

Various Citations to Boating, Channel Conditions, Channel Segmentation and Assessment of Navigability

Primary and secondary sources follow.

1. **Accounts of boating**

A. Three accounts of a flatboat in 1849

First account:

Farish, Thomas Edwin, 1915, History of Arizona, Vol. 1, Phoenix Arizona, Chapter 13, Troubles with the Indians; In Books of the Southwest, University of Arizona Library.

P. 234

“On the first of November, 1849, a flatboat, which had made the voyage down the Gila from the Pima villages, with Mr. Howard and family, and two men, a doctor and a clergyman, on board, arrived at the camp. During this voyage a son was born to Mrs. Howard, said to have been the first child born in Arizona of American parentage. The Lieutenant, it is said, purchased the craft, which was used as a ferryboat during the remainder of his stay, and was transported to San Diego where it was used on the bay. “This,” says Bancroft, “was the history of the first Colorado ferry.””

Second account:

Hanchett, L. J. Jr., 2002, Crossing Arizona; Pine Ridge Publishing, 1st edition, 438p.

P. 184, Lieut. Coutts of a boundary survey party that included Lieut. Whipple was at Yuma when the flatboat arrived from a trip down the Gila and made notes on Nov. 1, 1849 as follows:

THURSDAY, NOV. 1st. Maj. McD. Col. C. and Co. crossed their baggage and have been with me most of the evening. Mrs. Howard came into camp on 30th having come down the Gila some 200 miles in a boat and in which she had a fine son, called of course, Gila. Found today the remains of the

Third account:

Ross, C. P., 1923, The lower Gila Region, Arizona: Geographic, geologic, and hydrologic reconnaissance with guide to desert watering places; USGS Water Supply Paper 498, 237p.

On November 1, 1849,⁵⁰ a flatboat reached Colorado River at the present site of Yuma. It had made the voyage down Gila River from the Pima villages, carrying three men and the family of one of them. This boat was 16 feet long by 5 feet 6 inches wide. It was used for some time as a ferry across Colorado River. A boat of this size, carrying so many people with their baggage, could not float down this portion of the Gila now at any season. During floods the current is too swift and during the rest of the year there is insufficient water. This boat was equipped with wheels for use on land. If it attempted the trip to-day, it would have to forsake the river and resort to its wheels very promptly. In October, when this trip is reported to have been made, long stretches of the river bed are usually dry, as the summer rains are over, and those of the winter have not yet started.

B. Fur trappers

Pattie, James O., 1824-1830, Pattie's personal narrative of a voyage to the Pacific and in Mexico June 20, 1824-August 30, 1830, Edited by Tim Flint, from the original edition: Cincinnati, 122p.

Page 68 to page 72, a group of fur trappers led by James Ohio Pattie became the first to explore the delta of the Colorado River. After trapping in the mountains of Arizona and New Mexico, they canoed down the Gila River starting on December 3, 1827 to sell their furs at Spanish settlements they assumed existed further downstream. Pattie's party continued to catch beaver and had to build another canoe to haul the extra pelts. They eventually reached the tidewater in apparently 9 canoes in early January 1828 where the tide and rough waters flooded their camp and they could proceed no further. On December 3, Pattie reported:

"On the morning of the 3d, the first business in which we engaged, was to build ourselves a little fort, sufficient for defense against the Indians, This finished, we cut down two trees suitable for canoes, and accomplished these

important objects in one day. During this day we kept one man posted in the top of a tall tree, to descry if any Indians were approaching us in the distance. On the morning of the fourth we commenced digging out our canoes, and finished and launched two. These were found insufficient to carry our furs. We continued to prepare, and launch them, until we had eight in the water. By uniting them in pairs by a platform, we were able to embark with all our furs and traps, without any extra burden, except a man and the necessary traps for each canoe. We hid our saddles, hoping to purchase horses at the settlements, and return this way.

We started on the 9th, floating with the current, which bore us downward at the rate of four miles an hour. In the evening we passed the burnt town, the ruins of which still threw up [142] smoldering smoke.....”

C. Indians

Hanchett, L. J. Jr., 2002, Crossing Arizona; Quoting from Bolton, H. H., 1960, Rim of Christendom, New York, NY, Russell and Russell, 1960: Pine Ridge Publishing, 1st edition, 438p.

Page 14, from account of Padre Kino’s second trip into Arizona in 1698 where Kino describes small boats built and used in the Gila by Indians:

to plant. Culture borrowing was not one-sided. A principal article of native diet was fish, which was very plentiful in the Gila. “They fish,” says Manje, “with large and nicely made nets, like those of Europe, and another contrivance with which they take out the catch. It is shaped like a little boat, is two varas long and about one wide, is woven from poles very carefully bent like ribs, all coming together as in the prows, others crossing them and tied, as is shown by the drawing in the margin.” The jicaras or baskets likewise attracted attention. Some of them held a fanega or more of maize. Larger ones, water-tight, were used for boats, in which two men paddled back and forth across the river, using their hands for oars. And at that time the Gila was a real river, with water in it.

D. Immigrant

Hanchett, L. J. Jr., 2002, Crossing Arizona; Pine Ridge Publishing, 1st edition, 438p.

P. 173, on Oct. 5, 1849 James Collier with a group led by Capt. Thorn and his dragoons noted in his journal that some of the party of immigrants were going down the river on a raft.

bedding up on the high ground to sleep on, on account of the reptiles. Captain Thorn arrived in the night and reports 400 wagons ahead of us and some 400 emigrants at Pimos villages. Brought in nothing but two beeves. The reports from California are very flattering. Some of the immigrants in our party are going down the river on a raft I suppose they will beat us to the Colorado [by] some days. We’re getting very short of provisions and Capt. Thorn’s men have but five days left.

E. Immigrants

Hanchett, L. J. Jr., 2002, Crossing Arizona; Pine Ridge Publishing, 1st edition, 438p.

P. 212, Robert Eccleston, on Dec. 3, 1849, recorded how immigrants made boats out of wagon boxes as follows:

gradually) to leave our waggon, but, unlike many a poor Californian, only to exchange for a better. We found a splendid carriage about 1/2 mile below where we started from, & after reaching camp, sent back two yoke of oxen to bring it up; it was all complete, but all taken apart. It was close to the river, where, no doubt, the party that owned it had taken to water, making a boat of the box, &c., as many a party have done, from the signs along shore. In the afternoon we were surprised by the unexpected visit of Colonel Hays, whose camp is 300 yds. above us. He has come though fast, travelling some 25 or 30 miles pr. day. They carry corn. The colonel gave us some information concerning our future

2. Channel Condition

A. Once a well defined channel with hard banks

Darton, N. H., 1933, guidebook of the Western United States: Part F, the southern Pacific Lines of New Orleans to Los Angeles; USGS Bulletin 845, 304p.

have been developed. In places these later deposits were flooded by lavas, through which the present river trench has been excavated nearly 100 feet. From the historical record the Gila River channel has changed materially in a century or less. When it was originally discovered there was a well-defined channel with hard banks sustaining cottonwoods and other trees and plants. The current was swift and deep in places, so that the stream could be navigated by flat boats of moderate size, and it contained sufficient fish to be relied upon as food for many Indians. It was reported also that the water was clear and sea-green, very different from the present muddy stream. Now the Gila River is depositing sediment in its lower part, and its braided course follows many narrow sand-clogged channels. Possibly these changes may be due partly to diverting and damming the water and to an increase of silt caused by the removal of forest and increased grazing in the higher region.

B. River once had hard sloping banks lined with trees

Ross, C. P., 1923, The lower Gila Region, Arizona: Geographic, geologic, and hydrologic reconnaissance with guide to desert watering places; USGS Water Supply Paper 498, 237p.

p. 66 and 67, local rancher Montgomery discusses changes in the river channel as follows:

More recent information is furnished by Mr. John Montgomery, a ranchman residing in Arlington, who has had many years' experience in southwestern Arizona. He states⁵¹ that in the summer of 1889, when a boy of 12, he was in camp near Powers Butte, on Gila River. At that time the river had a well-defined channel with hard, sloping banks lined with cottonwoods and bushes. The water was clear, was 5 or 6 feet deep, and contained many fish. The grazing lands near the river were in much better condition than now. Several varieties of grass then abundant have since died out. Mr. Montgomery attributes the change in the character of the river largely to the practice of cattlemen of burning the heavy brush that once covered its banks in order to drive out wild cattle which had sought shelter there. This destroyed the natural protection and left the soft silty soil exposed to rapid erosion. The disastrous floods of 1890 and 1891 did much to break down the river's confining banks, partly filled the channel with sediment, and in general interfered with the equilibrium that had been established.

C. Uniform channel slope (no waterfalls)

Emory, Lieut. Col, W. H., 1848, Notes of a Military Reconnoissance from Fort Leavenworth in Missouri to San Diego, in California; Washington, 416p.

Page 136, a uniform gradient suggests insignificant bedrock control of channel morphology.

"From the 19th of October to the 22d November, we were following the course of the Gila river, occasionally forced into the mountains to avoid the canons. This route is never far from the 33d parallel of latitude, and is embraced between the 109° and 114 30' meridians of longitude, falling, during that distance, very uniformly from about 5,000 feet to near the level of the sea."

D. Gila River has typical alluvial channel movement

Emory, Lieut. Col, W. H., 1848, Notes of a Military Reconnoissance from Fort Leavenworth in Missouri to San Diego, in California; Washington, 416p.

Page 21, The ever changing location of the Gila River that is typical of sinuous alluvial channels is described.

Another consideration is, the treaty makes the Gila for a certain extent the boundary. The Gila does not always run in the same bed; whenever it changes the boundary must change, and no survey nor anything else can keep it from changing. The survey of that river, therefore, as it fixes nothing, determines nothing, is of minor importance. It forms of itself a more apparent and enduring monument of the boundary than any that can be made by art; and on the principle that that which is of the greatest necessity should be done first, the line from the Paso del Norte, until it strikes a branch of the Gila, would seem to demand the first attention.

It is but just to say these are not views recently adopted by me; they were entertained and expressed before leaving Washington and since, and I urged that none but the astronomical party, and just as much of the commission, should be sent to the Pacific side as was necessary to fulfil the conditions required by the letter of the treaty.

Very respectfully, your obedient servant,

Hon. T. EWING, *Secretary of the Interior.* W. H. EMORY.

3. Channel size

Note: It is possible that some channel width and depth data presented here may duplicate data given in Appendix C on my original report of Oct. 25, 2002.

A. Mexican military explorer

Hanchett, L. J. Jr., 2002, Crossing Arizona; Pine Ridge Publishing, 1st edition, 438p.

Page 28, from account of Juan Bautista de Anza's trip into Arizona along the Gila River in 1774 where Kino describes the depth of the Gila using palms. For a 7 inch palm the depth is about 3 to 3.5 ft.

Monday, November 13.—At a quarter past eight we set forth on the march, leaving the river to the right because it now turns toward the north. We went southwest for a league which was occupied by some small hills; this distance passed we went down to a valley, and from it, after turning to the west and also the west-southwest, and traveling three more leagues, we came to the river at the place called La Rinconada, where there is pasturage, and where a halt was made for the night. A quarter of a league before reaching this place, without any difficulty we crossed the Gila River, which had only five or six palms of water where it was the deepest.

B. Mormon Expedition

Hanchett, L. J. Jr., 2002, Crossing Arizona; Pine Ridge Publishing, 1st edition, 438p.

Page 106, from Col. Cooke's journal of the Mormon expedition where he describes the Gila River as rapid and 3-4 feet deep in places and at one location it was 150 yards wide as he prepared a boat.

I am now preparing a boat of the two pontoon wagon-bodies lashed together, end to end, between two dry cottonwood logs; in this I shall put all the baggage I can risk. The river is rapid, and in places three or four feet deep; and here it is one hundred and fifty yards wide. I have determined to send Lieutenant Stoneman in charge; he professes to have had similar experience, and is desirous to undertake it.

C. Forty-niner

Hanchett, L. J. Jr., 2002, Crossing Arizona; Pine Ridge Publishing, 1st edition, 438p.

Page 141, Journal of Asa B. Clarke, 1849, where river was ¼ mile wide but where he noted debris from past floods 10 to 20 feet above the water level at the time of his visit.

afternoon.

JUNE 11TH. Passing down the river at a mile distant,—its course being indicated by a line of cottonwoods, and running under a mountain on the opposite side, while on this side a plain extends two or three miles to some mountains—at ten o'clock perceiving that we were about to leave the river, we stopped to refresh our animals. There was, however, no grass to be found. Dr. Field and myself taking our water bags and gourds, set out for the river. The sun reflected from the sand, produced a burning heat. We found it more than a mile to water. The river was at this place a quarter of a mile wide. The volume of water at times must be immense, as there is brush and other substances lodged in the mesquites from ten to twenty feet high, through the adjoining plain, over which we have been traveling. Leaving at 4 o'clock, we ascended a bluff to the table lands, covered with black basalt, some

D. John Woodhouse Audubon

Hanchett, L. J. Jr., 2002, Crossing Arizona; Pine Ridge Publishing, 1st edition, 438p.

Page 161, Journal of Audubon on Oct. 3, 1849 notes the Gila River as rapid and fifty yards wide and 18-20 inches deep with very deep holes in places.

The river here is a very rapid stream at this season, about a hundred and fifty yards wide, and from eighteen to twenty inches deep, with very deep holes in places. The bottom is shifting quicksand, delightfully varied with drift logs, put exactly where they can best trip up the mules; as the water is like that of the Mississippi, *below* St. Louis, you never see the logs until you are over them.

E. Doctor Griffin

McNamee, Gregory, 1998, *Gila: the life and death of an American River*, updated and expanded edition, University of New Mexico Press, 232p.

Page 48, in 1848 according to John S. Griffin, a doctor, who traveled along the river:

they had hardly got cool—no grass, nothing but weeds & cactus. The River here [near Dateland] is some 60 or 80 yards wide—on an average 3 feet deep and rapid. We have seen more water fowl in the last two days, than we have yet met with on the River—ducks, brant geese & swan. The cotton wood shows the effect of frost very little—not more than the same tree did when we left the Rio Grande a month since—On the night of the 17th we had considerable frost.—The mountains still

4. Assessment of navigability

A. Original opinion by Lieut. Col. Emory upon completing a journey along the Gila River.

Emory, W. H., Lt Col, 1847, *Notes of Military Reconnaissance, Fort Leavenworth in Mo. to San Diego in CA*, including parts of the Arkansas, Del Norte and Gila Rivers: Washington, 414p.

Emory said the Gila River may be navigable at all stages of water as follows:

rivers.
The walls of the cañon are vertical, and about 50 feet high, and 1,000 feet long. Almost before entering the cañon, in descending the Gila, its sea-green waters are lost in the chrome colored hue of the Colorado. For a distance of three or four miles below the junction, the river is perfectly straight, and about 600 feet wide; and up, at least, to this point, there is little doubt that the Colorado is always navigable for steamboats. Above, the Colorado is full of shifting sandbars, but is, no doubt, to a great extent susceptible of navigation.
The Gila, at certain stages, might be navigated up to the Pimos village, and possibly with small boats at all stages of water.
Near the junction, on the north side, are the remains of an old Spanish church, built near the beginning of the 17th century, by the renowned missionary, Father Kino. This mission was eventually sacked by the Indians, and the inhabitants all murdered or driven off. It will probably yet be the seat of a city of wealth and importance, most of the mineral and fur regions of a vast extent of country being drained by the two rivers. The stone butte through which they have cut their passage is not more than a mile in length. The Gila once flowed to the south, and the Colorado

B. Opinion by author McNamee

McNamee, Gregory, 1998, *Gila: the life and death of an American River*, updated and expanded edition, University of New Mexico Press, 232p.

WHEN ANGLO-AMERICANS first came to the Southwest, much of the Gila River was navigable. Within half a century it no longer carried enough water to float a raft. For newcomers who had read of the abundant waters of the desert, this was a constant source of confusion. One of them was a government inspec-

C. Gila River once could be navigated by flat bottom boats

Darton, N. H., 1933, guidebook of the Western United States: Part F, the southern Pacific Lines of New Orleans to Los Angeles; USGS Bulletin 845, 304p.

nearly 100 feet. From the historical record the Gila River channel has changed materially in a century or less. When it was originally discovered there was a well-defined channel with hard banks sustaining cottonwoods and other trees and plants. The current was swift and deep in places, so that the stream could be navigated by flat boats of moderate size, and it contained sufficient fish to be relied upon as food for many Indians. It was reported also that the water was clear and sea-green, very different from the present muddy stream. Now the Gila River is depositing sediment in its lower part, and its braided course follows many narrow sand-clogged channels. Possibly these changes may be due partly to diverting and damming the water and to an increase of silt caused by the removal of forest and increased grazing in the higher region.

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