 12th Infantry, began construction on the new wagon road from Camp Whipple to the Agua Fria. Perkins was given the following orders by the Assistant Adjutant General Stone:

> To make a good practical wagon road over and down it (Large Mesa) and to cross the Agua Fria stream, where it will connect with a road from the south to be built by the troops from Camp McDowell. The Department Commander directs that the road if not completed by the first of October, will however be in such an advanced condition, as to render it possible for light loaded wagons to pass over.

At the same time, Company A, 21st Infantry, commanded by Captain P. Collins, was engaged in building the southern half of the road. By the end of October the road construction between Whipple and McDowell was completed.

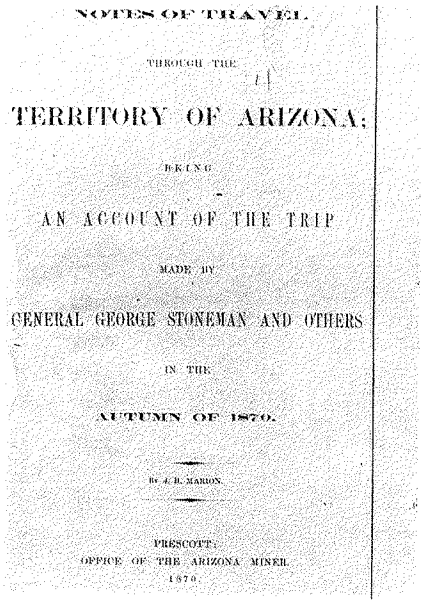
E. ECONOMIC DEVELOPMENT AND INDIAN RELATIONS

On October 15, 1870, the official Townsite of Phoenix was selected. The settlement's original name, Pumpkinville, was considered too undignified. The names Stonewall and Salina were considered also, but the name of Phoenix was chosen by Darrell Duppa. The Phoenix was a mythical bird which arose from its ashes after it had been consumed by fire. Duppa believed that the new town of Phoenix would arise from the ancient Hohokam villages. Two weeks later the road from Ehrenburg to Phoenix to Camp McDowell was opened. Another military road to the north opened from Camp Verde to Sunset Crossing. And finally, amidst the increased civic and military activity in the valley area, the earliest placer mining operations began in Cave Creek near a section called Blue Wash.

The following year, Prescott's *Arizona Miner* optimistically requested that "more capital, more labor . . . come to Arizona; - no particular difference to which section, as every section contains rich mines." Their optimism was premature, as the Apaches were still raiding from the Mexican border north to the Mogollon Rim. Key events would start moving the army towards its inevitable clash with the raiding bands.

On April 28, 1871, a large force made up of Anglos, Mexicans, and Papagos attacked a friendly Apache village near Camp Grant. When the shooting stopped, 8 warriors and 136 women and children lay dead. The Camp Grant Massacre, as it was called, caused a ripple that was felt all the way back to Washington, D.C. It ended General Stoneman's career in Arizona, and public outcry brought the peace commissioners to Arizona. The populace of the territory celebrated the slaughter as a victory against the Apache.

General Crook was ordered to replace Stoneman and arrived in Arizona on May 2. The General immediately made a round of the garrisons as Stoneman had done earlier. However, the General was ordered not to take to the field.



NOTES OF TRAVEL

THROUGH THE

TERRITORY OF ARIZONA;

BEING

AN ACCOUNT OF THE TRIP

MADE BY

GENERAL GEORGE STONEMAN AND OTHERS

IN THE

AUTUMN OF 1870.

By J. H. MARION.

PRESCOTT:
OFFICE OF THE ARIZONA MINER.
1870.

NOTES OF TRAVEL THROUGH THE TERRITORY OF ARIZONA

Being an account of the trip made by General George Stoneman and others in the Autumn of 1870

By J. H. MARION
Edited by DONALD M. POWELL

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forage arrived in about an hour, when we bade adieu to Captain Netterville, and Lieutenants Riley and Garrett, who had accompanied us thus far. The hour was spent by Colonel Stoneman in talking with Captain Netterville about the new post which the Captain, with Lieutenants Silva and Barrett, Company "E," 21st Infantry, and "K" troop, 3d Cavalry, were about to start on Mineral Creek, near Pinal Mountain, and which is now established.[67] After going about 35 miles, over a country in which there was not a drop of water, but plenty of grass, we encamped late in the night, and slept a little while the animals were being fed. On the way, we passed two or three places where white men had been killed by savages, and saw the graves of the murdered men. Distance traveled, about 35 *miles.*

Thursday, September 29. We were up and away long before daylight and soon reached the Gila river, at Florence, when men and animals slaked their thirst, which was great, as we had made about 53 miles without water. The bottoms of the Gila, at this point, are large, and the soil very productive. Cottonwood and Mesquite were thick. Fine farms, and substantial adobe houses were seen on every side, and we could not help feeling pleased at once more beholding these evidences of civilization. Thomas R. Ewing,[68] who owns the finest ranch at this place, was very kind to us. He informed us that most of the river bottoms for 30 or 40 miles, were settled and under cultivation. The Gila furnishes plenty of water for purposes of irrigation, and the rule is to raise two crops a year. It was late in the afternoon when we started from Florence, and crossed the Gila, on our way to Camp McDowell. Twenty miles were soon passed, and we lay down on the desert to rest, having made, with our morning's journey of 18 miles, a distance of 38 *miles.*

Friday, September 30. Got an early start, and reached the Upper Crossing of Salt river about noon, crossed it and rested near a farmhouse. While approaching the river, we got a fine view of the immense valley in which stands the town of Phoenix, and in which are many of the finest ranches in Arizona. We had friends there whom we would have gone to see but for the fever and ague which was preying upon us. Salt River, or Rio Salado, as some call it, is, next to the Colorado, the largest stream that flows near or through Arizona. The water was low when our party crossed it, yet it was with some difficulty we made the trip. The wash, in its bed, and on its banks is made up, principally, of granite and quartz bowlders, which strengthened our belief that the stream passes through mineral bearing regions, above in Central Arizona. Three years ago there were not to exceed ten settlers upon this portion of the river; to-day, there are nearly 300, and the population is rapidly increasing. Scores of miles of ditches to convey water for irrigating, have been constructed, and the place is really the granary of Northern Arizona. Soon as the heat, which had been intense, became less, we took up the line of march for Camp McDowell, where we arrived about 8 o'clock in the evening.[69] On the march we passed some immense ruins. The road, from Salt river to McDowell, follows the west bank of the Verde, one of the largest and prettiest streams in the Territory, and upon which the post is located. Mesquite, *Palo Verde,* Cottonwood, and other trees were plenty in the vicinity, but grass was scarce, save on the river bottoms. The post itself is, we think, the finest in the Territory. The houses, of which there are a great number, are of adobe, well ventilated and scrupulously clean, as, indeed, was the large parade ground, and every place and thing in and about the post. It has, for a long time past, been commanded by that brave officer, Colonel G. B. Sanford,[70] who, with his noble troop, has inflicted many telling blows on the Apaches. The other officers of the post were Captain Moulton, Lieut. Veil C. De Witt, Surgeon, and Field Surgeon D. J. Evans. Troops — "C" and "E," 1st Cavalry, and "A," 21st Infantry. The sutler's store of W. B. Hellings & Co.[71] is the finest, best stocked establishment of the kind in the Territory, and its proprietors, Messrs. Hellings & Grubb, are gentlemen in every sense of the term.

The four peaks, which so many of our prospectors have

seen from a distance, are not far from McDowell, and though they look barren and forbidding, Colonel Sanford assured us that he had found pine timber, and water, in valleys, between the peaks. He and his troopers once surprised a rancheria up there, and killed several of its inmates.

The ranks of the two Cavalry companies were nearly full, and a finer lot of men are not to be found in the Territory. Captain Collins' Infantry company was very small, but every man in the company was a veteran. All the troops went through their drill in a very creditable manner. We missed seeing a Cavalry guard-mount, and were sorry for it, as Dr. Wirtz informed us that it was "splendidly done," by men and horses.

Saturday, October 1st. Since crossing the Upper Gila, we had traveled upon old and good roads, but now, we were about to take a new "road," over portions of which a vehicle of any sort had never passed. Therefore, we called upon Colonel Stoneman quite early, to learn the news. It was not very encouraging. He read us a letter from Colonel Frank Wheaton,[72] who had reconnoitered the route, and gave, in the letter, his opinion, that Colonel Stoneman would find it impossible to take his ambulances over the route. This fell on us "like a wet blanket." But, Stoneman said he would see whether or not he could make it. This suited us, as we were exceedingly anxious to get a breath of mountain air, and to see pine trees again. Our old and reliable escort, teamsters, wagons and teams, were ordered to turn back to Salt River, and take the road *via* Phoenix and Wickenburg, to Whipple, which they did. About 4 o'clock in the afternoon, the two ambulances were in readiness, we jumped in and followed a small escort. We made about ten miles that afternoon, through a poor-looking country, and camped for the night.

Sunday, October 2d. Made an early start; were, soon after starting, joined by Col. Sanford, Mr. Grubb, and some cavalrymen. Reached Cave creek[73] in about 10 miles travel; found plenty of wood, water and grass; rested a few hours, and put out again for next camp — New River[74] — distant

about ten miles, where we arrived late at night, very much fatigued, for the road had been rough and hilly. We found plenty of water in the stream, and refreshed ourselves.

Monday, October 3. Made about *ten miles* to-day, over a rather rough road, and encamped on the east bank of the Agua Frio, within plain view of the mouths of Black Cañon[75] or Turkey creek, and the big, black cañon of the Agua Frio. After dinner, Capt. Sanford, Mr. Grubb, and a few cavalrymen, started up the mountain to search for the men of Company F, 12th Infantry, who, we knew, were close by, building a road. The Captain missed the men and their camp, in going up the mountain, and kept on until he reached the Agua Frio, where he got directions regarding their whereabouts. He then returned, found them, and arrived in camp early next morning, with the news, which was, if anything, more discouraging than that contained in the letter of Col. Wheaton. But Stoneman had reconnoitered the mountain, the previous evening, and knowing not the word fail, he gave orders for the wagon to return to Camp McDowell; also, to lighten up the ambulance as much as possible, and hitch up. The ambulances were lightened and we started up Black Canyon, over a rough road, which, however, was nothing in comparison to what we afterwards encountered. When just about ready to commence the ascent of the mountain, Sergeant John Powers, of E. Troop, First Cavalry, and one private, made their appearance. The Sergeant was on his return to meet Colonel Stoneman, with an answer to a dispatch the Colonel had sent Capt. Brown, commanding Camp Verde. His story was short. He and his companion had ridden about *one hundred miles in fourteen hours,* and lost one man on the way, who became deranged, and rode off in search of water. The Sergeant followed him, and found his horse, which had been stripped of saddle and bridle. When he found the man's horse thus stripped, he gave the man up for lost, and started on. This occurred near the Agua Frio. We afterwards found the man's saddle and bridle, and the man himself, who said he had been chased by Indians, which was

all in his imagination. After thanking the Sergeant and his companion for the long, swift ride they had made, Stoneman led the way, and we started in climbing, and such climbing! Why, a California packer would not have attempted to drive his pack-train over such a mountain. But, it was the best we could do, and on we went, "slow like a snail," over great, rough trap bowlders, some of which were as large as an ambulance. Now and then, the animals had to be unhitched, and the ambulances pulled up by means of ropes. Oh! it was trying on nerves. Our poor nerves gave out early in the day, and leaving officers and men to "do their duty, nobly," we crawled to camp, where we found Lieutenant King, Dr. Soule, and other friends, who gave us something to eat and drink, and a good bed to shake in. It was about 5 o'clock in the afternoon, when we got over our shake and fever, and thinking our party ought to be near port, we started out to hail them, if in sight. They were in sight, and soon landed on the summit, tired and hungry, after their hard day's work — a day that had told fearfully on men and animals. Capt. Brown having arrived from Camp Verde, during the afternoon, with a pretty fair escort, Colonel Stoneman thanked Captain Sanford and his men for well performed services, and, in the kindest manner possible, ordered the Captain to turn back to his post. We then started on over a ten-mile mesa, that would have been level, but for the great number of hard-hearted nigger-head bowlders, which made the ride very unpleasant. We made a dry camp, and all, save the sentinels, slept as soundly as ever tired men slept.

Tuesday, October 4. We got up early, and having left the *trap* behind us, we traveled at a good gait over a nice granite road. Arriving at the Agua Frio, we stayed a few hours, hitched up again, and drive to Lerty's[76] place, where, we encamped all night. Distance traveled, about *twenty* miles. Mr. Lerty and Mrs. Branaman contributed liberally to our mess, and we had a glorious time eating pies and eggs, luxuries to which we had, for some time past, been strangers. Since leaving Black Cañon, the air had been quite chilly,

which rather pleased us, after our long spell of suffering down south.

It was about ten o'clock, on the morning of the 5th of October, when we alighted at Colonel Stoneman's tent, near Fort Whipple and Prescott, and were welcomed back by Lieutenant E. W. Stone,[72] who appeared as glad to see us back safe, as we were to see him, and our own beautiful country, a country we would not trade for any we had seen in our ride of about 800 miles, through Arizona, notwithstanding that we had seen and passed through some beautiful regions.

In conclusion, we wish to state our belief, that no State or Territory on the Pacific slope offers greater inducements to labor and capital — than badly abused, illy treated, neglected Arizona, and that, as soon as both these needed elements shall have found their way within her borders, the progress she will then make; the wealth she will then contribute to the world, will be as great if not greater than California. But, croakers may say, "the day is far distant when the resources of Arizona shall have become available." We think not, for despite all the drawbacks from Indian wars, isolation, and partial failure to work mines, Arizona has progressed — is progressing. Possessing, as she does, vast forests of timber, an immense area of the best pastoral land in the world, a fair quantity of rich agricultural land, pure water, fine, healthy climate, rich and extensive mineral resources, and, last, but not least, the key to the Pacific — (for through her Territory are the only practicable routes for the great railroad that are soon to be built from the Atlantic and Gulf States to those of the Pacific), we think — and the thought does not appear to be an extravigant [*sic*] one — that in less than ten years from to-day, Arizona will have sufficient wealth and population to entitle her to enter the Union as a full and equal partner.

(1)

215

Engineer Office
(Headquarters Department of Arizona)
Prescott A. T. July 2d 1875.

To the
Assistant Adjutant General
Department of Arizona
Prescott.

Sir:

I have the honor to submit the following report, in obedience to instructions from Brevet Major-General Kautz commanding Department. A Map and estimates of labor and materials required for improvements of road from Camp McDowell to Prescott are herewith respectfully submitted.

X The Act of Congress entitled "An Act to provide for the construction of certain Military roads in Arizona" provides that a road

shall be constructed from Camp McDowell to Prescott with a branch road to Camp Verde. I have the honor to state that the present road is entirely practicable with one exception, and that the largest freight teams in Arizona now pass over the road.

The Black Mesa, 7 miles in length, Basaltic formation is covered with Volcanic Rocks in great numbers. Soil of a porous nature. In rainy seasons and in wet weather it is exceedingly difficult to travel over this part of the road, the wagons sinking deep in the soil nearly to the hubbs, circumstances of this kind render it impossible for freight teams to move and they are obliged to lay by and wait till Mesa dries up. This Mesa can be avoided and a more practicable road constructed by following up Black Cañon from Swilling's Ranch 4 miles - thence along edge of

Black Mesa to Bumble Bee Creek, thence along this Creek for 4 miles, thence the road will pass through foot-hills into Big Bug - and from thence will run nearly North to Boggs' Ranch on Agua Fria. From Boggs' Ranch the road will follow closely the Agua Fria and will join the road already built at Old Flour Mill - This will shorten the present road from Spaulding's Ranch to Boggs about 10 miles. From Flour-Mill to Prescott a good freight road is already made and in use.

The Branch road to Camp Verde between Camp McDowell and Prescott per Act of Congress above cited will leave present road at the Big Bug Crossing will pass Vickers Ranch and along Ash Creek thence across foot-hills and join road from Prescott to Camp Verde at G. W. Hance's Ranch. - This will be a good road requiring very little work

and will shorten distance about 8 miles — the present road now runs by Shemmers Ranch at Ash Creek.

The road from Swelling to New River Cave Creek and to McDowell is a good freight road nearly the entire distance with the exception of a sand wash about 6 miles which can be avoided by leaving Sand Wash 5 miles from Gong and turning due East on divide and striking Verde River near Reeves' Ranch thence follow Verde bottom road to Camp McDowell, a good hard road the entire distance from Reeves' to McDowell.

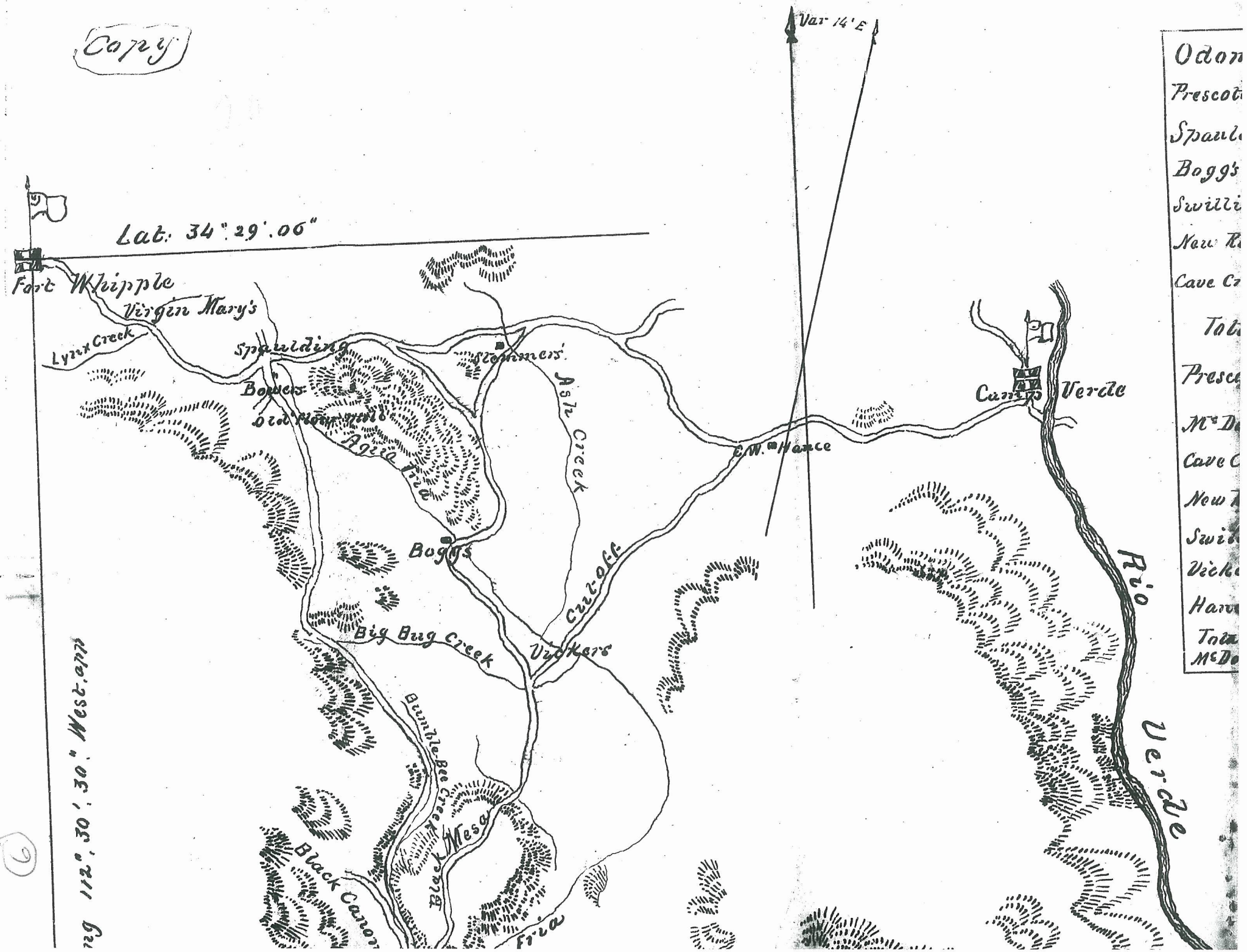
It is recommended that work on this road be commenced after the Summer Rains — Water then can be obtained in more convenient localities for animals and men. Considerable work has been done on this

(5)

Very Respectfully
Your Obedient Servant
(Sgd.) E. D. Thomas
1st Lieut. 8th Cavalry
A.D.C. & Actg. Engineer Officer

A true copy
[illegible]
Quartermaster U.S.A.

Aug. 9th D.M.G.O. 1873.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Fort Whipple
Virgin Mary's
Lynx Creek
Spaulding
Bowers
Old Town ruins
Agua Fria
Stommers
Ash Creek
Boggs
Big Bug Creek
Cut-off
Vickers
Bumble Bee Creek
Black Mesa
Black Canon
Camp Verde
E.W. Hance
Rio Verde
Odon
Prescot
Spaul
Bogg's
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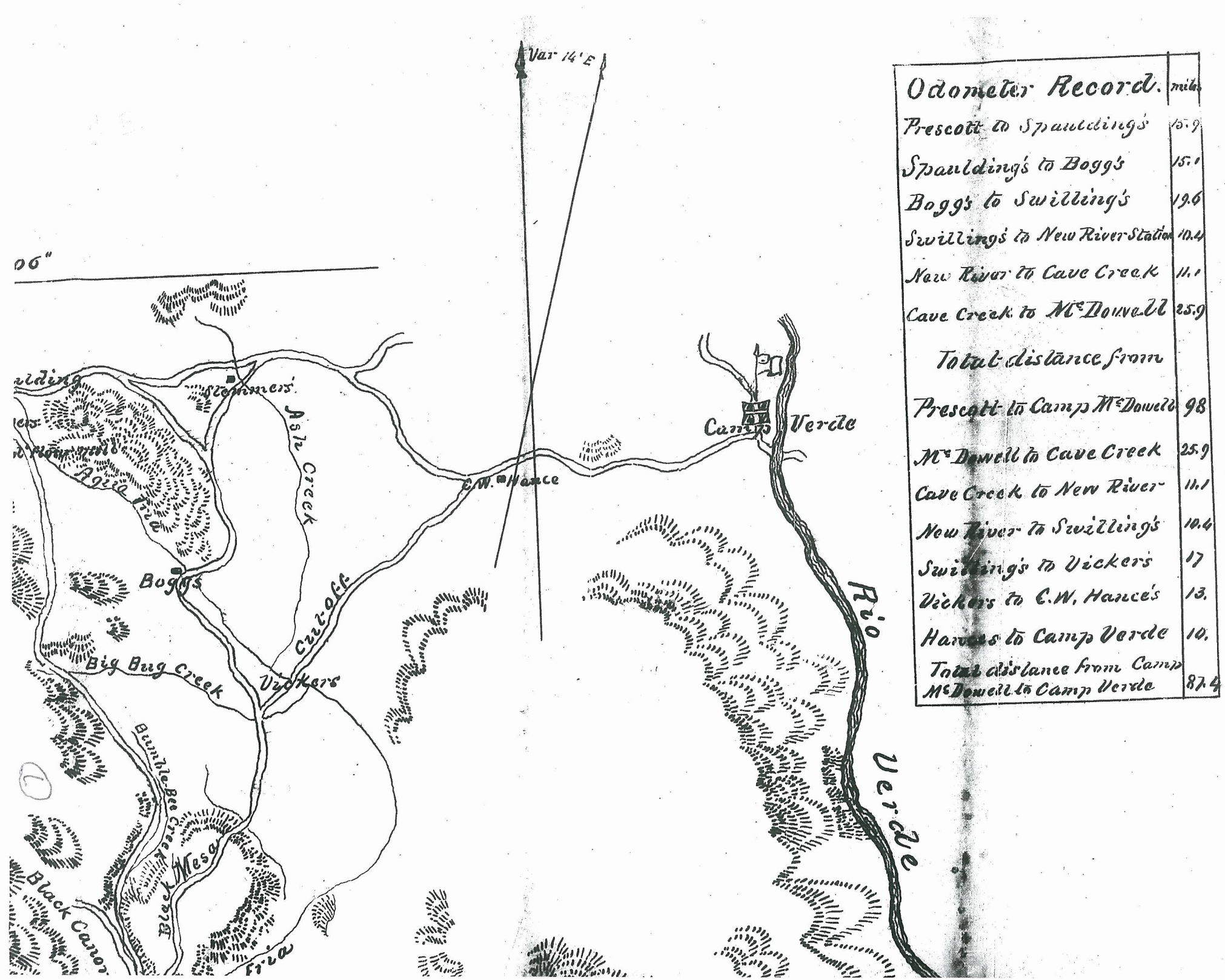
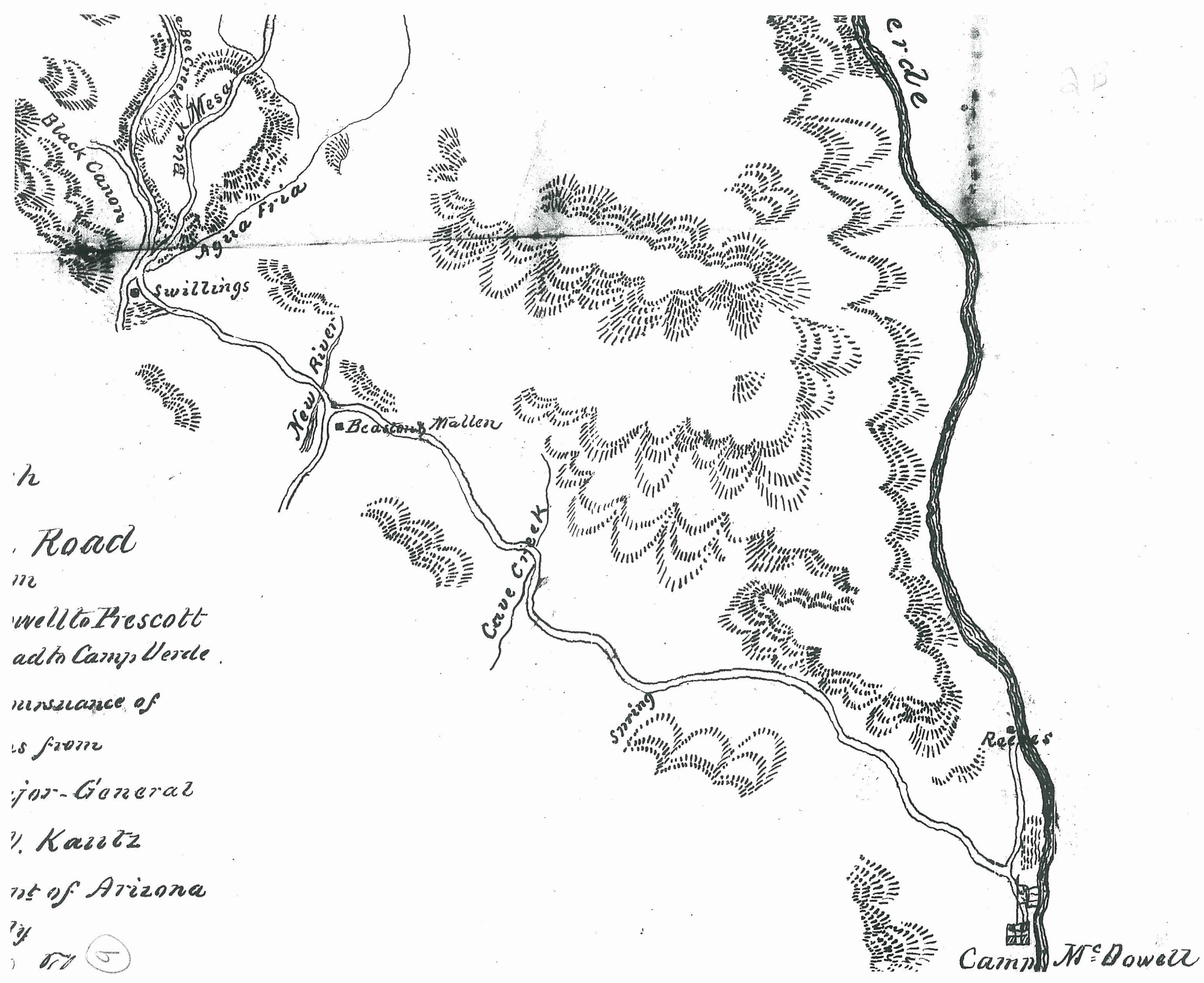


Odometer Record.	miles
Prescott to Spaulding's	15.9
Spaulding's to Boggs	15.1
Boggs to Swilling's	19.6
Swillings to New River Station	10.4
New River to Cave Creek	11.1
Cave Creek to McDowell	25.9
Total distance from	
Prescott to Camp McDowell	98
McDowell to Cave Creek	25.9
Cave Creek to New River	11.1
New River to Swilling's	10.4
Swilling's to Vickers	17
Vickers to C.W. Hance's	13.
Hances to Camp Verde	10.
Total distance from Camp McDowell to Camp Verde	87.4

Sketch of Wagon Road from Camp McDowell to Prescott with Branch road to Camp Verde

Prepared in pursuance of instructions from Brevet Major-General August V. Kautz Comdg Dept of Arizona By

C. M. Tt



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Sketch of Wagon Road from Camp McDowell to Prescott with Branch road to Camp Verde.

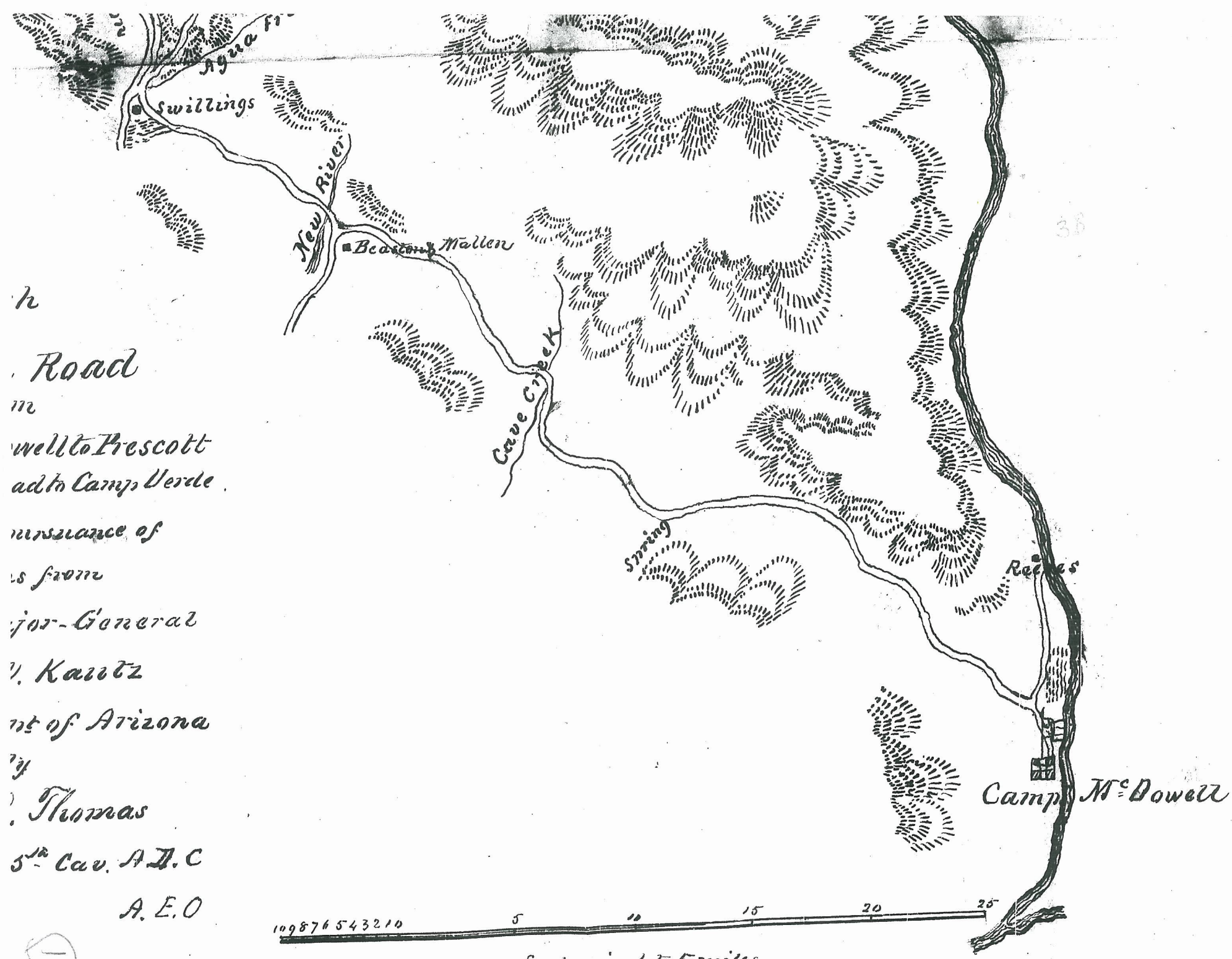
Prepared in pursuance of instructions from Brevet Major-General August V. Kautz Comdg Dept of Arizona

By

E. D. Thomas

1st Lieut 5th Cav. A.D.C

A. E. O



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. Thomas

5th Cav. A.A.C

A. E. O

(12)

Estimate of Cost of Labor and Material for improvement of Road from Camp McDo to Prescott with branch Road to Camp Verde S

1 Foreman, to superintend laboring parties per month, 26 days. Board furnished		13
1 Cook to superintend the preparation of food and necessary cooking for labor-ing force of 50 men		80
50 Laborers to do all work on road such as grading, felling of trees building of stone walls, placing of culverts and drains, digging ditches, in fact all work required of them. To work 10 hours each day, 26 working days in each month. Soldier rations to be furnished on the ground cooked		33
200 lbs. Blasting Powder (San Francisco rates	13¢	26
300 feet fuse (" " "	1¢	3
Incidental expenses.		43
		72

Recapiturlation

50 Laborers 2 mos each or 52 days @	$ 35 per mo	35
1 Foreman 2 " " "	$ 150 "	3

(13)

Estimate of Cost of Labor and Material for improvement of Road from Camp McDowell to Prescott with branch Road to Camp Verde A. T.

Foreman, to superintend laboring parties per month, 26 days. Board furnished	130	00
Cook to superintend the preparation of food and necessary cooking for laboring force of 50 men	80	00
Laborers to do all work on road such as grading, felling of trees building of stone walls, placing of culverts and drains, digging ditches, in fact all work required of them. To work 10 hours each day, 26 working days in each month. Soldier rations to be furnished on the ground cooked	35	00
lbs. Blasting Powder (San Francisco rates 13¢	26	00
feet fuse (" " " 1¢	3	00
Incidental expenses.	435	00
	729	00

Recapitulation

Laborers 2 mos each or 52 days @ $35 per mo	350	00
Foreman 2 " " " $150 "	300	00

1 Foreman, to superintend laboring parties per month, 26 days. Board furnished	130
1 Cook to superintend the preparation of food and necessary cooking for laboring force of 50 men	80
50 Laborers to do all work on road such as grading, felling of trees building of stone walls, placing of culverts and drains, digging ditches, in fact all work required of them. To work 10 hours each day, 26 working days in each month. Soldier rations to be furnished on the ground cooked	35
200 lbs. Blasting Powder (San Francisco rates 13¢	26
300 feet fuse (" " " 1¢	3
Incidental expenses.	435
	729

Recapitulation

50 Laborers 2 mos each or 52 days @ $35 per mo	350
1 Foreman 2 " " " $150 "	300
1 Cook 2 " " 80 "	160
200 lbs Blasting Powder (San Francisco rates) 13¢	26
300 ft fuse (" ") 1¢	3
Incidental Expenses	435
	4424

over

Foreman, to superintend laboring parties per month, 26 days. Board furnished	130	00
Cook to superintend the preparation of food and necessary cooking for laboring force of 50 men	80	00
Laborers to do all work on road such as grading, felling of trees building of stone walls, placing of culverts and drains, digging ditches, in fact all work required of them. To work 10 hours each day, 26 working days in each month. Soldier rations to be furnished on the ground cooked	35	00
0 lbs. Blasting Powder (San Francisco rates 13¢	26	00
0 feet fuse (" " " 1¢	3	00
Incidental expenses.	435	00
	729	00

Recapitulation

Laborers 2 mos each or 52 days @ $35 per mo	3500 00
Foreman 2 " " " $150 "	300 00
Cook 2 " " 80 "	160 00
0 lbs Blasting Powder (San Francisco rates) 13¢	26 00
0 ft fuse (" ") 1¢	3 00
Incidental Expenses.	435 00
	4424 00

over

(16)

Page 2

(signed) E. D. Thomas
1st Lieut 5th Cavalry
A.D.C. and Acting Engineer Officer

A true copy
[signature]
Quartermaster, U.S.A.

Aug 9th D. M. G. O. 1873.

(17) 14

Materials to be furnished by Quartermasters Department, Dept of Arizona - Subject to approval of Department Commander - for construction of Roads to Skull Valley and from Camp McDowell to Prescott - all to be returned when roads is completed.

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150 Picks and Handles.
150 Shovels and Handles.
25 Hatchets and Handles.
50 Axes and Handles.
10 Wheel-barrows
5 Stone hammers.
3 Logging Chains.
3 Carts with Mules. Soldier Drivers.
1 Six mule team and wagon complete with Driver.
1 Cooking stove with furniture (complete)
1 Wall tent complete
1 Hospital tent - (for mess tent)
10 Galvanized Iron Buckets.
10 Water Keg. 10 gallons each.
2 Cross Cut saws, Large.
2 " " , hand.
2 Iron wedges
2 Hammers.
1 Square.

150 Picks and Handles.
150 Shovels and Handles.
25 Hatchets and Handles.
50 Axes and Handles.
10 Wheel-barrows
5. Stone hammers.
3 Logging Chains.
3 Carts with mules. Soldier Drivers.
1 Six mule team and wagon complete with Driver.
1 Cooking stove with furniture (complete)
1 Wall tent complete
1 Hospital tent (for mess tent)
10 Galvanized Iron Buckets.
10 Water Kegs, 10 gallons each.
2 Cross Cut saws, Large.
2 " " , hand.
2 Iron wedges
2 Hammers.
1 Square,
2 Scrapers.
4 Drills for Blasting 12. 16. 20. and 30 inches in length.
1 Portable Forge (with set of tools)
10 Camp Kettles
6 Mess Pans.

(19)

1C

1 Grindstone, ready for use
5- Stone Mason Trowels
4 Tables
5- Benches.
1 Iron rest for Camp Kettles
5- Crowbars (Steel)
1 Plow.

(Sgd) E. D. Thomas.
1st Lieut. 5th Cavalry
A. D. C. and Acting Engineer Officer

A true copy
[illegible]
Quartermaster, U. S. A.

Ch. g 9th D. M. & C. 1873.

ATTACHMENT E

Past and Recent Occurrence of Verde River Beaver Dams

SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM
Bulletin 56

MAMMALS OF THE MEXICAN BOUNDARY OF THE UNITED STATES

A DESCRIPTIVE CATALOGUE OF THE SPECIES OF MAMMALS OCCURRING IN THAT REGION; WITH A GENERAL SUMMARY OF THE NATURAL HISTORY, AND A LIST OF TREES

BY

EDGAR ALEXANDER MEARNS, M. D.

Major and Surgeon, U. S. Army

PART I

Families Didelphiidæ to Muridæ

WASHINGTON
GOVERNMENT PRINTING OFFICE
1907

hair has been plucked out; but the price at which they were sold shows that beaver trapping was not a remunerative occupation in Arizona, which is further attested by the great abundance of these animals along the rivers of the Territory during the early eighties. I have had large skins offered me, prepared with less skill and pains than those above described for 50 cents apiece; but the value has risen so that a trapper named Milligan, who obtained more than 100 skins on the Gila and Verde rivers during the winter of 1886–87, selling them by the pound, received an average price of $5 apiece. The largest beaver taken by Mr. Milligan weighed 73 pounds.

Habits and local distribution.—Signs of the beaver were evident on nearly all of the streams of the Colorado Basin visited by me from March, 1884, to May, 1888. I always found this animal to be excessively shy, secretive, and difficult of observation, in these respects quite different from the half-tame beavers of the Yellowstone National Park. The slight amount of information respecting them that I was able to obtain while in Arizona can be best presented in the form of extracts from my diary of those years, as follows:

July 18, 1884, Fort Verde, Arizona.—Beavers are abundant in pools of Beaver Creek from above Montezuma Well to the Verde River. Mr. Henry Mehrens, a settler living just below Montezuma Well, says he frequently sees them in pools of Beaver Creek, which are there densely bordered by tule (*Scirpus*) and surrounded by willow and cottonwood trees, upon which they feed. He informed me that beaver frequent the irrigation ditches of the ranches along the stream, doing some damage to the ditches and shade trees planted along them.

August 16, 1884, Fort Verde, Arizona.—I killed an old male beaver about 3 miles above the post of Fort Verde, in the Verde River. I first saw it in the river a good way above me, floating like a piece of driftwood, low in the water. For some time I was unable to make out whether it was an animal or not; but I soon saw it move its head up and down slightly, and then I felt sure that it was a beaver—the first one I ever saw. Every walk I had taken along the banks of the Verde River had revealed to me evidences of the abundance and industry of this singular beast. Large cottonwood trees were to be seen with trunks gnawed half through, which, on the next occasion that I visited the spot, were lying prostrate, felled by the beaver. Numbers of cottonwood trees had been cut down by them during the preceding two months, and in some places every tree near the water and some good-sized ones at quite a distance from the stream had been cut, until the spot resembled a clearing made by the woodman's ax. The saplings and limbs were frequently dragged to form a large windrow beside the river bank, in doing which well-made paths had been swept in the sand and loam by the industrious beavers. I had not seen any typical or recently occupied beaver dams, although there were re-

mains of several old ones near the post of Fort Verde. But notwithstanding the plentitude of beavers not one had before been seen, although the streams had been forded at night and in the evening many times. This one was seen on a cloudy day, after a shower, and was shot from an ambush as it swam slowly down the river channel, with only its head visible above the surface of the water most of the time, although it sometimes floated higher and drifted like a board. It was so large and heavy that it was with difficulty removed to a small tree and hung up in the shade.

August 11, 1884, Fort Verde, Arizona.—Visited a spot two miles above the post where beavers had been hard at work cutting cottonwood trees and lopping off the branches close to the trunk. Well-worn paths had been made by them when carrying the branches to the river. I was walking silently and cautiously in the shade of the cottonwoods at a place where the bluff bank was about 10 feet high, when I noticed a ripple proceeding from the nearer shore beneath some jutting roots and brushwood, and crept stealthily to the shore and saw that there was a great commotion in the water. In fact, the whole stream was quaking from the rapid movements of some animal beneath the surface. Soon the head of a large beaver emerged from the shallow water on the opposite side, and in a moment another and another. It proved to be a beaver mother giving instructions to her kittens in the art of swimming. I quickly pulled both triggers of my shotgun. Then there was a splash, and for a moment the water and sand fairly boiled, after which there was only the spasmodic kicking and flapping of a wounded beaver, which was secured, not however without difficulty, from a dangerous quicksand among some stranded snags of trees about which the beavers had been trying to build a dam. On this account the beaver colony was not subsequently molested by me, as I was desirous of observing their method of work on the attempted dam.

August 21, 1884, Fort Verde, Arizona.—This evening I repaired to the spot where I shot the beaver and watched for these animals until it was pitch dark. I saw a large beaver at work on the dam, but it flapped its tail on the water and dived upstream, and I did not see it again. As the darkness increased I could hear them splashing in the water and flapping their tails on the ground with a sharp thud from time to time, but I could see nothing, as the night was dark save when a distant flash of lightning illumined the water for a second.

August 22, 1884, Fort Verde, Arizona.—The beavers are putting forth strenuous efforts to cut down all the timber near their dam. I am interested to see whether they will actually succeed in cutting off some large trees from which they have stripped the bark and on

which they have commenced to chisel the wood. Some of these trees are cottonwoods, two feet or more in diameter. Beavers have already felled some of the largest trees in the vicinity, and it is probable that others will soon follow. The limbs have been cut from the felled trees at the trunk and carried off. To cut some of them the animals had to climb along the trunk to a position 10 to 15 feet above the ground. There are numerous beaver slides in the vicinity of the dam, and these are well worn and cleanly brushed by the leafy boughs that have been dragged down them.

September 4, 1884, Fort Verde, Arizona.—To-day I shot a young male beaver. Its stomach was nearly filled with the bark of the cottonwood. We had this young beaver served on our table, and all who partook of it pronounced it to be excellent meat.

September 12, 1884, Fort Verde, Arizona.—One young beaver was seen swimming in the Verde River with only the nose and fore part of the head out of water. It climbed out upon the opposite river bank, where I obtained a good view of it.

October 17, 1884, Gila River at the San Carlos Indian Agency.—Beavers are abundant. I saw many cottonwoods cut down or gnawed by them.

October 25, 1884, Fossil Creek, Arizona.—Beavers are numerous on this stream. While on this expedition (with General Crook) I saw fresh signs of the beaver on White River, the Gila, Salt River, and Tonto Creek, and old signs on Pine Creek, all in Arizona.

January 17, 1885, Indian Garden, Oak Creek, Arizona.—Beavers have cut many small saplings, but no large trees, along this stream.

May 13, 1885, Gila and Salt rivers, near Phoenix, Arizona.—Tracks and cuttings of the beaver were seen.

June, 1885, Fort Verde, Arizona.—Early in June, when fishing for bonytail (*Gila*) on a sluice of the Verde River, I accidentally stumbled upon a nest containing three young beavers, two of which I took for specimens on another occasion (June 13). The nest was contained in a hollow of the large decayed bole of ash trees that grew out of a common base, and was composed of stalks and leaves of sedge, tule, and herbs, together with some dry leaves and fine rootlets that had been washed bare by the stream. On this neat and soft bed were the three little ones. The mother dived into the pool which had undermined the trees along the jutting bank, but soon came back to look after her progeny and was quite bold. On subsequent visits to this nest I heard the splash of the parent when I approached the spot, and the progeny followed her example as soon as I reached them. The mother did not appear, but the young ones swam freely around the pool in my presence.

June 19, 1885, Fossil Creek, Arizona.—Beavers were seen in Fossil Creek, central Arizona.

October 1, 1885, Fort Verde, Arizona.—Being desirous of obtaining a handsome section of a cottonwood tree bearing the marks of the beaver's teeth, I selected an immense one which the beavers had cut two-thirds through, and which exhibited well the marks of their teeth and their apparent intention and ability to fell a tree in a particular direction. Colonel Clendennin, commanding the post, kindly allowed me to take a large crosscut, double-handed saw and the provost sergeant with two men. The tree proved to be larger than I had supposed, and we were unable to saw it down. As a good deal of heavy cottonwood timber had been cut by beavers in that vicinity, I measured the circumference of the trunks of six of the larger trees. The measurements, taken above the cutting, were as follows: 31½ inches, 21½, 55½, 36, 87½, and 89. One or two of the trees measured were still standing nearly cut through, but these were felled by the beavers soon after and carried away by them, with the exception of the heaviest trunks from which all the branches were gnawed.

November 7, 1885.—A prospector related a story of a fight between a beaver and mountain lion. The miner, encamped on the Colorado River at a point where there was a broad sand flat, saw a beaver in the early morning crossing the sand flat to a strip of cottonwood timber, whence it was afterwards seen dragging a stick of wood back toward the water. A mountain lion was then seen crouched in the trail watching, ready to intercept the beaver. As the latter approached the lion sprang upon it, and the two animals closed in a desperate conflict. The fortunes of war wavered, now on the side of the lion, anon on that of the beaver. The miner, taking his rifle in hand, cautiously approached the combatants and watched them from a place of concealment. After fighting a long time the beaver was left dead on the field and the lion attempted to crawl from the spot, followed by the prospector, who found it unnecessary to kill the lion with his rifle, as it soon lay down upon the sand and died from exhaustion and loss of blood.

January 22, 1886, Fort Verde, Arizona.—During the past week there have been long heavy rains. The rainfall in the valley amounted to several inches, while upon Grief Hill, 1,500 feet higher (altitude about 5,000 feet), the precipitation amounted to 5 inches. The Verde River overflowed its banks and flooded the beavers out from their burrows in the river banks. For a night or two they were seen all along the river, showing great excitement, and several of them were shot.

March 26, 1886, Fort Verde, Arizona.—A few days ago a female mallard flew from a beaver-felled cottonwood whose branches drooped into the water beyond a pile of driftwood. As I had been within a few feet of the spot for a quarter of an hour without noticing the duck, I suspected that it had a nest among the driftage. To-day,

with a view to discovering the mallard's nest, I stopped and scrutinized the spot with particular care from the opposite bank of the stream, and descried a huge beaver seated upon the tree trunk beneath the débris. It had evidently been driven from its home by the very high water of the rising stream, and had sought concealment in this shady spot. When I revisited the place later in the day the beaver had returned, but only its head was out of water, and that so nearly concealed by brushwood that I caught sight of it too late for a shot. When first seen I could easily have obtained the specimen had my gun been loaded for such tough game; but it had gone before exchange of cartridges could be effected.

May 28, 1886, Fort Verde, Arizona.—Hoy, the driver of the post water wagon, brought me a large female beaver that he killed with a stone under the bank of Beaver Creek. The soldier's dog caught one of this beaver's young, which Hoy also brought to me (Nos. 6785 and 2339, coll. Amer. Mus. Nat. Hist.).

June 11, 1886, Fort Verde, Arizona.—To-day I saw a place where the beavers' castoreum had been deposited. The ground was stained blackish, and the odor was so strong as to attract my attention when riding near.

February 10, 1887, Fort Verde, Arizona.—A beaver was caught in a steel trap eight days ago, and left one fore foot in the trap. To-day it was found stranded upon a low sand island, having but recently died. The uterus contained three fetuses about 25 mm. in length. They were contained in spherical sacs as large as a hen's egg. The placenta was four times larger than the embryo, which latter had developed largely to head and hind extremities. The weight of the other was 46 pounds; eye 9.5 mm. in diameter.

March 15, 1887, Verde River, Arizona.—I saw a beaver come out of its burrow in the bank and drag a cottonwood branch into its home in broad daylight.

March 27, 1887, Fort Verde, Arizona.—I have noticed that beavers have been working on ash trees in several localities in this region of late.

April 3, 1887, Box Canyon of the Verde River.—Beavers are numerous, and have cut much of the timber along the river bank. Mr. J. P. Milligan took 120 beavers on the Gila and Verde rivers during the winter of 1886–87, and sold the skins at $2.50 a pound (about $5 apiece).

November 22 to 24, 1887.—On the East Verde River are several fine beaver dams. One of them is 4 feet high, and could not have been better built by man. This dam is superior to any other that I have seen in the region. Beavers are very plentiful on the East Verde.

I found bones of the beaver in many cliff and cave dwellings of the extinct race of man known as cliff dwellers in the Verde Valley, Arizona, from 1884 to 1888.

The dens of beavers are usually dug in the bluff banks of streams, and have the entrance at a considerable depth below the surface of the water. At the back part are usually one or more openings, probably for the purpose of admitting the air, which are concealed by brush and weeds. At Fort Verde a beaver den was partially opened, and a bull-dog that had earned the reputation of being a hard fighter was admitted. In the fight that ensued the dog was badly beaten, and could not again be induced to attack a beaver.

Mr. Stuart Daniels found beavers on the Sonora River, Mexico. He also found them in abundance on the Gila River, Arizona. On the Boundary Survey they were found on the San Pedro River and on Babocomeri Creek, one of its tributaries in Arizona. Two trappers whom we met at Yuma, Arizona, in March, 1894, had recently arrived from a 200-mile trapping expedition down the Gila River. They had shipped a number of beaver and raccoon skins taken during this trip, but found no beavers on the lower portion of the Gila. I saw old beaver cuttings on the Gila in the vicinity of Adonde Siding, Arizona, in February, 1894. Residents said that there had been scarcely any beavers on the lower Gila since the flood of February, 1891, which washed them all out. One man told me that beavers were then (February, 1894) working extensively at Mohawk, on the Gila. Beavers were formerly found at Gila City, but had been driven out by previous floods. In the years 1893 and 1894 a colony of beavers was located about 12 miles below Yuma, on a lagoon of the Colorado River. Seven of them were trapped by Mr. Smart, of our party. Beavers are common on the Colorado, and doubtless sometimes ascend the Salton and New river lagoons of the Colorado Desert during seasons of overflowing; but we saw no signs of them at the time of our visit away from the Colorado River in that region.

No signs of beavers were seen by us on Cajon Bonito Creek or the San Bernardino River, terminals of the Yaqui River; but Mr. Hall, who resided in the Guadalupe Canyon, informed me in 1892 that he had seen their cuttings lower down on Cajon Creek; but I failed to discover them there.

Beaver Presence Survey of Upper Verde River
Preliminary Report by Walt Anderson
1 November 2009

Grant Project No. AZFO-090810 from The Nature Conservancy to Prescott College

Introduction.

Based on an initial proposal by Dale Turner of the Arizona state office of The Nature Conservancy, an agreement was made with the author (Anderson) to use the person-power of his Wetland Ecology and Management class at Prescott College to collect beaver presence data on the Upper Verde River and to write one or more research papers on beaver ecology or management that might help shed light on the beaver influences on the Upper Verde.

Kim Schonek, Verde River Projects manager working out of the Prescott Office of The Nature Conservancy developed the sampling protocols and participated in some of the surveys. The ten students who participated in the sampling were Graham Benton, Carissa Condor, Blaine England, Felipe Guerrero, Mike Jennings, Nelson Lee, Gregory Smart, Elizabeth Sotack, David Wilson, and August York. Walt Anderson also participated in each sampling day. Except for the first day (when all students worked together to learn the process) and the third day (when half the class sampled invertebrates at Campbell Ranch), the class was divided into two teams in order to cover two segments per day.

Data were collected as follows:
A. 8/29/09. Headwaters Springs to Campbell Ranch
B: 9/1/09. Verde Ranch, Up
C: 9/1/09. Verde Ranch, Down
D: 9/3/09. Campbell Ranch, Down
E: 9/4/09. Bear Siding
F: 9/4/09. Perkinsville
G: 9/9/09. Gas Line, Up
H: 9/9/09. Gas Line, Down
I: 9/11/09. Sycamore Creek at Verde
J: 9/11/09. Verde at Sycamore Creek

From high to low in the watershed, segments (and primary ownership) were as follows (letters are the same but are arranged by location rather than date):
A. 8/29/09. Headwaters Springs (**TNC: The Nature Conservancy)** to Campbell Ranch (**AZGFD: Arizona Game & Fish Department**). *(Campbell Ranch, a.k.a. Upper Verde Wildlife Management Area)*
D: 9/3/09. Campbell Ranch, Down (**AZGFD)**
G: 9/9/09. Gas Line, Up (**USFS: United States Forest Service, Prescott National Forest**)
H: 9/9/09. Gas Line, Down (**USFS**)
B: 9/1/09. Verde Ranch, Up (**private**)
C: 9/1/09. Verde Ranch, Down (**private**)
E: 9/4/09. Bear Siding (**USFS**)
F: 9/4/09. Perkinsville (**USFS**)
J: 9/11/09. Verde at Sycamore Creek (**USFS**)
I: 9/11/09. Sycamore Creek at Verde (**USFS**)

Note that some segments sampled may have crossed property lines (e.g., Verde Ranch upstream route crossed a fence onto national forest). Permission to cross private lands was attained in advance of sampling.

Methods.

Sampling followed established Beaver Presence Survey Protocol (to follow, so not repeated here). GPS coordinates were taken at designated points, and mapping in the Prescott College GPS lab was done after sampling was finished. In addition to descriptions of the start and ending points for each reach surveyed (e.g., water and air temperature, stream width and depth, channel type, substrate type, turbidity, riparian and aquatic vegetation, and anthropogenic sign), we collected similar information for the first den or lodge found in each reach. We also took GPS readings for each dam, den, lodge, or den/lodge combination we found. We also recorded beaver chew marks by woody plant species for saplings (under 2" diameter) and trees. Since beaver-cut trees often sprout a multitude of new stems, we did not treat sprouts emerging from a cut trunk as saplings.

Bird surveys were conducted concurrent with the beaver surveys by Walt Anderson and Felipe Guerrero, each working with separate teams.

Results and Discussion

Data sheets are on file with Kim Schonek of The Nature Conservancy, Prescott Office. Data have been transcribed into Excel worksheets, and Kim has already used some of the maps and data summaries for interpretative purposes. She and I plan to mine the data more deeply to see what inferences may be drawn and to suggest what questions might be asked (and answered) in the future. I will simply mention a few points here, and some additional analysis is in the paper by Benton.

It did not take long to discover that the four miles in four hours suggested by the protocol was not reasonable. Some surveyors had to walk the banks with varying degrees of obstruction (cliffs, dense vegetation at times), while others had to wade (even swim) in order to look for well-hidden bank dens (as most of them were). Recording data also was time-consuming, and some routes had to be shortened because of threats of thunderstorms (with possible flooding). In fact, the river experienced several flash floods right before and during our sampling period, making banks slippery with mud and causing water to be higher and muddier than usual, which impeded our movements. High water may also have hidden some bank dens.

We are confident that we found all dams (6), but our total of active dens/lodges (17) may have been somewhat of an underestimate. As another measure of fresh, localized beaver activity, we noted clusters of ten or more chew marks in a concentrated area; this suggested the possible presence of a nearby den. If we did find a den, then the cluster factor was not recorded there. We found 9 such clusters, suggesting that there could have been up to 26 dens in the reaches surveyed.

How does the Verde compare with other beaver streams? Colony density for six North American beaver streams in Alaska, California, Massachusetts, Wyoming, New Brunswick, and Minnesota (see Gurnell 1998:170 in Benton references) ranged from 1.6 - 2.0 colonies per mile. River density for colonies in Kansas ranged from 0.1 – 2.2. If we take our most conservative estimates of number of Upper Verde colonies, actual dens/lodges located (17), we would have an average estimate of 1 colony per mile. If we include dense chew clusters where dens were not located, then the total of dens/lodges/chew clusters (26) would give us an average of 1.5 colonies per mile of river. Either estimate (1 to 1.5) seems pretty impressive for an arid river in the Southwest. Of course, beaver sign is not uniform along the river; there are high-density areas and low ones. Further mining of the data may suggest possible reasons for the variation (e.g., food supply, hydrology and geology, land uses such as grazing intensity, and so forth) that could stimulate future question-focused research.

It is clear that beavers have significant effects on both aquatic and riparian ecosystems. Benton's paper on how dams affect hydrology and nutrient cycling in the Verde is particularly illuminating.

Of course, even when beavers have bank dens, they can have notable effects on local conditions, though dams are especially important ecologically.

I personally revisited one site of intense beaver activity twice after the initial beaver surveys, and I would like to briefly describe what I saw. Downstream from the Campbell Ranch (Game & Fish access point), there are several bank dens and considerable beaver activity as evidenced by chew marks, trails, stripped branches in the channel, and so forth. Further down there is a series of three dams and ponds that may extend for close to a mile of stream. The upper dam is relatively small, as the channel is narrow. The second dam is substantial, and many trees are inundated in the long pool that extends all the way up to the first dam. The lower (third) dam is perhaps a half mile downstream, but it backs water up almost to the middle dam. Rather than a simple dam spanning the stream, it consists of many smaller dams that connect between anchor points such as trees or spits of land. Total dam length for this meandering structure is an amazing 351 feet. A large lodge is in the pool perhaps a hundred feet above the dam front.

When flash floods raced down the river in late August and early September, there was considerable large debris movement that collected perhaps six feet up in trees and other obstacles. The raging torrents also carried large sediment loads and redistributed soil, resulting in muddy banks. I saw evidence that when the floods hit this beaver dam complex, the upper dam suffered some breakage, but held, thus slowing the force of the flood. The second dam also held and slowed the flood, which then was further dissipated by the long, deep pool with considerable emergent vegetation of bulrush and cattails (some up to 15 feet tall!). In other words, this series of three dams with pools supporting thick vegetation (especially cattails and willows) functioned to take the punch out of the floods. We sampled a number of sites downriver after the floods, and though we could see high water marks, we did not see significant erosion, thanks, most likely, to beaver activities and dam architecture. As Benton notes in his paper, the beaver ponds capture not just debris but also nutrients.

In addition to active dams, there are traces of former dams, now abandoned. Many of these had become substrates for growth of cattails and willows, perhaps some sprouting from materials placed in the dams by beavers. In the lower dam in the complex mentioned above, some of the dams had short vertical hedges of Coyote Willow sprouts that had been trimmed by the beavers. They had created a living dam of shrubby willows with anastomosing roots reinforcing the structure and a renewable food supply!

Parts of the Verde River have steep cutbanks from erosional history. As ponds build up organic and inorganic matter, they replace former degradation with aggradation. The abundance of vegetation that develops in and next to the ponds further stabilizes the system.

Where the beaver ponds occur and where cattle grazing is limited or absent, extensive marsh vegetation develops. Cattails colonize easily, as their airborne seeds disperse widely. Once established, cattails clone by means of spreading rhizomes. Where depths are suitable and erosion minor, cattails and bulrushes form dense thickets. The beaver ponds provide them with relatively stable water levels even during the dry seasons. The plants are also resistant to flash floods, partly because they bend over to let the flood waters pass over them without damage and because the submerged rhizomes sprout if exposed leaves do get torn away. Floating debris gets caught in emergent aquatic plant thickets, as well as in willows, cottonwoods, and other riparian plants, and all this structure further slows the forces of floods and helps build soil.

Beavers have been known to reduce tree cover by cutting larger trees down, but this is partly offset by the sprouting of cottonwoods and willows; beavers can thus change tree structure by favoring smaller stem diameters. While one might expect a large pond complex like we found to have much-reduced density of large trees, most of the larger trees were not harvested. I believe this is because the ponds create such extensive cattail and bulrush beds and perhaps sources of other edible aquatic plants, and sprouting willows provide plenty of high quality food requiring less harvest effort than do large trees.

The extensive tree growth in and around the beaver ponds tends to produce considerable shade and a source of allochthonous material (energy) into the stream ecosystem. The diversity and structure further attract birds and other organisms, creating biotic hot spots. On a visit to the ponds on 10/22/09, I saw bear, otter, and elk sign; a Cattle Egret and an American Coot (neither likely on river stretches without the beaver ponds); and almost all of the Marsh Wrens and Song Sparrows seen that day.

Though beavers are not likely to be seen by a group of people in daylight, we did see two swimming beavers in Sycamore Creek and found a dead, decaying beaver at the Verde Ranch.

Bird species lists for each site follow the protocol pages. I suggest that intensive bird surveys comparing areas of beaver activity with areas without might further support the suggestion that beavers create biological hotspots.

Student Research Papers

The following are papers written by students during this Wetland Ecology and Management class. All students submitted their papers to two peers for review, then also received comments from the instructor. Two students who participated in the beaver surveys had not submitted finished papers at the time of this report. The relevance of these papers to the beaver study are roughly in descending order below.

Graham Benton: The Effects of Beaver Dam Construction in the Southwest on the Hydrology and Nutrient Cycling of Riparian Ecosystems, with a Focus on the Verde River

David Wilson: Bridge Creek Basin Restoration Facilitated by Beaver as a Model for Upper Verde River Management

Elizabeth Sotack: The Effect of Beaver-Otter Relationships on Native and Non-Native Fish Species in the Verde River, Arizona

Gregory G. Smart: Anthropogenic Change and Invasive Species Impacts on Native Fish Populations in the Verde River, Arizona

Mike Jennings: Impacts of Bullfrog on the Native *Rana* Species of the Southwest and Subsequent Mitigation Possibilities

Nelson Lee: Conservation Efforts on the San Pedro River

Felipe Guerrero: Biological and Ecological Impacts of Recreational Fishing: Angling Pressures on Target Species and Aquatic Ecosystems

August York: Wetland Construction

Collection of Beaver-related Papers

I have collected a number of potentially useful references for the benefit of anyone who continues to work with this or subsequent data sets.

Riparian Trees of the Verde River Field Guide by Walt Anderson (donated to TNC)

Photographs of study reaches, students, and organisms by Walt Anderson (donated to TNC)

ATTACHMENT F

Irrigation Return Flow Data

ATTACHMENT F. ROSS (2010) DIVERSION AND RETURN FLOW DATA FOR VERDE VALLEY IRRIGATION DITCHES

DITCH	MEASUREMENT PERIOD	AVERAGE DIVERTED FROM VERDE RIVER INTO HEAD GATE (cfs)[a]	AVERAGE DIRECTLY RETURNED TO VERDE RIVER (cfs)[a,b]	PERCENT DIVERTED THAT DIRECTLY RETURNED TO VERDE RIVER	PAGE REFERENCE
Diamond S	November 2008 to May 2010	26.25	15.10[c]	58	pp.125,127
Eureka	October 2008 to May 2010	9.13	3.70	41	pp.122,124
OK	March 2009 to May 2010	16.37	6.22	38	pp.121,123
Verde	May 2009 to May 2010	26.35	8.38	32	pp.124-126
	Total:	***78.10***	***33.40***	***43***	---

Notes:

[a] cfs = cubic feet per second.

[b] Does not include infiltration beneath irrigated fields and along ditches that returns to the Verde River as baseflow.

[c] Calculated based on Ross' statement that, on average, 11.15 cfs diverted into this ditch does not return to the river.

ONE-DIMENSIONAL HYDRAULIC MODEL OF VERDE RIVER NEAR CAMP VERDE, ARIZONA INCLUDING IRRIGATION DITCH DISCHARGE

By Robert P. Ross

A Thesis

Submitted in Partial Fulfillment

Of the Requirements for the Degree of

Master of Science

In Geology

Northern Arizona University

December 2010

Approved:

_____

Abraham Springer, Ph. D., Chair

_____

Charles Schlinger, Ph. D.

_____

Roderic Parnell, Ph. D.

projected decrease to 10,022 AF/yr by 2050. This decrease in demand is based on a decrease in agricultural demand, presumably projecting current trends of conversion of agricultural land to residential/non-cropped land. Projected demand for residential areas increases, but the magnitude of increase is less than that of the decreased demand of agricultural areas. Current available resources are determined by status quo and assured and adequate methods, with available surface water supply increased in assured and adequate measurement (1923.86 AF/yr vs. 952 AF/yr). These totals use an averaged amount of 0.33 AF/yr for exempt wells, and 0.50 AF/yr for non-exempt wells. Exempt wells are generally for residential use, and produce less than 35 gpm, while non-exempt wells generally produce more than 35 gpm (ADWR, 2000). Commercial/industrial use was considered the same for the projected values as the status quo, and agricultural use was assumed 60% of the current value (CYHWRMS, 2010). It is unclear whether the contributions of the irrigation ditch systems were considered.

1.3.2 Ditch systems overview

Irrigation ditches have been a part of the Verde River system since pre-European settlement, although the majority of the ditches were constructed in the 1800s and early 1900s. The ditches are generally open earth-lined channels fed by large diversion structures comprising river sediment and riprap bulldozed to form an embankment downstream of the diversions. Presently, these diversions do not provide for diverted flow metering; they have the primary function of diverting enough flow from the river to feed the ditch. All four of the ditch diversions in the study area have a large over-flow spillway just above the headgates, where extra diverted flow (often

in excess of 50% of the diverted flow) is returned to the main stem of the river (Fig. 8).

The ditch substrate is generally clay-rich soil, and no significant seepage has been detected over the ditch lengths, other than when the channel base has been disturbed during maintenance operations (Alam, 1997). The headgates of each ditch are opened to varying heights to allow flow into the ditch. Lateral structures are used to deliver water to users, and can be concrete-lined culverts, open earthen channels, or sub-grade pipes. Most ditches use some combination of the three conveyance channel types.

Spillways may occur along the operational length of the ditch, with increased likelihood of these structures with increasing length. The Verde Ditch has upwards of six spillways (A. DePuoy, pers. comm., 2009). These spillways are generally active only during seasonal high-flow conditions, to prevent structural breaches within the ditches or lateral conveyance systems. Each ditch has a primary return flow to the Verde River (Beaver Creek in the case of the Eureka Ditch) after the terminal water user.

These ditches are largely unregulated, due to their long tenure and operation within the Verde Valley. They are operated under a "grandfathered" exclusion of Section 404 of the Federal Clean Water Act; installation of any permanent structure would require a 404 permit, as well as several other state and federal permits. The process would take at least three years, and the ditch companies would incur significant expenses from the process (Alam, 1997). The permitting produces a

Figure 8 - Verde Ditch head gate and spillway. Initial spillway is on right side of picture, while the head gate is on the lower left side. Note the large percentage of flow that the spillway is returning to the river. Blue arrows indicate flow direction.

significant challenge to the ditch companies, especially as they currently operate without undergoing any new permitting.

Potential future conflicts may arise between the ditch companies, agencies concerned with ecological impacts of ditches on the main stem river flows and riparian habitats, and agencies concerned with maximizing downstream water resources to southern Arizona municipalities. The irrigation ditches are primarily concerned with delivering the needed water to their stakeholders; most would likely be open to permanent structures and metered delivery if the required time and expense could be minimized. The following sections deal with the irrigation ditches around Camp Verde; they were chosen to provide the longest possible continuous river reach for modeling purposes.

Eureka Ditch

The Eureka Ditch was built in 1893, and irrigates about 421 acres and supplies 180 water users over its eight-mile length. It diverts at 703014.85 E 1321698.12 N (Fig. 9) on the northeast side of the Verde River, and returns flow to Beaver Creek near Camp Verde 718581.86 E 1304733.14 N (Fig. 10). The diversion is about 50 feet in length, and is less than three feet high. The Eureka ditch management reports an average flow of 15 ft^3/s at the diversion. John McReynolds is the ditch boss (2006 - present), and the ditch is operated by an association (Alam, 1997). The ditch is generally closed from late November until early March for maintenance, including repair and reinforcement of structure, and removal of vegetation within the ditch channel. A large wash (Grandpa Wash) above the

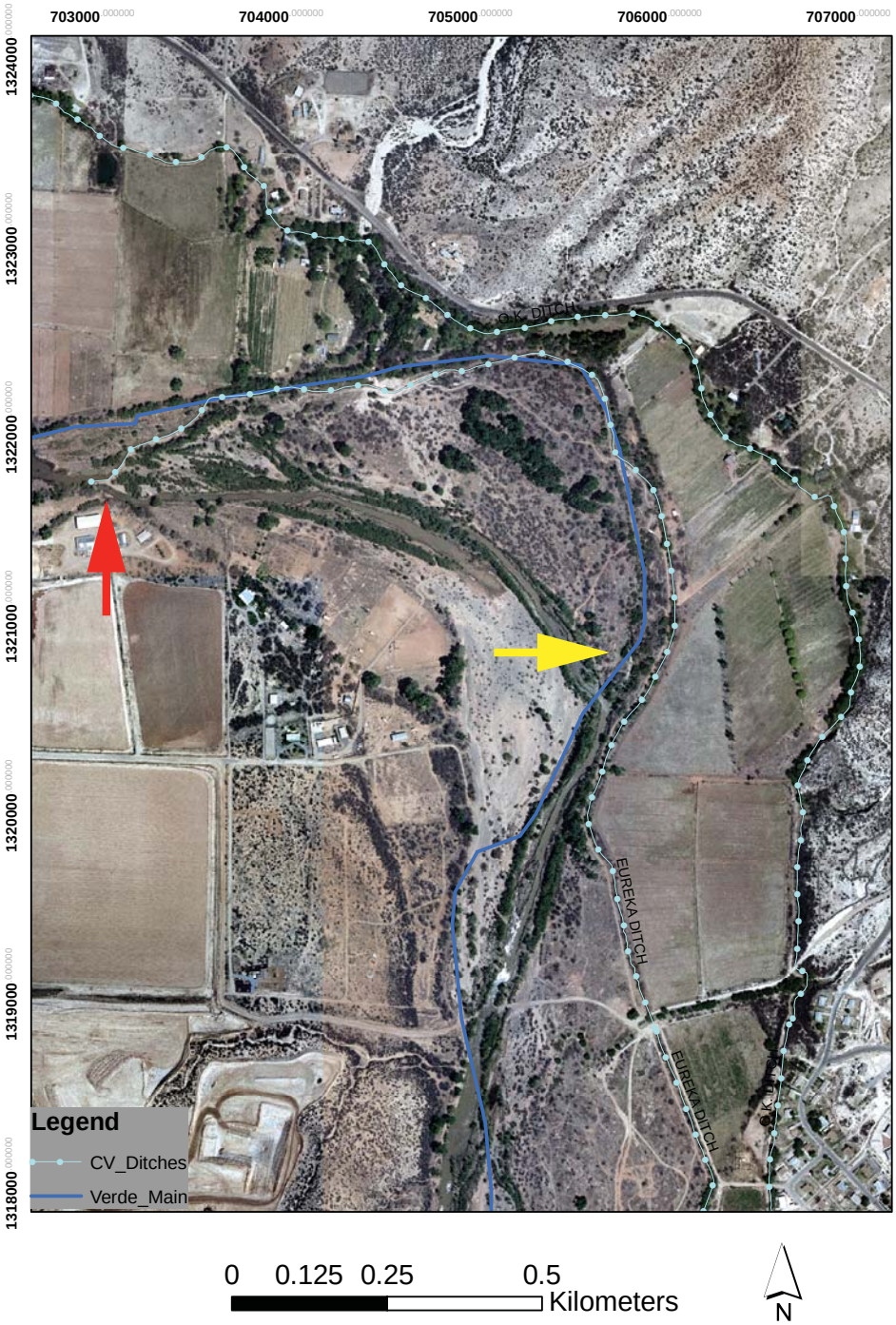

Figure 9 - Location map of Eureka Ditch diversion and head gates, Camp Verde, central Arizona. The first major spillway in on the ditch before the head gates control flow diverted into the ditch proper. Red arrow is diversion, and yellow arrow is location of head gates.

Figure 10 - Location map of Eureka Ditch return flow to Beaver Creek, Camp Verde, central Arizona. Red arrow is return location.

headgates sometimes deposits sediment to form a natural dam, which needs to be mechanically cleared to maintain flow (J. McReynolds, pers. comm., 2008).

OK Ditch

The OK Ditch was constructed in 1873, and serves 107 users (including the Camp Verde Indian Reservation) and 620 acres over its six-mile length (Alam, 1997). It diverts on the northeast side of the Verde River at 693675.92 E 1334149.55 N (Fig. 11), and returns flow to the Verde alongside Grandpa Wash 704427.8 E 1322975.68 N (Fig. 12). It diverts flow about one mile south of the Oak Creek/Verde river confluence, and has a reported average diverted flow of 30 ft^3/s. Bob Kovacovich is the ditch boss (2000-present), and the OK Ditch is operated by an association. The OK is closed for a short annual maintenance period, but flow is maintained for most of the year, depending on the needs of water users (B. Kovacovich, pers. comm., 2010). The diversion structure of the OK Ditch uses larger rocks from external sources as well as river sediment and riprap to maintain a three-foot-high structure that is highly flood-resistant due to its resilient foundation (Alam, 1997).

Diamond S Ditch

The Diamond S Ditch is operated by an association, which is managed by a board of directors. Frank Geminden is the contact for the ditch company (2003-present). The Diamond S Ditch was constructed in 1895, making it one of the newer Camp Verde area ditches. It is five miles long, and serves 82 users and irrigates 385 acres (Alam, 1997). It diverts from the east side of the Verde River 720603.55 E 1293638.14 N (Fig. 13), using a series of sluice gates to divert flow efficiently, with

Figure 11 - Location map of OK Ditch diversion and head gates, Camp Verde, central Arizona. First major spillway of ditch is above headgate control structure. Red arrow is diversion location, and yellow arrow is head gate location.

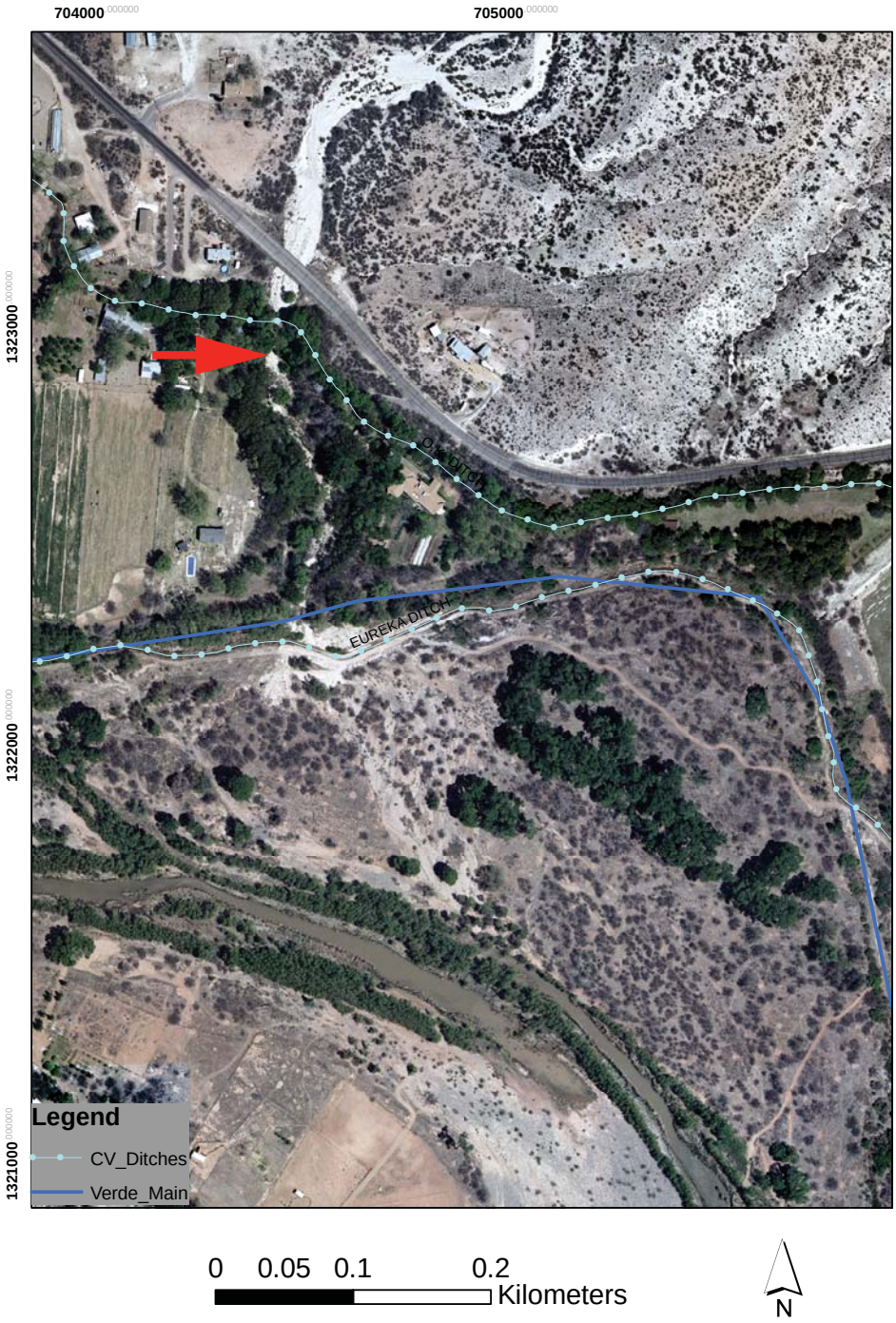

Figure 12 - Location map of OK Ditch return flow to Verde River, Camp Verde, central Arizona. Terminal spillway contributes discharge to Eureka Ditch system above first water user. Red Arrow is top of terminal spillway.

Figure 13 - Location of Diamond S Ditch diversion and head gates, Camp Verde, central Arizona. Red arrow is diversion structure, and yellow arrow is head gate structure. Initial spillway is directly above the head gates.

an average diversion of 21 ft^3/s. The diversion structure is roughly 300 feet long and nearly four feet high; it is generally stable due to a large rock/concrete foundation. The return flow for the ditch is located near a large stock pond southeast of Camp Verde 724752.04 E 1281847.68 N, where it returns to the Verde River (Fig. 14).

Verde Ditch

The Verde Ditch is the largest of the four Camp Verde area ditches, serving 1337 acres and 600 users over its 17-mile length (Alam, 1997). It is court-managed due to historical litigation involving users along its top portion ("new" or "upper Verde Ditch") and the lower portion ("lower old Verde Ditch"). The ditch commissioner of the Verde Ditch is charged with distributing the water appropriately; this responsibility is shared among the board of commissioners. Al DePuoy is the current contact for the ditch (2009 – present). The Verde diversion is about 200 feet long and four feet high, and diverts from the west side of the Verde River 708185.4 E 1312924.84 E (Fig. 15). The Verde Ditch has a spillway at the head gate structure that returns large amounts of discharge to the river; the main stem of the Verde River drops temporarily to ten feet in width downstream of the diversion (Fig. 16). The Verde Ditch returns flow to the Verde River a considerable distance downstream from Camp Verde 730978.827 E 1265973.425 N (Fig. 17). The Verde Ditch has some unique management challenges compared to the other three ditches in the study area, mostly due to its length and the increase in urbanization around much of the ditch. Urban runoff can contribute large amounts of water during wet seasons, providing the need for multiple spillways (Alam, 1997).

Figure 14 - Location map of Diamond S Ditch return flow to Verde River, Camp Verde, central Arizona. Red arrow is return flow.

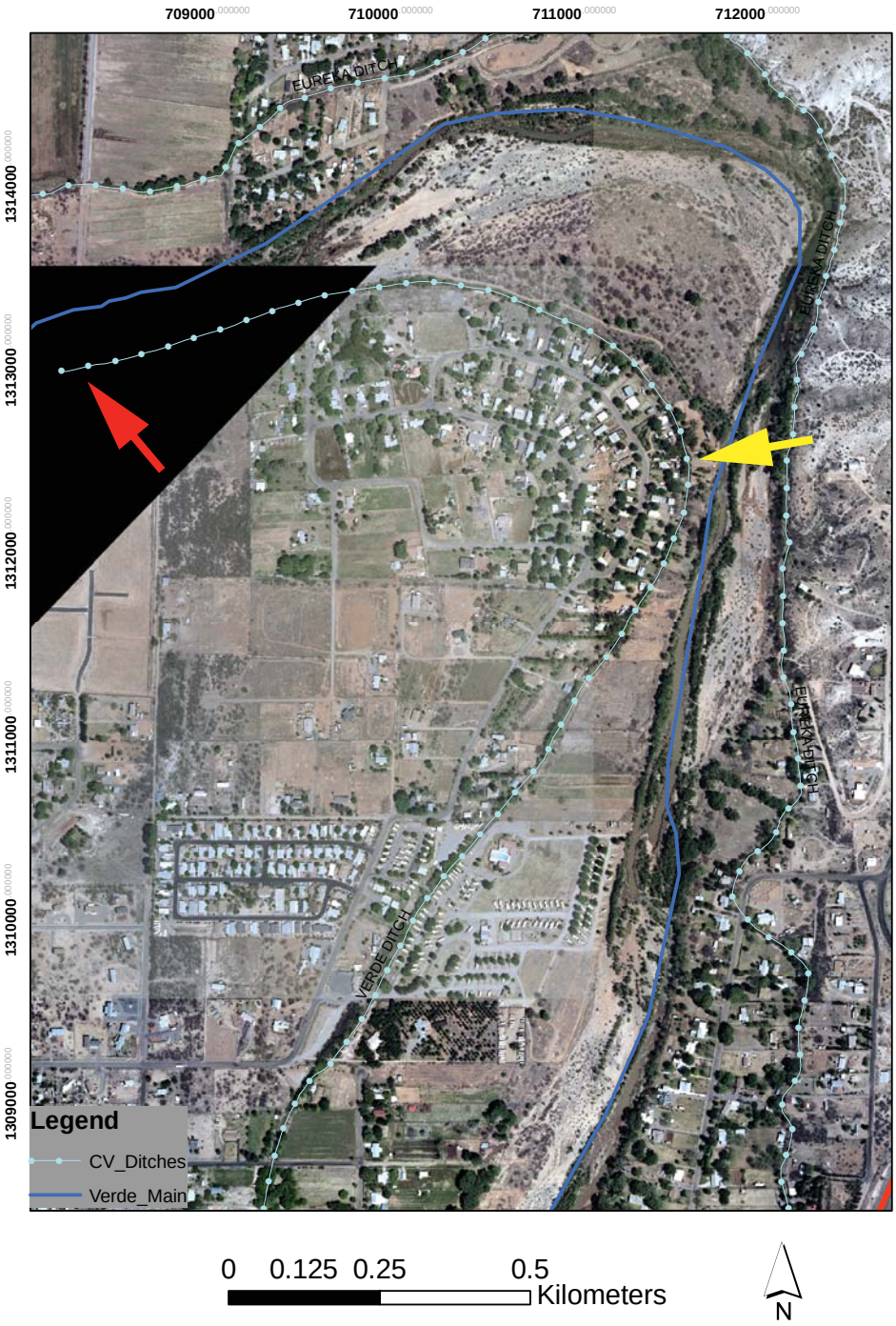

Figure 15 - Location map of the Verde Ditch diversion and head gates, Camp Verde, central Arizona. Red arrow is diversion structure, and yellow arrow is headgate. Large initial spillway is directly above head gate structure. Black triangle is gap in aerial photo coverage.

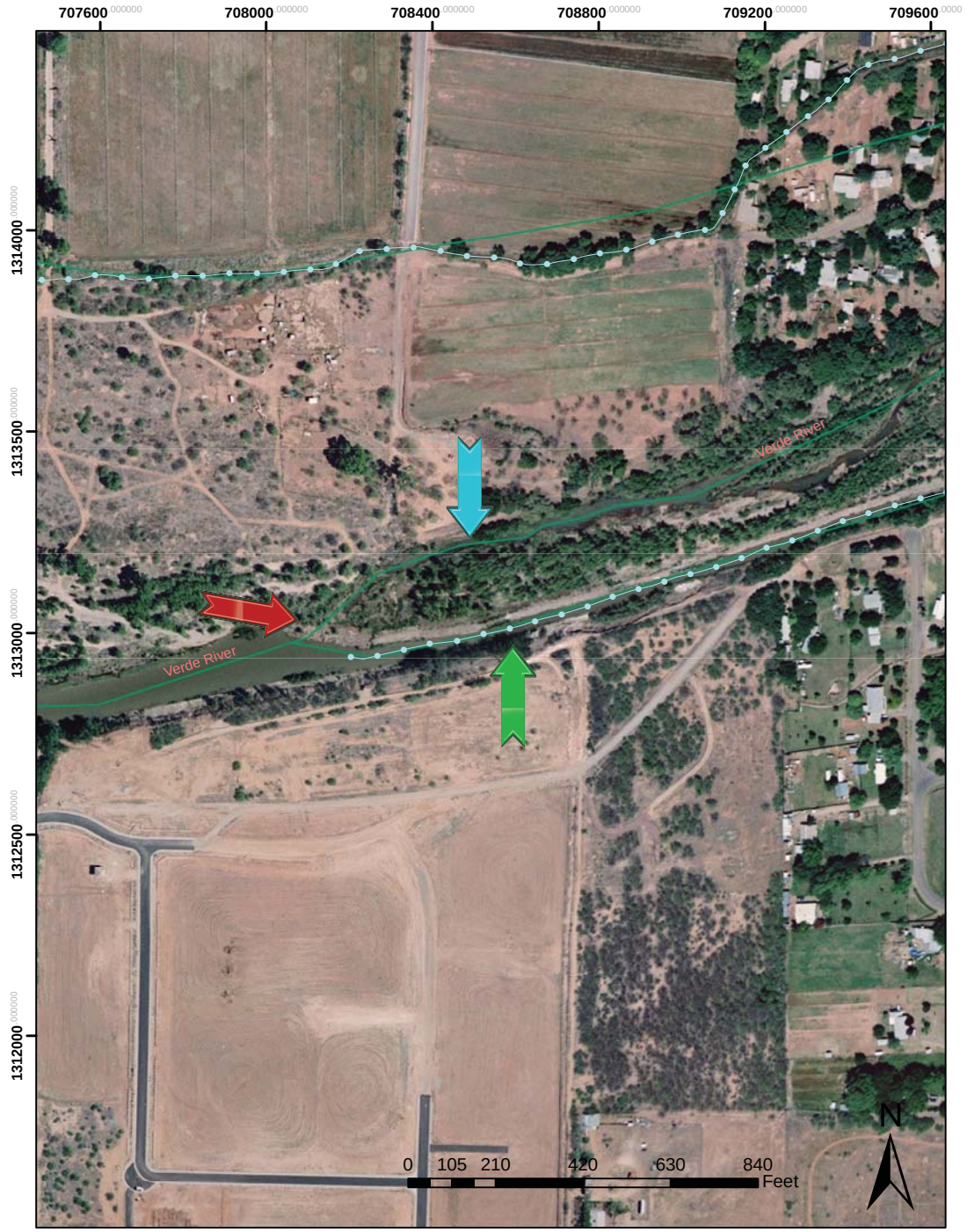

Figure 16 - Decrease in channel size and natural flow downstream of Verde Ditch diversion, Camp Verde, central Arizona. Red arrow shows diversion structure, green arrow is Verde Ditch, and blue arrow is Verde River after diversion. Note channel width of the Verde River decreases from near 30 meters to 3 meters after diversion. A series of spillways from the ditch return a large percentage of the diverted flow to the river over the next kilometer.

Figure 17 - Location map of Verde Ditch main return flow to Verde River, Camp Verde, central Arizona. Red arrow is main return flow.

vegetation (Masek-Lopez, 2001) by type were used to help to estimate ET within the study reach and over the courses of the ditches (Fig. 24). Error margins for spatial editing of shapes, points, etc. are as small as less than one meter, and may be as great as five meters in certain areas of heavy vegetation (Table 7).

2.2.2 Channel survey

Supplemental survey work along the study reach from the Oak Creek/Verde River confluence to the return flow of the Verde Ditch yielded 142 bathymetric cross sections, with variable spacing dependent upon river characteristics. Width of transects ranges from 7 feet to 195 feet. Cross sections are closely grouped around changes in conveyance dictated by widening/narrowing of the channel, diversions and return of flow, and changes in slope or material properties (Manning's roughness coefficient), and are more widely spaced along reasonably straight sections of the river (Fig. 25). Cross-section ends were established with a hand-held GPS unit (Garmin ETrex, non-WAAS enabled), with inherent error ranging from two to fifteen feet, depending on signal reception. Topography such as cliffs, high terraces, and heavy vegetation increased systematic error of GPS-based positions. Level lines marked at five foot increments tied into rebar and a depth rod marked in decimal feet were used to develop bathymetry along each cross section. The period of the survey collection was between December 2008 and May 2009, with 142 cross sections gathered along the reach (Fig. 26).

2.2.3 Ditch flow instrumentation

The four irrigation ditches along the study reach were instrumented with vented-cable pressure transducers, which automatically correct for barometric

pressure, at or near the headgates and locations of return flow (Fig. 27). Transducers are deployed in 1.5-inch well casing with sand point tips, and are fixed to permanent structures such as concrete weirs, headgates, culverts, and fencing (Fig. 28). Transducers were programmed to measure and record stage every hour. Field tablet computers are used to download data, which were then exported to Microsoft Excel format (App. A).

The Eureka Ditch was instrumented beginning September 2008, the Diamond S Ditch in November 2008, the OK Ditch beginning March 2009, and the Verde Ditch in May 2009. All instruments remain in place at the completion of this study (12/2010). Data gaps exist in all ditches over periods of maintenance closure, with the Eureka having the longest closure period (generally late November through March). The transducers deployed (Table 8) are all manufactured by InSitu Inc. (Ft. Collins, CO), and are a mixture of older miniTroll units (deployed on the Eureka Ditch), and newer LevelTroll units (deployed on all other ditches). These units have pressure tolerances ranging from 5 to 15 pounds per square inch, or PSI, and provide conversion from pressure measurement to stage in feet. These units have a measurement uncertainty of 0.05 feet (InSitu, 2008), and may have additional uncertainty due to drift caused by water turbulence at the deployment site (e.g., just below Verde Ditch headgate) and/or turbidity created by high discharge events. Vegetative matter at or near the transducer may also factor into error. The transducers collect stage data every hour (App. A), and these stage data were converted to discharge by using rating curve equations (App. B). Stage data were corrected by rating curves at seven out of eight sites by comparing manually measured stage to the

Figure 27 - Example of pressure transducers deployed at headgates and return flows of Camp Verde area irrigation ditches. Model shown is Level Troll 900, InSitu LLC, Ft. Collins, CO.

Figure 28 - Example of pressure transducer deployed at head gate of the Eureka Ditch, Camp Verde, central Arizona. This deployment is down the ditch from the head gates, and is above the first water user. This site is located within a concrete weir, and the site is also utilized by Salt River Project (SRP) as a gauging station. Blue arrow indicates flow direction.

Table 8 - Summary of pressure transducer type, tolerance, interface software, serial number, and deployment location

Serial #	Unit designation	Location	Tolerance	Software
132535	Level Troll 500	Diamond S head	5 psi	WinSitu 5
134774	Level Troll 500	Diamond S return	5 psi	WinSitu 5
120789	Level Troll 700	OK head	30 psi	WinSitu 5
120797	Level Troll 700	OK return	30 psi	WinSitu 5
18532	miniTroll 900	Eureka head	15 psi	WinSitu 4
18432	miniTroll 900	Eureka weir	15 psi	WinSitu 4
18478	miniTroll 900	Eureka return	15 psi	WinSitu 4
136732	Level Troll 500	Verde head	5 psi	WinSitu 5
120802	Level Troll 700	Verde return	30 psi	WinSitu 5

stage reading from the instrument, with R^2 values ranging from 0.92 to 0.96. This correction generally bracketed the extreme high and low measurements, and provided corrected stage measurements in good agreement with observed stage (Table 9). Errors vary widely by site, and are greatest at instrumentation locations with high turbulence or water-borne debris.

The resulting stage measurements were converted into mean daily average values, to simplify the dataset, match USGS stream gage data, and to facilitate hydraulic modeling (App. C). Standard errors for these rating curves are R^2 values ranging from 0.98 to 0.92, depending on the sites (Table 10). The instantaneous flow was measured with a SonTek (YSI Inc., San Diego, CA) sonic flow meter, and the depth at the transducer was measured with a depth rod marked in increments of decimal feet. Depth measurement error is estimated at 0.05 feet. Errors for the flow measurements do not exceed 0.5% of measurement value (Table 11). Measuring flow and graphing it against the measured stage at the transducer produced the rating curves. Error compounded by calculations varies by instrument and site (Table 10). The resulting mean daily discharge is used as point discharge input for the hydraulic model.

2.2.4 Elevation model

Elevation models are in two basic formats, the digital elevation model (DEM) and the triangulated irregular network (TIN). In both cases, 3D point data consist of horizontal coordinates (x/y data; lat/long or UTM), with an associated elevation value for each point (z data). The DEM exists as a raster dataset, with evenly-spaced elevation nodes in a grid format. These nodes are connected by

Table 9 - Comparison of simulated stage to measured stage.

Site	Measurement date	Measured Stage (ft)	Calculated Stage (ft)	Percent difference
OK headgate	6/1/2009	1.75	1.580	0.10
	6/24/2009	1.55	1.580	(0.02)
	8/11/2009	1.8	1.820	(0.01)
	9/28/2009	1.7	2.130	(0.25)
	11/11/2009	2.41	2.820	(0.17)
Site Average		**1.84**	**1.99**	**(0.08)**
OK return	6/1/2009	1.5	1.300	0.13
	6/24/2009	1.21	1.210	0.00
	8/11/2009	1.27	1.210	0.05
	9/28/2009	0.8	0.970	(0.21)
	11/11/2009	1.52	1.440	0.05
Site Average		**1.26**	**1.23**	**0.03**
Eureka headgate	9/30/2008	1.134	1.134	0.00
	10/28/2008	1.144	1.144	0.00
	6/24/2009	1.226	1.230	(0.00)
	9/21/2009	1.457	1.457	0.00
	9/28/2009	1.361	1.361	0.00
	10/22/2009	1.338	1.338	0.00
Site Average		**1.28**	**1.28**	**(0.00)**
Eureka return	6/24/2009	0.9	1.009	(0.12)
	8/11/2009	0.85	1.070	(0.26)
	9/21/2009	1.4	1.290	0.08
	10/22/2009	1.36	1.400	(0.03)
	5/9/2010	1.59	1.501	0.06
Site Average		**1.22**	**1.25**	**(0.03)**
Diamond S headgate	11/25/2008	3.2	2.620	0.18
	6/1/2009	2.791	2.897	(0.04)
	9/28/2009	3	3.110	(0.04)
	10/22/2009	3.24	3.290	(0.02)
	5/9/2010	2.84	2.690	0.05
Site Average		**3.01**	**2.88**	**0.04**
Diamond S return	11/25/2008	1.2	1.730	(0.44)
	6/10/2009	1.3	1.520	(0.17)

Table 9, continued.

	9/21/2009	1.4	1.450	(0.04)
	10/22/2009	0.92	1.100	(0.20)
	5/9/2010	1.31	1.400	(0.07)
Site Average		**1.23**	**1.44**	**(0.17)**
Verde headgate	6/8/2009	2.6	2.360	0.09
	8/3/2009	1.8	1.807	(0.00)
	9/28/2009	1.8	1.737	0.03
	10/22/2009	1.4	1.490	(0.06)
	5/9/2010	2.1	1.936	0.08
Site Average		**1.94**	**1.87**	**0.04**
Verde return	6/8/2009	0.48	0.522	(0.09)
	8/3/2009	0	0.053	0.00
	8/12/2009	0.4	0.440	(0.10)
	9/21/2009	1.3	1.420	(0.09)
	10/22/2009	1.4	1.720	(0.23)
	5/9/2010	0.7	0.959	(0.37)
Site Average		**0.71**	**0.85**	**(0.19)**

Table 10 - Comparison of simulted discharge to measured discharge.

Site	Measurement date	Measured Discharge (ft3/s)	Calculated Discharge (ft3/s)	Mean calculated discharge (ft3/s)	Percent difference (instantaneous)	Percent difference (mean)
OK	6/1/2009	9.274	9.86	11.97	-0.06	-0.29
headgate	6/24/2009	21.217	13.37	13.23	0.37	0.38
	8/11/2009	11.57	12.3	13.64	-0.06	-0.18
	9/28/2009	9.231	15.77	11.02	-0.71	-0.19
	11/11/2009	19.54	21.24	21.26	-0.09	-0.09
	Site Average	**14.17**	**14.51**	**14.22**	**-0.11**	**-0.08**
OK	6/1/2009	6.31	5.99	5.77	0.05	0.09
return	6/24/2009	10.089	7.04	6.58	0.30	0.35
	8/11/2009	6.894	6.61	6.41	0.04	0.07
	9/28/2009	4.559	4.96	5.32	-0.09	-0.17
	11/11/2009	9.56	8.72	8.28	0.09	0.13
	Site Average	**7.48**	**6.66**	**6.47**	**0.08**	**0.09**
Eureka	10/28/2008	13.76	13.13	13.79	0.05	0.00
headgate	6/24/2009	11.901	11.75	11.75	0.01	0.01
	9/21/2009	14	13.8	13.71	0.01	0.02
	9/28/2009	12.25	12.52	12.53	-0.02	-0.02
	10/22/2009	12.37	12.36	12.35	0.00	0.00
	Site Average	**12.86**	**12.71**	**12.83**	**0.01**	**0.00**
Eureka	6/24/2009	1.812	2.62	2.6	-0.45	-0.43
return	8/11/2009	1.975	2.85	2.85	-0.44	-0.44
	9/21/2009	4.231	3.63	3.64	0.14	0.14
	10/22/2009	3.98	4.09	4.09	-0.03	-0.03
	5/9/2010	5.18	4.46	4.46	0.14	0.14
	Site Average	**3.44**	**3.53**	**3.53**	**-0.13**	**-0.13**
Diamond S	11/25/2008	21.25	20.5	20.46	0.04	0.04
headgate	6/1/2009	26.86	26.44	24.85	0.02	0.07
	9/28/2009	27.86	27.096	36.45	0.03	-0.31
	10/22/2009	30.24	30.08	34.51	0.01	-0.14
	5/9/2010	25.35	18.08	21.19	0.29	0.16
	Site Average	**27.04**	**26.79**	**26.71**	**0.07**	**-0.03**
Diamond S	11/25/2008	24.89	25.57	22.16	-0.03	0.11
return	6/10/2009	22.503	22.64	22.51	-0.01	0.00
	9/21/2009	20.461	21.47	20.48	-0.05	0.00
	10/22/2009	16.92	16.31	14	0.04	0.17
	5/9/2010	21.48	21.17	21.19	0.01	0.01
	Site Average	**21.25**	**21.43**	**19.49**	**-0.01**	**0.06**
Verde	6/8/2009	32.899	32.953	31.819	0.00	0.03
headgate	8/3/2009	30.756	29.64	29.51	0.04	0.04
	9/28/2009	29.202	28.77	29.06	0.01	0.00
	10/22/2009	23.56	24.04	24.02	-0.02	-0.02

Table 10 continued.

	5/9/2010	30.16	31.03	31.13	-0.03	-0.03
	Site Average	**29.32**	**29.29**	**29.11**	**0.00**	**0.01**
Verde	8/3/2009	0	0	0	0.00	0.00
return	8/12/2009	1.176	1.47	1.71	-0.25	-0.45
	9/21/2009	8.6697	8.27	6.94	0.05	0.20
	10/22/2009	9.61	10.36	10.385	-0.08	-0.08
	5/9/2010	6.514	6	6.02	0.08	0.08
	Site Average	**4.34**	**4.69**	**4.70**	**-0.04**	**-0.05**

Table 11 - Rating curve equations and R^2 error propagation.

Instrument location	Correction curve	R^2 error for correction curve
OK headgate	y=0.7196x+0.899	0.0825
OK return	y=2.2035x-1.371	0.0591
Eureka headgate	Null	0
Eureka return	y=x-9.099	0.0017
Diamond S headgate	y=0.8864x+0.4258	0.0147
Diamond S return	y=-0.2364x+(1.7591)	0.0009
Verde headgate	y=3.4188x-0.7974	0.0017
Verde return	y=0.8896x+0.0366	0.0298
	Rating curve	**R^2 error for discharge rating curve**
OK headgate	y=0.2238x-0.0298	0.0669
OK return	y=0.1756x-0.0234	0.0736
Eureka headgate	y=0.2667x	0.041085
Eureka return	y=0.1062x-0.0331	0.1137
Diamond S headgate	y=0.2521x	0.0051
Diamond S return	y=0.4201x-0.0005	0.0005
Verde headgate	y=0.448x+0.0113	0.0096
Verde return	y=6.2832x	0.0405
	Systemic error in instrument	**Propagated error**
OK headgate	0.05	0.1174
OK return	0.05	0.1068
Eureka headgate	0.05	0.0647
Eureka return	0.05	0.1242
Diamond S headgate	0.05	0.0524
Diamond S return	0.05	0.0500
Verde headgate	0.05	0.0509
Verde return	0.05	0.0709

Chapter 4 - Field Work

4. 1 Instrumentation and channel survey

In addition to model parameters existing in the GIS (thalwag and channel boundaries) and from USGS stream gage records (stage and discharge data for the Verde River and its tributaries), data were needed to define the effects of the irrigation ditches on river baseflows. Specifically, these data were needed for diversion and return flow of the ditches over the course of a year for conditions of low-flow, high-flow, and ditch closure during maintenance. Elevation data for the channel bed from USGS DEM and LiDAR-derived contours from Yavapai County Flood Control district were inadequate for creating profile cross sections. Physical surveys were needed to construct accurate cross sections for HEC-RAS model performance.

4.1.1 Instrumentation

The four ditches in the Camp Verde reach were each fitted with a pressure transducer at or near the headgates and near the location of return flow, beyond the terminal water user (Fig. 31). These pressure transducers are InSitu units, with two older miniTrolls and six newer Level Trolls of varying pressure tolerances (Table 8).

The Eureka Ditch was instrumented in September 2008 with the two miniTrolls (serial numbers 18432; 18478) at a concrete weir above the first water user and in a corrugated steel culvert at the terminal water user before it discharges to Beaver Creek. Both transducers were mounted in 1 ¼" well casing with sand point tips to allow flow-through. The casings are fixed to a chain link fence at the weir (Fig.

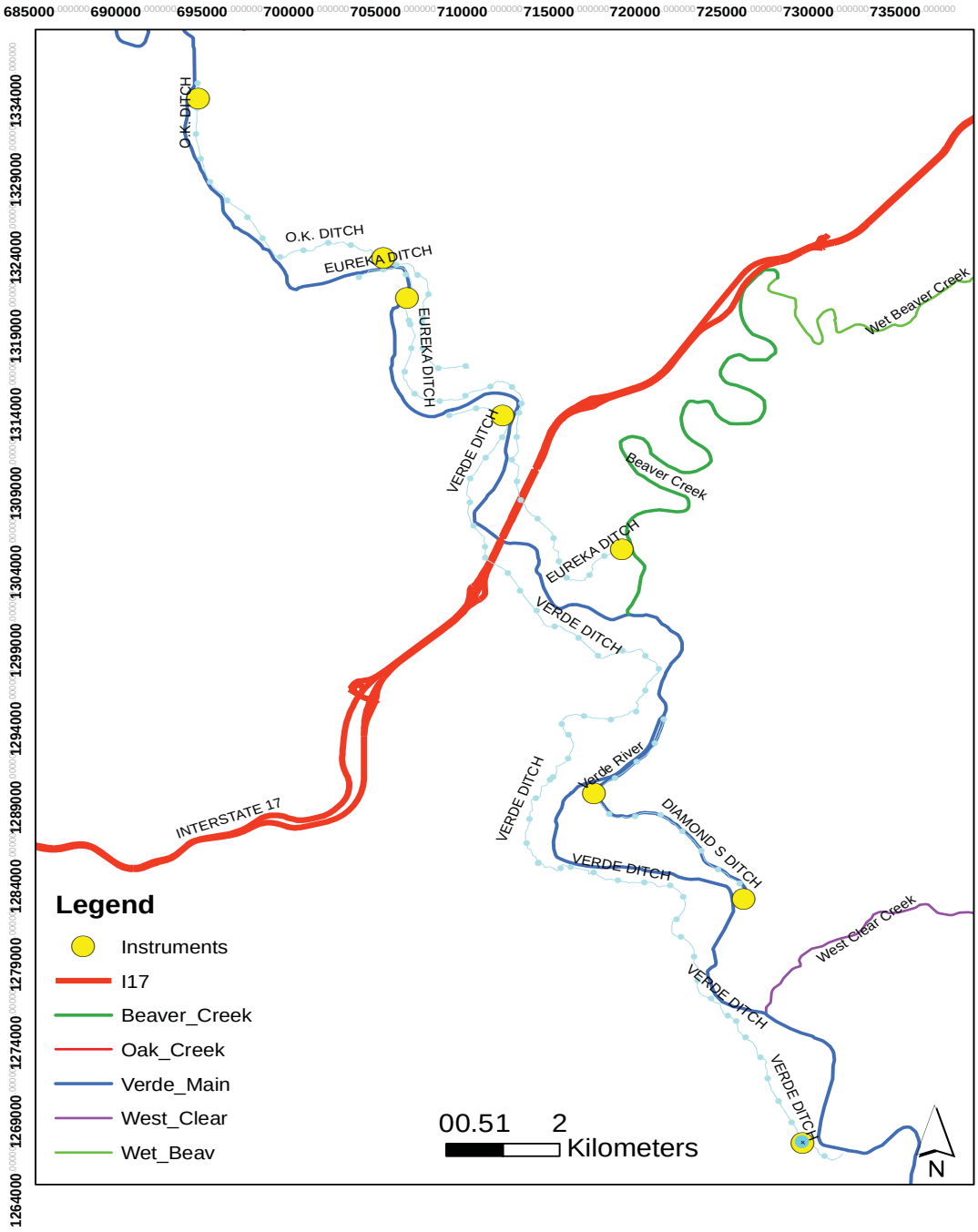

Figure 31 - Location map of transducers deployed in the Verde River hydraulic model study, Camp Verde, central Arizona. Yellow points indicate instrument placement, and coverages representing Interstate 17, Verde River, and tributaries are included for spatial reference.

28), and to a metal gate at the return flow (Fig. 32). Both transducers were programmed to read stage every hour, and to save the reading in an onboard data logger. Data were retrieved periodically with an InSitu Rugged Reader handheld field computer (serial number 132681), via a proprietary serial bus interface attached to the transducer (serial number 0097260).

The OK Ditch was instrumented in March 2009 with two Level Trolls (serial numbers 120789; 120797) at a concrete culvert upstream of the first water user and at a concrete pipe outlet downstream of the terminal water user (Fig. 31). The well casing was fixed to the concrete culvert structure with a fence post mount drilled into the concrete (Fig. 33). The well casing at the pipeline discharge was fixed to the concrete lining with a fence post mount drilled into the concrete (Fig. 34). Both transducers recorded hourly stage data, which were recovered using a ruggedized field tablet computer equipped with WinSitu software (v5, InSitu Inc., Ft. Collins, CO) with a proprietary InSitu interface connecting via a USB port and the transducer (serial number 137010).

The Diamond S Ditch was instrumented in November 2008 with two Level Trolls (serial numbers 132535; 134774) at the headgate structure and at a concrete culvert near the return flow, past the terminal water user (Fig. 31). The well casing at the headgate was fastened to steel pipe cross members with heavy gauge baling wire and cable ties (Fig. 35). The well casing at the concrete culvert near the return flow was fastened to exposed rebar from a broken portion of the culvert with heavy gauge baling wire and cable ties (Fig. 36). Hourly stage data were recorded and retrieved in the same manner as the OK Ditch system.

Figure 32 - Pressure transducer installed at Eureka Ditch return flow, Camp Verde, central Arizona. Shortly after this location, flow is returned to Beaver Creek.

Figure 33 - Pressure transducer installed at OK Ditch head gate, Camp Verde, central Arizona. This location is about 10 yards downstream of the initial major spillway returning flow to the Verde River. Blue arrow indicates flow direction.

Figure 34 - Pressure transducer installed at OK Ditch return flow, Camp Verde, central Arizona. This outlet is next to Grandpa Wash, which contributes some of the OK return flow to the Eureka Ditch.

Figure 35 - Pressure transducer installed at Diamond S Ditch headgate, Camp Verde, central Arizona. This concrete weir is directly at the headgates of the ditch, and is directly downstream of a major spillway returning significant flow to the Verde River.

Figure 36 - Pressure transducer installed at Diamond S Ditch return flow, Camp Verde, central Arizona. This culvert is directly downstream of the final flow diverted from the ditch into a storage tank. Blue arrow indicated flow direction.

The Verde Ditch was instrumented in April 2009 with two Level Trolls (serial numbers 136732; 120802) at the headgate structure and downstream of the terminal water user (Fig. 31). The well casing at the headgate was attached to a steel I-beam cross member with cable ties (Fig. 37); heavy flow during monsoon season displaced the instrument, and it was fastened to exposed rebar on the concrete wing of the structure in August 2009 (Fig. 38). The instrument at the return flow was attached to a chain link fence crossing the channel at the end of the downstream final water user's property boundary using baling wire and cable ties (Fig. 39). Hourly stage measurements were recorded and downloaded with the same equipment as described for the OK and Diamond S Ditches.

4.1.2 Rating curves

For each gauged ditch location, rating curves were used to constrain outlying stage measurements to agree with manual measurements, as well as to convert stage data to discharge data. In the case of stage data correction, numerous field measurements of depth were taken at the transducer location and compared with the transducer reading. For discharge, flow conditions calculated from velocity measurements were compared with the observed stage at the transducer. In both cases, equations relating observed to measured stage and stage to discharge were developed by means of linear regression.

4.1.3 Stage correction

Of the eight transducers deployed, one (Eureka weir) consistently displayed stage values coincident with field measurements of stage taken at the

Figure 37 - Pressure transducer installed at Verde Ditch head gate prior to high-flow displacement, Camp Verde, central Arizona. Instrument was recovered after August 2009 floods and relocated to river left side of structure. Blue arrow indicates flow direction.

Figure 38 - Pressure transducer installed at Verde Ditch head gate after high-flow displacement, Camp Verde, central Arizona. Current location of transducer (pictured) is on river left side of headgate structure. Blue arrow indicates flow direction.

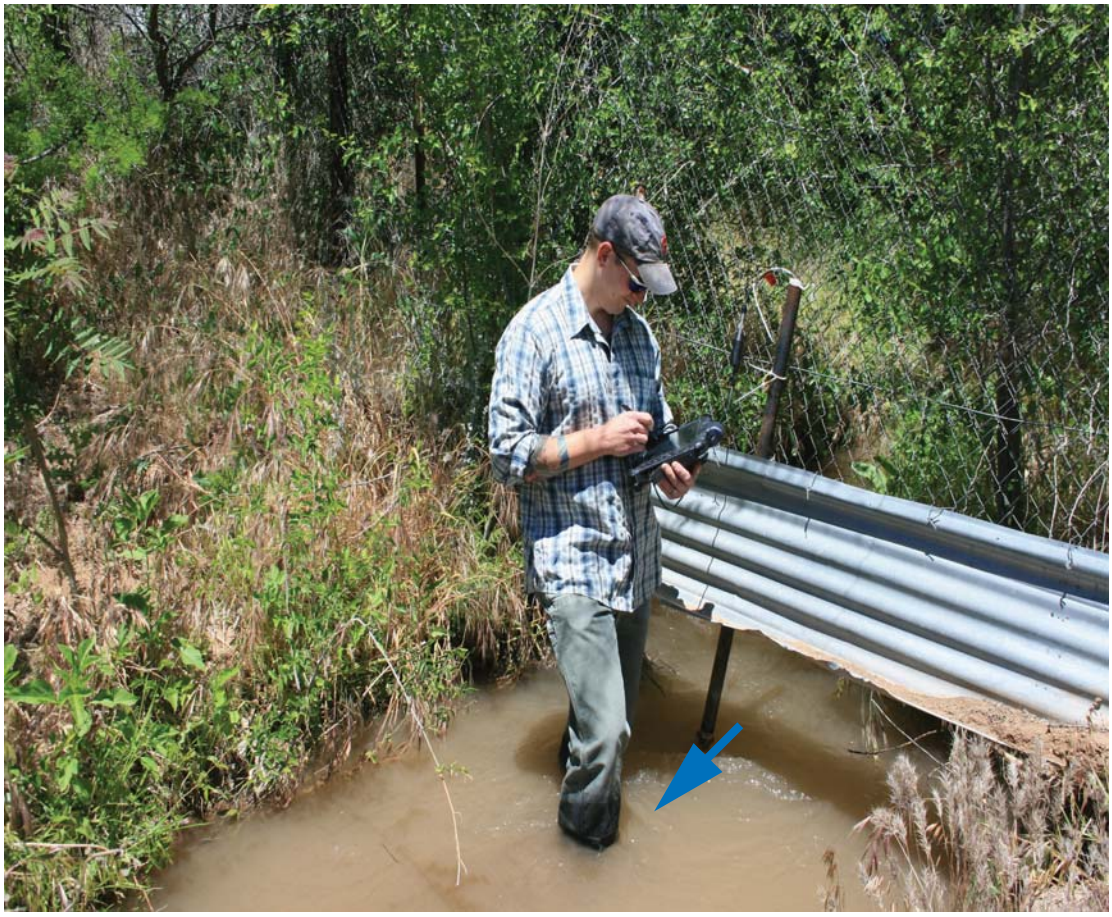

Figure 39 - Pressure transducer installed at Verde Ditch return flow, Camp Verde, central Arizona. Location is downstream of terminal water user. Blue arrow indicates flow direction.

transducer location. This transducer was mounted in a concrete flume, and was situated within laminar flow.

The other seven transducers were subject to water turbulence and debris collection, due to deployment in a less-than-ideal natural channel. Instrument sites needed an anchor spot, which in these types of channels is generally not in laminar flow in the channel center. Flow turbulence may have had a pressure effect within the well casings above the sand point tip, causing the indicated water level to be higher or lower than the actual water level outside of the instrument chamber. This flow turbulence led to inconsistent stage readings (App. A), but the data were corrected to reasonable values by manually measuring depth at the transducer, and comparing these direct stage measurements to the stage value indicated by the transducers.

The two sets of stage data (measured and indicated) were graphed against each other, and the equation of a linear regression trend line was determined (App. A). The equation of this trendline was then applied to indicated data, and the high and low extremes of the downloaded data were removed.

Currently, between four and seven relationships are included in the rating curve for each transducer. Corrected measurements of stage at or near the headgates were in good agreement with previously reported average and seasonal maximum values (Alam, 1997; Tinlin, 1977), and matched field measurements taken at known stages. RMS values of the accuracy of the linear regression curve relative to the compared field and indicated stage measurements vary between sites, and lie between 0.89 and 0.99 (Table 10).

4.1.4 Discharge estimation

The boundary condition data desired for the irrigation ditch/riverine system are discharge rates at known times at locations of diversion and return flows. To convert stage to discharge, a second rating curve was created for each instrumentation site. These rating curves relate discharge rates measured near the transducer with a SonTek sonic flow meter (serial number P2804) to observed stage at the transducer. The flow measurements were conducted by measuring at varying increments to obtain an average of 20 points across the channel, with each point taking a 40 second velocity measurement at 60 percent of depth (Fig. 40). The discharge was calculated by the SonTek onboard analysis program by deriving velocity per area increment and adding all flow derivations across the channel width. The SonTek was calibrated at each site using an onboard ping test to ensure quality data collection. For each site, between four and seven comparison measurements were made (App. B), with a 0/0 base point added for the linear regression analysis. Each rating curve yielded a linear regression equation, with RMS values ranging from 0.91 to 0.99 (Table 10). While an expanded rating curve for a wider range of flow variation would generally lend to an exponential fit, the limited range of discharge measurements created a linear best fit. The equation was then applied to corrected stage data for each transducer, yielding hourly discharge data in m^3/s and ft^3/s (App. B).

4.1.5 Data simplification

The length of deployment for pressure transducers collecting hourly stage data yielded large amounts of data (App. A). To reduce and simplify datasets,

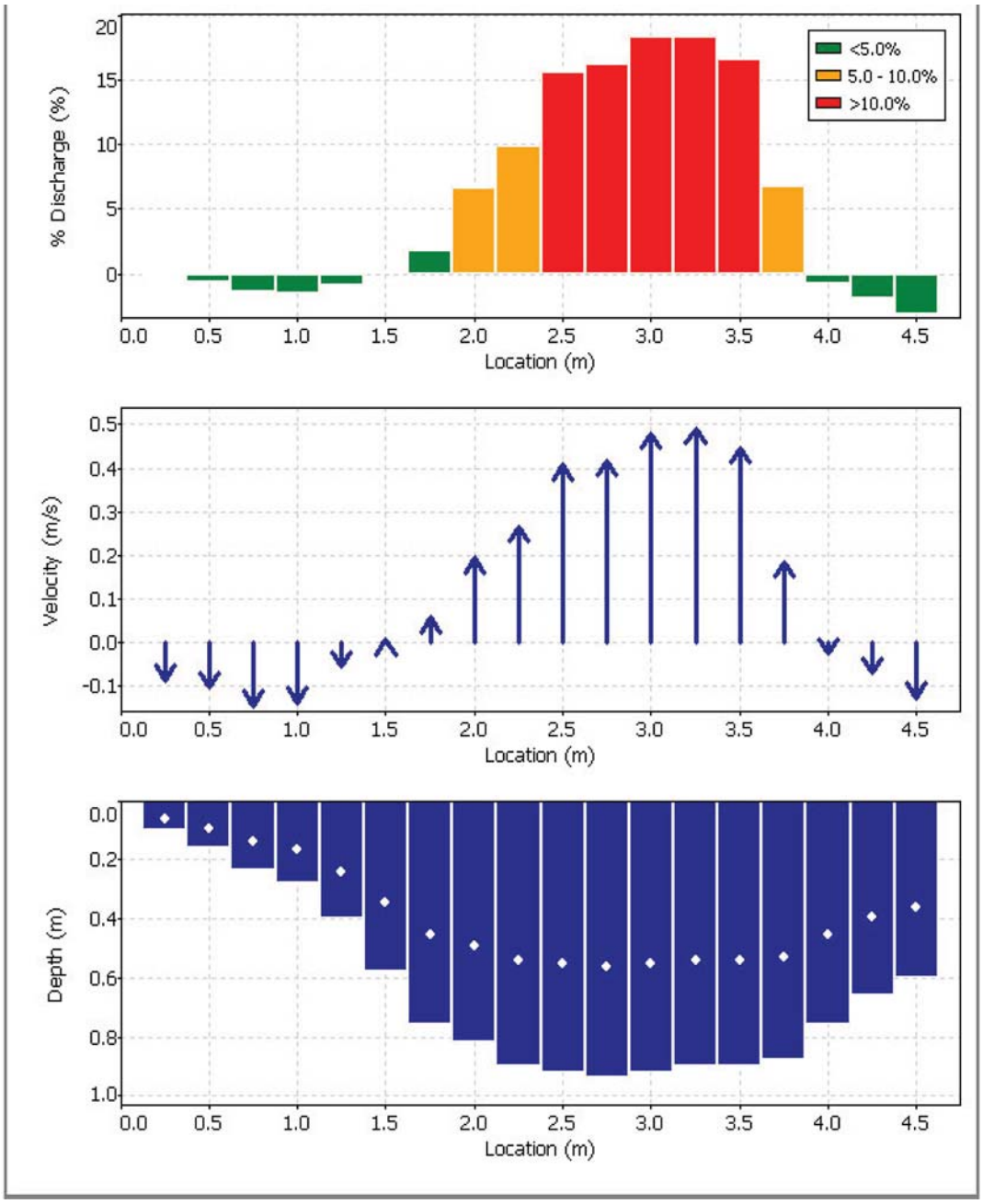

Figure 40 - Example cross section of velocity/area calculation of SonTek flowmeter. Measurement taken using 6/10 (60% depth) method at OK headgate.

and to provide meaningful parameters for the hydraulic model, the hourly discharge and stage data were reduced to mean daily averages (App. C). A PivotTable was created using the original date, corrected stage, and discharge in ft^3/s. The value reading of both stage and discharge was set to the average function, resulting in daily mean for each group of data associated with each date (App. C). The data match the format of the USGS stream gauge data for the Verde River and all tributaries, where mean daily discharge and stage are reported (App. E). The resulting data, much more manageable in number, provide better overall representations of the diversion and return flows of the ditches, and simplify graphical representations and data analysis for the YC WAC and for interested stakeholders and investigators.

4.2 Survey

Accurate channel cross-sections were needed for constructing the HEC-RAS model, and elevation data of the required resolution were not available through the DEM or LiDAR contour data. Verde River channel cross-sections were surveyed from the Oak Creek confluence to the point of the Verde Ditch return flow. A level string line marked in five-foot increments was set across the channel and fixed to rebar driven into each channel bank. The start station for each survey was marked with a Garmin ETrex handheld GPS unit, and depth from the water surface to channel bottom was measured with a depth staff marked in decimal feet at each five-foot increment. Cross-section lengths ranged from 10 to two hundred thirty feet, with average water depths of 5 feet. Survey data were recorded manually in the field, and were then processed using Microsoft Excel spreadsheets. Survey locations were chosen by river characteristics and accessibility. Changes in river conveyance such as

Chapter 7 - Results and Discussion

7.1 Results

7.1.1 Ditch instrumentation

All four irrigation ditches were monitored for differing time intervals (Table 8). For each instrument, hourly stage data were corrected to measured levels (App. B), and were then converted to discharge with a rating curve of measured stage to discharge (App. C). These data were then processed into mean daily flow (App. D). Values for flow conveyed past the headgates of the ditch were generally consistent, and average values are in good agreement with reported values from past measurements and reports (Table 6). Errors were calculated as percent deviation from mean values and measured values, and are reported as R^2 deviance from linear regression fitted to rating curves (Table 10). Error was propagated across calculations by taking the square root of the summation of all errors individually squared. Mean daily flow data for ditches reflects changes in seasonal ditch consumption and events such as closure for maintenance and rapid flows.

OK Ditch

The OK Ditch was monitored from March 2009 to May 2010. It was instrumented at a concrete weir near its headgates and at a siphon after its terminal water user. Average discharge at the head was 16.37 ft^3/s, and average discharge at the terminus was 6.22 ft^3/s. Maximum head and terminus values were 24.66 and 8.46 ft^3/s, respectively. The error propagated across R^2 values from the rating curve corrections and inherent instrument error was 0.50 at the head and 0.54 ft^3/s at the end, with respective deviations from mean of 3.8% and 8.6% (Table 10). The

measured values of discharge at the OK headgate differ from instantaneous calculated values by 11%, and differ from the mean daily values for the dates of measurement by 8% (Table 11). Measured values at the OK return flow vary from instantaneous measurement by 8% and from mean daily calculated values by 9% (Table 11). The OK Ditch consumes a modest portion of the water it diverts, with a 10.15 ft^3/s drop between average values over the study period (Fig. 53).

Eureka Ditch

The Eureka Ditch was monitored from October 2008 to May 2010. It was instrumented at a concrete flume above its first water user and at a gate across a culvert at its terminal water user. Average flow diverted into the ditch was 9.13 ft^3/s; with an average return flow of 3.70 ft^3/s. Maximum discharge was 15.70 ft^3/s at the head and 6.22 ft^3/s at the return. Propagated error for the head and return was 0.07 and 0.45 ft^3/s, with deviations from mean of 0.7% and 12.1% (Table 10). Measured values at the Eureka head vary from instantaneous calculated values by 1% and from mean daily calculated values by less than 1%. Measured values at the Eureka return flow vary from calculated instantaneous and mean daily values by 13% (Table 11). The Eureka Ditch consumes a considerable amount of its diverted flow, with the difference between average values of 9.48 ft^3/s (Fig. 54).

Verde Ditch

The Verde Ditch was instrumented in May 2009, and has been recorded into May 2010. An instrument was placed on the headgate structure, but was later moved to a water wing nearby after being displaced by heavy flow. The return flow instrument was fixed to a chain link fence near the return flow, downstream of

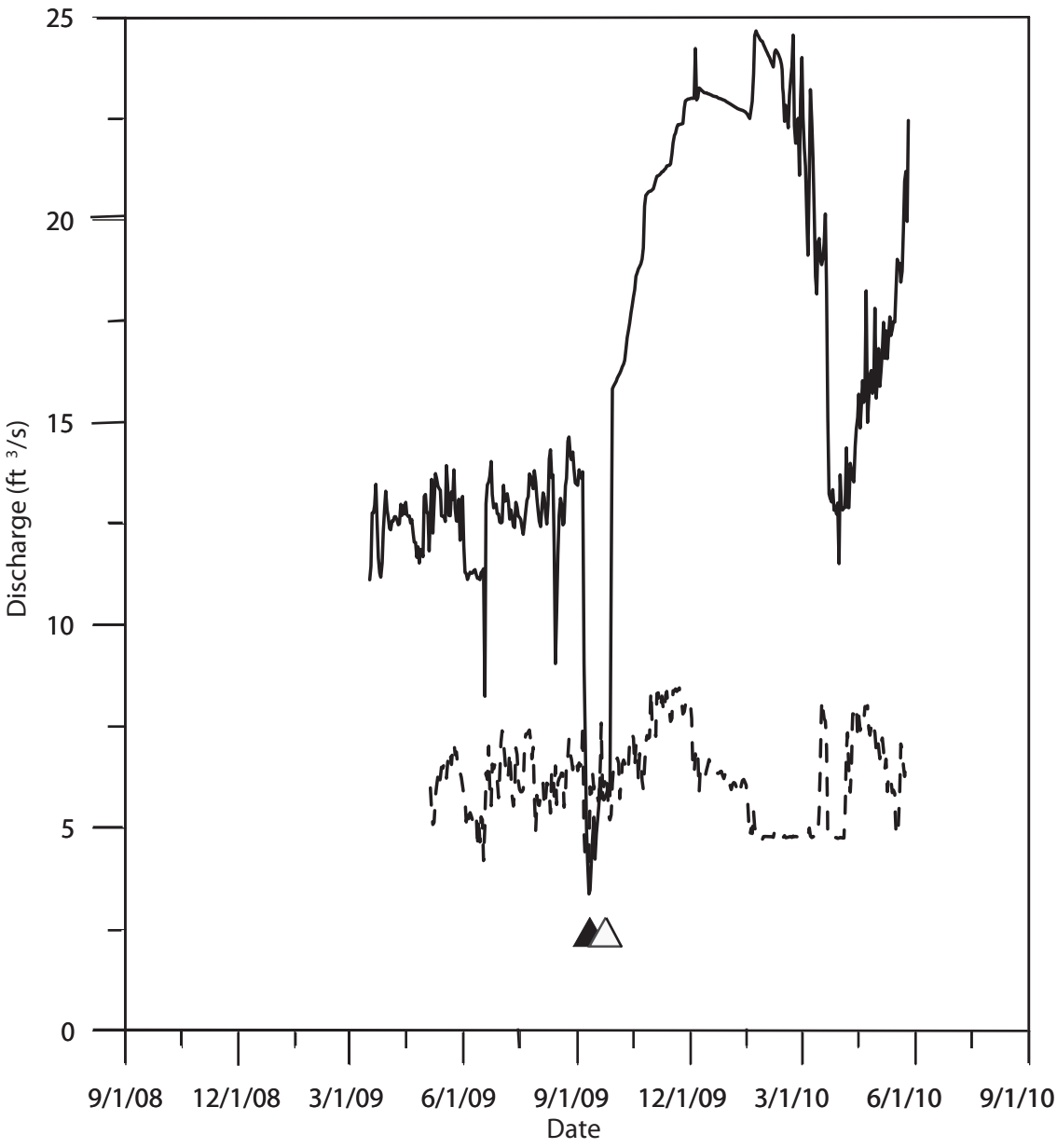

Figure 53 - Discharge and return flow of the OK Ditch, Camp Verde, central Arizona. Black arrow shows ditch closure, and white arrow shows resumption of operations. Solid black line is diverted flow, and dashed black line is returned flow.

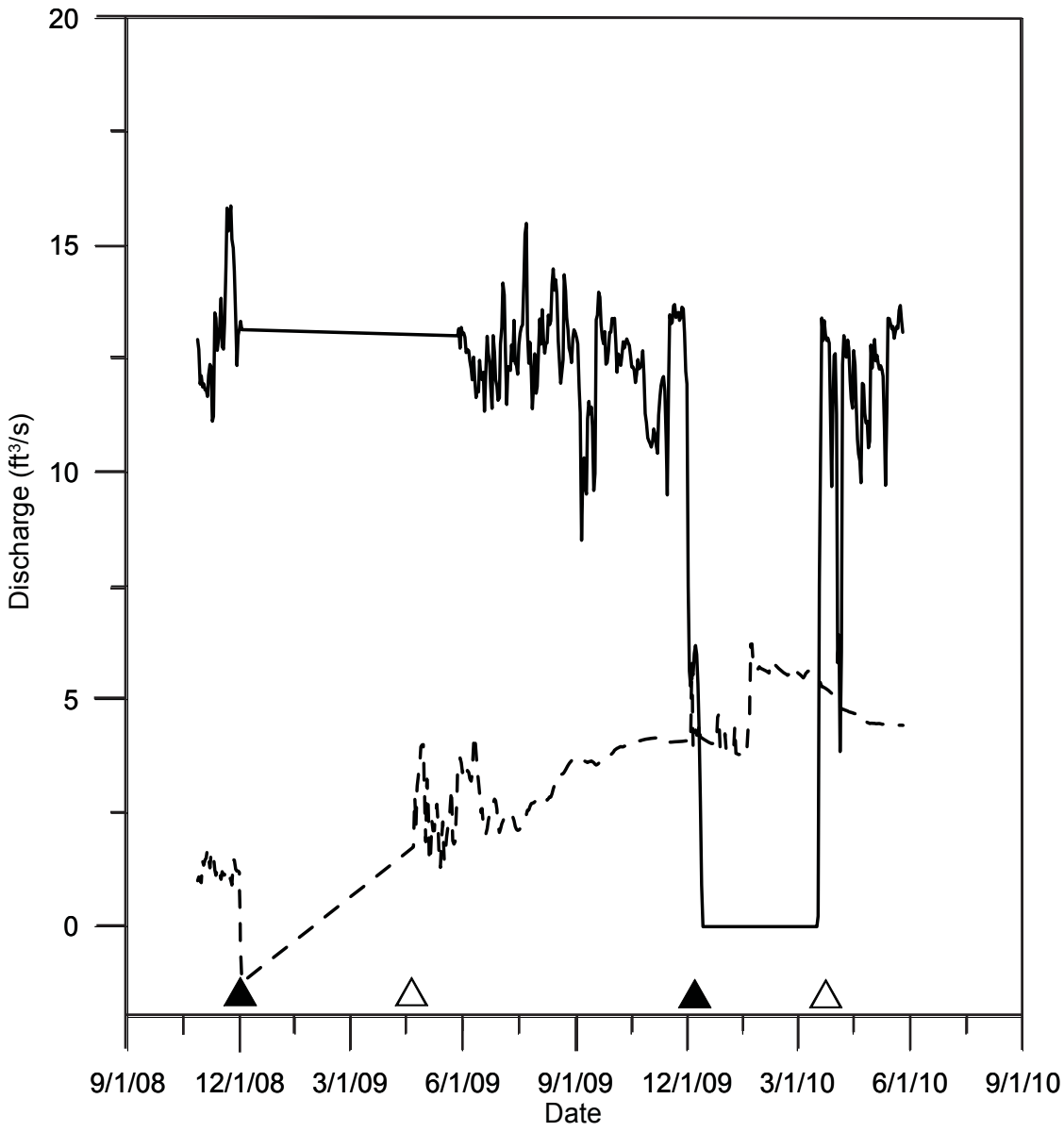

Figure 54 - Discharge and return flow of the Eureka Ditch, Camp Verde, central Arizona. Black arrows show ditch closure, and white arrows show resumption of operations. Solid black line is diverted flow, and dashed black line is returned flow.

the terminal water user. Average diversion was 26.35 ft^3/s; with an average return of 8.38 ft^3/s. Maximum flow at the headgate is 88.32 ft^3/s (likely a spike in the instrument from rapid drying), and maximum flow at the return is 16.94 ft^3/s. Propagated error for the headgate was 0.19 ft^3/s, with a deviation from mean value of 1%. Error for the return measurement was 1.18 ft^3/s, with a percent deviation from mean of 16.5%. This larger deviation is due to a measurement taken by SonTek meter that was at the low end of the instrument's tolerance; otherwise, mean deviation is less than 4% (Table 10). Measured values at the Verde headgate differ from instantaneous calculated values by less than 1% and from calculated mean daily values by 1% (Table 11). The Verde Ditch consumes much of its diverted flow, as it often runs dry at the terminus. Average consumption is 17.92 ft^3/s (Fig. 55).

Diamond S Ditch

The Diamond S Ditch has been instrumented from November 2008 to May 2010. The head transducer is installed above the headgate in a concrete weir, and is attached to a concrete culvert at the terminus. Average diversion at the head is 26.25 ft^3/s; with average return of 20.55 ft^3/s. Maximum diverted and returned flows are 28.36 and 29.02 ft^3/s, respectively. Error for the head gate and return flow is 0.09 ft^3/s (0.3% deviation from mean) and 0.11 ft^3/s (0.05% deviation from mean) (Table 10). Measured discharge varies from calculated instantaneous and mean daily discharge by 1% at the headgate. The deviations at the return flow are 1% for instantaneous calculated values, and 9% for mean daily calculated values (Table 11). Average consumption is 11.15 ft^3/s (Fig. 56).

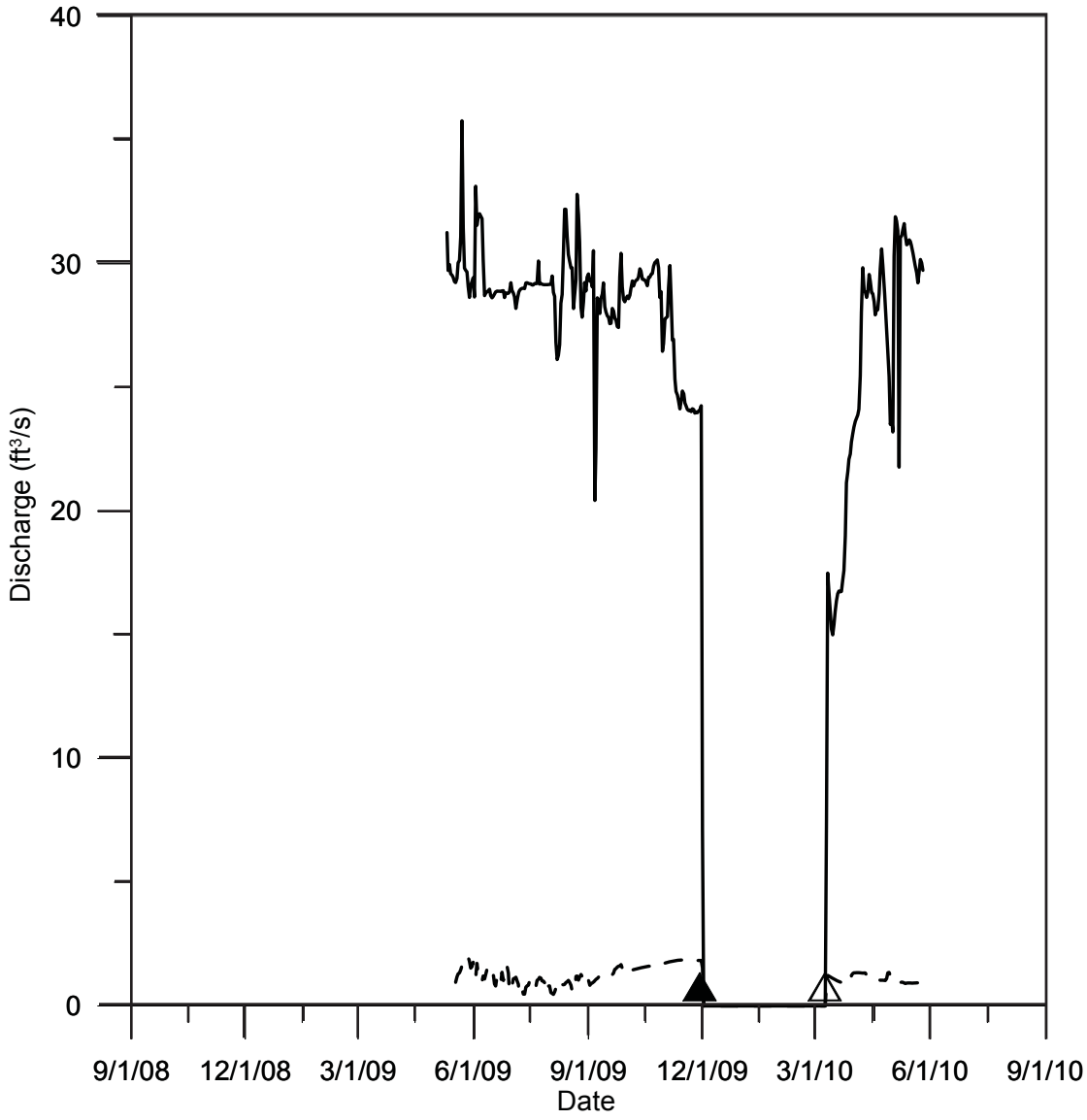

Figure 55 - Discharge and return flow of the Verde Ditch, Camp Verde, central Arizona. Black arrow shows ditch closure, and white arrow shows resumption of operations. Solid black line is diverted flow, and dashed black line is returned flow.

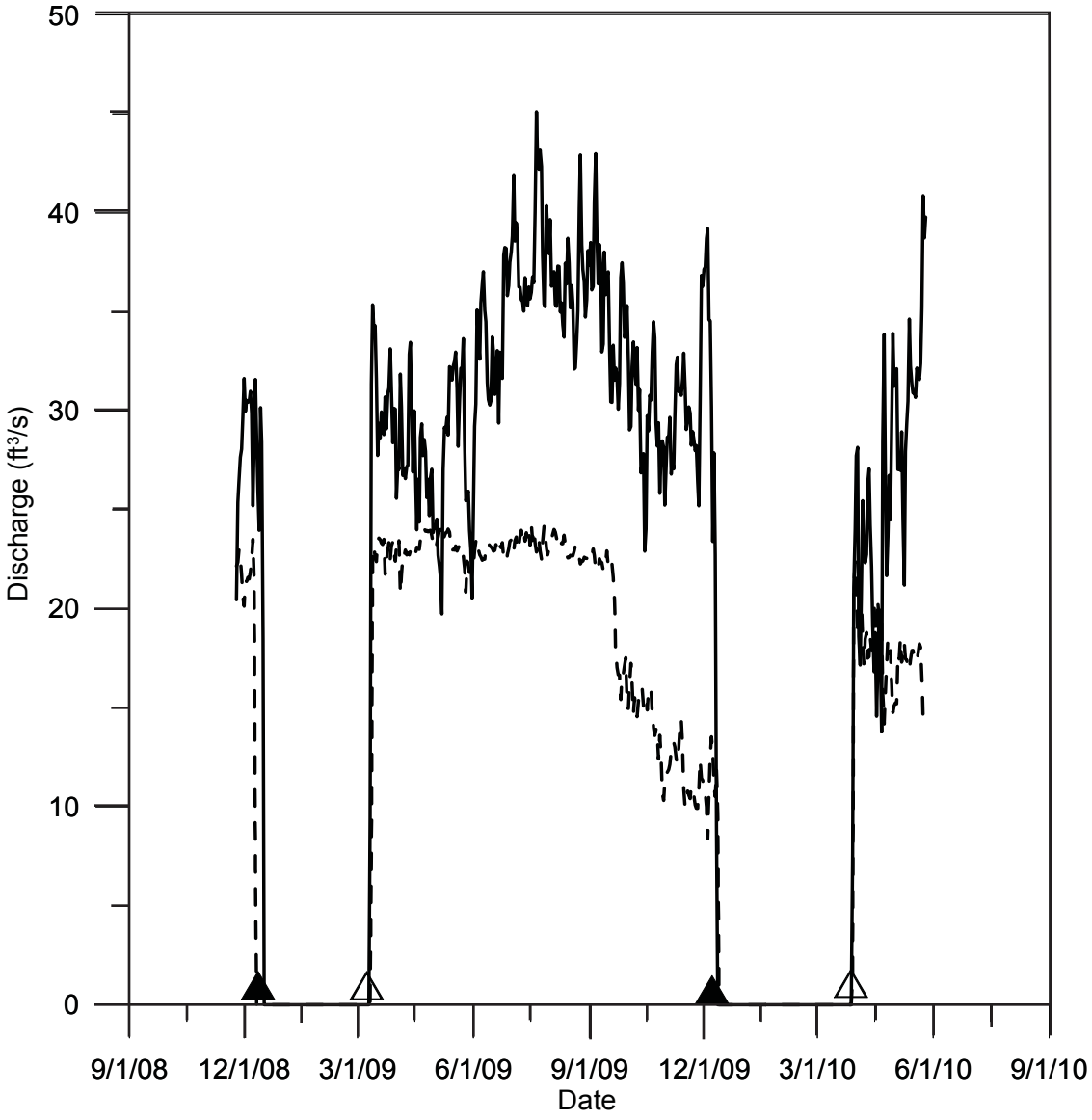

Figure 56 - Discharge and return flow of the Diamond S Ditch, Camp Verde, central Arizona. Black arrows show ditch closure, and white arrows show resumption of operations. Solid black line is diverted flow, and dashed black line is returned flow.

insignificant compared to the magnitude of simulated differences between diverted and non-diverted river baseflows, as referenced above (Table 12).

7.2 Discussion

7.2.1 Implications of ditch instrumentation

Diversion structures for the irrigation ditches along the model reach are constructed solely to divert more flow than is necessary to ensure adequate delivery to the headgates of the ditches. Although more flow will be diverted at higher stages, a relatively constant amount of water is actually routed through the headgates of the ditches. In fact, at very high discharge periods, the headgates of some of the ditches are temporarily closed to prevent damage to the ditch system by flow greater than the conveyance capabilities of the ditch (F. Geminden, pers. comm., 2010). At very high discharge, it is likely that flow is not actually diverted by the diversion structure, but in fact flows directly into the ditch. These events often require repair of the diversion structures and conveyance systems leading to the headgates. It is likely that at lower flows, the small changes seen in the discharge entering the ditch headgates are reflective of the changes in river flow (Figs. 53, 54, 55, and 56).

7.2.2 Implications of model output

Discussion of changing management strategies

The irrigation ditches of Camp Verde are not efficient in their initial diversion of river flow. The simple diversion structures do not divert a set amount of water needed for the ditch operations; rather, they divert often twice the adequate flow to the headgates of the ditch, where large amounts of diverted flow are returned to the channel to ensure the proper amount of water entering the ditch. These

large amounts of diverted flow cause an unnecessary decrease in wetted area within the main stem of the river channel temporarily, and create lasting decreases in hydraulic parameter values (e.g., velocity, flow area, top width, etc.) for significant distances downstream. This can be seen in the steady-state simulation with just the OK Ditch diversion; parameters do not return to those of the undiverted simulation until the last three cross-sections of the model (Fig. 62).

Effects of ditches on river flows

The calibrated simulation results indicate that irrigation ditch diversions impact downstream flows by reducing velocity, hydraulic radius, and discharge, among others (Figs. 58, 59, 60, and 61). While the ditches do not consume the full amount of water diverted, they do decrease the in-channel flow downstream of diversion, and reduce flows significantly over large reaches of the river system. Ditch operations most likely expand the Verde River riparian ecosystem spatially, and have possibly created unique ditch ecosystems, although this is speculation based on general observations, and not currently a defendable hypothesis. Given the amount of water returned to the channel after initial diversion and before flow through the headgates, as well as the large amount of water returned by two of the four ditches (Diamond S and OK Ditches) at the return flow sites, it is likely that more modern management practices including engineered diversion structures or pumps, permanent flow monitoring, and scheduled, metered delivery would provide the necessary amount of water to the water users, maintain baseflow necessary for riparian vegetation, and maximize the flow left in the main stem. The major issues in implementation of these practices include the time and expense of procuring new