ORIGINAL

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41. Correspondence from Department of the Interior, United States Indian Service, Klamath Agency, Oregon to Secretary of the Interior, Washington, D.C., dated August 25, 1904

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57. Correspondence to Commissioner of Indian Affairs, Washington, D.C. from Superintendent, Pima Training School, dated Sacaton, Arizona, March 13, 1905

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EXHIBIT 1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON 25, D. C.

IN REPLY REFER TO:
Grp 372, Arizona

5/15/64

1.372

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MAY 15 1964

BUR. OF LAND MGMT.
PHOENIX, ARIZONA

Memorandum

To: SD, Arizona

From: Director

Subject: Consideration and opinion on reestablishment of a portion of the boundary, Salt River Indian Reservation, T. 1 N., R. 5 E., G&SRM.

By your memorandum of October 26, 1962, you requested our consideration and opinion on the matter of identifying and reestablishing the boundary of the Salt River Indian Reservation along the Salt River within T. 1 N., R. 5 E., Gila and Salt River Meridian. That memorandum was accompanied by a most comprehensive report on the historical background of the reservation, together with all apparent historical maps of the general area. In response to the request of the Chief, Division of Engineering, dated December 19, 1962, you furnished, by memorandum dated January 23, additional data relating to past stream flow of the Salt River and a 1960 aerial mosaic of the river upon which you have delineated the last vestiges of the river's north channel as determined by an on-the-ground inspection.

The consideration of the position of the southerly boundary of the Salt River Indian Reservation turns around two points: first, the intent of the Executive order by which the reservation was established; and second, the present position of the boundary in consideration of the movements of Salt River since the date of the reservation's establishment.

This Bureau has a prime and direct interest in the determination of the position of this boundary through a continuing public land interest in lands outside the reservation. In general terms, lands and resources north of this boundary inure to the benefit of the Indians while the land and resources south of this line are subject to laws and regulations pertaining to public lands. Of immediate value are the deposits of sand and gravel, which are apparently in great demand, within the old river bed.

You report that there is a conflict between what you believe to be the proper position for the reservation boundary, that is, the so-called

Exhibit "B"

north channel of the river, with that which the Superintendent of the Pima Agency, Bureau of Indian Affairs, believes to be the proper position, that is, the so-called south channel of the river. However, nothing of a documentary nature has been submitted by you, and presumedly by the Indians, to support their position with material facts. It is the intent of this memorandum to examine the conflict of interest and to give you our opinion thereon by which you may proceed with the official reestablishment of the controversial boundary.

T. 1 N., R. 5 E., was originally surveyed in 1868 by W. F. Ingalls, Deputy Surveyor, as shown upon the official plat approved October 22, 1868. The field notes and plat depict the presence of Salt River in the northwesterly portion of the township, flowing in a general WSW direction, through two distinct and separate channels for almost the entire distance. The channels are labeled respectively, "North Channel of Salt River" and "South Channel of Salt River". The intervening island area is 1/2 to 3/4 mile in width. Upon the plat this island area carries the notation, "Land sandy subject to overflow, Soil 3rd rate." The original survey did not meander or segregate the river channels or island area and their representation upon the plat is by sketching, coordinated with the recorded section line crossings.

At the time of the original survey, and on the date of Arizona's admission into the Union, Salt River would have to be considered as a non-navigable stream. In those years the stream flow was a variable thing ranging from flash flooding to complete absence of any water. During the spring and early months there was undoubtedly a good flow therein as runoff from the melting snows in its headwaters. At about the turn of the century and subsequently, retention dams have been constructed on the upper reaches of the Salt River and its major tributary, the Verde River, for irrigation and power purposes. Consequently, the river has ceased flowing except for flash flooding or the release of excess impounded waters. This cessation of flow has practically stabilized the position of the river bed since the time of the dam construction.

By Executive Order dated June 14, 1879, a tract of public lands within T. 1 N., R. 5 E., and Tps. 2 and 3 N., Rs. 5, 6 and 7 E., was set apart in the territory of Arizona as a reservation for the Pima and Maricopa Indians. The portion of the Executive Order pertinent to the boundary question at hand reads:

> "Beginning at the point where the range line between Ranges 4 and 5 east crosses the Salt River; thence up and along the middle of said river to a point where the easterly line of Camp McDowell Military Reservation, if prolonged south, would strike said river; * * *."

The E. O. also contains these stipulations:

> "It is hereby ordered that so much of townships 1 and 2 north, ranges 5 and 6 east, lying south of the Salt River, as are now occupied and improved by said Indians, be temporarily withdrawn from sale and settlement until such time as they may severally dispose of and receive payment for the improvements made by them on said lands."

This last part of the order can only be interpreted as a termination of Indian rights to any lands south of the river and it can hardly be presumed that any such rights or occupancy of lands in 1879 are now outstanding in either individual Indians or the tribe. The order does not designate whether it was the intent of the boundary to follow the north or the south channel. In reaching an opinion on this question, we must then consider the collateral evidence as to its position as proposed or interpreted by Government officials having general administrative authority over the territorial lands and as shown upon the historical maps which you have submitted. The preponderance of this evidence is in favor of the north channel.

The reserved tract has since become known as the Salt River Indian Reservation.

Executive Orders dated September 28, 1911, and October 23, 1911, added lands within T. 2 N., R. 5 E., to the existing reservation, which additions do not affect the question at hand.

The map identified as, Sketch of a portion of Salt River, traced in Adjutant General's Office, Jan'y. 9, 1879, shows thereon a "Proposed Res'n" whose south boundary is shown as following the north channel.

A map not identified otherwise but containing the notation, Traced in Adjutant General's Office, March 4, 1879, depicts a shaded area, presumedly the reservation, as extending to the south channel. This particular map is the only historical map that treats the south channel as the boundary.

The map of Arizona Territory, prepared by the Army in 1879, shows the reservation boundary along the north channel. This map was found here in Washington in the National Archives and is an addition to the maps submitted by you.

The map identified as, Gila River Reservation and Surroundings, Pima Agency, A. T., also being possibly House Document, H. 399-1879, shows the north channel as the reservation line. We have not been able to find, however, this map in the House documents for the year 1879. The

map is quite material for it was prepared by the Pima Indian Agency and can only be construed as their consideration at that date of the position of the reservation line as between the north and south channels.

Perhaps the most pertinent map is that prepared by the Surveyor General at Tucson, dated July 12, 1879, titled, Plat showing Lands Reserved for Pima and Maricopa Indians by Executive Order of June 14, 1879. The reservation boundary is shown along the north channel. This is an official plat in every sense whose purpose in preparation was to guide the Government in its administration and disposal of lands in the vicinity of the reservation. If it did not properly represent the extent of the reservation, then it would have been incumbent upon the Indian Service to seek an amendment thereof. There is no evidence upon the plat, of any objection or amendment.

In 1888, L. D. Chillson, Deputy Surveyor, executed a resurvey and subdivision of so much of T. 1 N., R. 5 E., into 40-acre tracts as was situated at that time north of the right bank of Salt River. One book of the field note record of this work states on its face, "Meander Lines of Right Bank of Salt River - - - which constitutes the South Boundary of the Salt River Indian Reservation." Those meander lines were of the right bank of the north channel. It is apparent from the record that the surveys were requested and paid for by the Indian Office.

In 1910, R. A. Farmer, Topographer, executed a dependent resurvey and subdivision of sections within T. 1 N., R. 5 E., of reservation lands, based on the Chillson surveys. This work did not reach south of the right bank of the north channel of Salt River. In Mr. Farmer's repeated phrasing, the meandering of the right bank is described as, "Right bank of Salt River which river is S. bdy. of the Salt River Indian Reservation." The immediate record does not reflect that the surveys were made for the benefit of the Indian Service or were paid for by that agency but such conditions must have prevailed as this Bureau had no direct interest in such survey of the reservation lands. The Farmer survey has apparently been employed by the Indians for purposes of issuing allotments and trust patents.

Other maps which you have submitted are only of incidental interest to this vicinity and do not show any historical or collateral evidence of the reservation boundary. The 1912 and 1952 topographic maps published by the Geological Survey each depict a boundary line within the river bed. These lines are generalizations only, representative of office determinations perhaps, without basis of material evidence.

The preponderance and weight of evidence favors the recognition of the north channel of Salt River as being the south boundary of the reservation. In the apparent absence of protest or amendment by the Indians

to the boundary as shown upon many maps and as officially surveyed and established upon the ground by two official surveys, it must be considered that until recent years the Indians were apparently complacent with the boundary being along the north channel. In a similar matter the Solicitor considered the question of the historical position of a portion of the boundary of the San Carlos Indian Reservation (55 I.D. 560). In the syllabus of the opinion, it is said:

> In determining the boundaries of an Indian reservation the recognition by the Interior Department of a boundary as such for more than 60 years will be held as controlling.

The case at hand is not unlike the San Carlos situation in age and recognition.

Therefore, it is our opinion and conclusion that the south boundary of the Salt River Indian Reservation within T. 1 N., R. 5 E., is the north channel of Salt River.

It is well established under common law that a riparian owner of lands upon either a navigable or nonnavigable stream follows with his ownership the shifting of the stream, if the change has been gradual (New Orleans v. United States, 10 Pet. 662). The movement of a stream can thus result in both a gain of lands through alluvium and a loss of lands by erosion.

Since the Executive Order established the southerly boundary of the reservation as the middle of Salt River, thereby granting to the reservation the stature of a riparian owner, it should be considered that this boundary has shifted as the river has subsequently moved.

The historical mapping evidence reflects that there has been some movement in the north channel of the river in a generally southerly direction since the original surveys of 1868. This movement has had the effect of adding considerable lands to the reservation as originally surveyed. There is no direct evidence that the river's movement has been by means other than by normal erosion and accretion. Movement in the nature of an avulsive action is not apparent although in all likelihood the erosional effect was accelerated during periods of flood when the river was active.

Since Salt River has ceased to carry any continuous flow of water, due to the retention of almost all waters by dams in its upper reaches, it may be considered that the river has reached a stabilized condition and is no longer subject to shifting or movement. Within this concept

then the position of the reservation boundary should be established within the considered position of the north channel, as the river ran at the time of the cessation of flow.

Upon the submitted 1960 aerial mosaic you have identified the last vestiges of this north channel. The channel is so identified upon the mosaic by the yellow coloring.

Therefore, you will accept this particular channel as being the abuttal of the reservation within T. 1 N., R. 5 E., and you will identify, mark and monument its centerline as the limiting northerly boundary of public land areas lying southerly thereof. Corners thereon will be marked in accordance with secs. 278-279 of the Manual.

The movement of the north channel, since the original survey, has been in a southerly direction. The adoption of the present position of the north channel, as described above, would have the effect of adding an estimated area of 200 acres of land to the reservation from that shown upon the 1868 plat. Considering the position of the reservation boundary as established by Farmer in 1910, there will be added an estimated area of 360 acres. In other words, the Indians are not suffering any loss of lands by the reestablishment of the boundary as proposed but are gaining thereby the estimated area of 360 acres. Within T. 1 N., R. 5 E., this is an additional 20 percent of the base lands.

At this time, no sectional subdivision or relotting of the lands added to the reservation will be undertaken. The area between Farmer's record meander line and the new boundary line will be shown upon the plat only as "accretion." See sec. 639 of the Manual.

The resurveys in T. 1 N., R. 5 E., will proceed in accordance with these opinions and directions as expeditiously as possible.

The aerial mosaic is being returned under separate cover. All other submitted material is being retained unless you have an expressed desire for its return.

R. R. Hochmuth

Acting

I concur. MAY - 6 1964

John A. Carver, Jr.

EXHIBIT 2

A HISTORICAL ANALYSIS OF PORTIONS OF THE SALT AND GILA RIVERS, ARIZONA

Prepared For

Larry J. Richmond, Ltd.
Phoenix, Arizona

Prepared By

Elaine C. Lacy
Fred Andersen
Constance Brown
Dennis Preisler

of

RESEARCH MANAGEMENT WEST
Tempe, Arizona

February, 1987

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INTRODUCTION

This report examines the history of portions of Arizona's Salt and Gila Rivers from the time of the first Anglo settlement, roughly the mid nineteenth century, to statehood, 1912. The study area includes the Salt River from Indian Bend Wash in Tempe to its confluence with the Gila River, and the Gila River from that confluence to the Maricopa County line. Particular attention will be given to settlements along the rivers, including their economic activities; uses of the rivers by local inhabitants; transportation within the study area; irrigation projects undertaken in the area; flood histories of the rivers; and other information pertaining to river uses during the study period.

The sources of the Salt River lie high in Arizona's White Mountains. It is formed by the joining of two rivers, the Black and White. The Salt then flows 200 miles through gorges and canyons, across alkaline beds that give it its flavor and name, and into the desert where it is captured behind giant dams. The Salt River bed continues through the Salt River Valley and the river is reborn as the Gila. The Gila River flows from New Mexico into Arizona on its way to join the Colorado River. The Salt and Gila meet in the Phoenix area. Before the Salt and Gila join, the Salt has drained 13,000 square miles of watershed, including that of the Verde. It has been fed by roughly 50 relatively large tributaries and about 20 smaller ones, and hundreds of miniscule streams.

Today the Salt River has been harnessed and is utilized down to almost the last cupful. After the Salt flows through the penstocks or over the spillway at Stewart Mountain Dam, it runs down to the Granite Reef Diversion Dam. Before reaching Granite Reef, the waters of the Salt mix with those of the Verde River. At that point the water is divided into two main canals. From the two canals, the flow is diverted into secondary canals, then into laterals, and finally into irrigation ditches. There is some overflow and wastage, which goes back into the Salt and Gila River channels through the New and Agua Fria River channels for northern canals, and directly into the confluence of the Salt and Gila in the southern canals.

The Salt River no longer exists after it joins the Gila, but the salt marshes between Phoenix and Gillespie Dam, and the salt cedars and tamarisks along the Gila's banks are evidence of the alkalinity which the Salt carried from the mountains to the north.

This report is concerned with the nature and use of the Salt and Gila Rivers before the building of the great dams. How were the rivers used earlier? What was the nature of the rivers? How did they change after the construction of the dams?

FIELD SURVEY NOTES

In the preliminary stages of the investigation, field survey notes were scanned on portions of the Salt and Gila River basins. The following townships were examined, which surround the Salt River from the west end of the Pima-Maricopa Reservation, past Mesa, Tempe and Phoenix, to the junction with the Gila River; then following the Gila past Avondale and Buckeye, to where the river begins to turn southward near Palo Verde. Also studied were two townships in southwestern Maricopa County where the Gila River leaves the county.

TABLE 1
TOWNSHIP AND RANGE

T 1 N, R 5 E
T 1 N, R 4 E
T 1 N, R 3 E
T 1 N, R 2 E
T 1 N, R 1 E
T 1 N, R 1 W
T 1 N, R 2 W
T 1 S, R 1 W
T 1 S, R 2 W
T 1 S, R 3 W
T 1 S, R 4 W
T 1 S, R 5 W
T 5 S, R 9 W
T 5 S, R 10 W

T1N,R5E: Field Survey Notes: Arizona, Book 2, Mar/Apr-1868.
The north and south channels of the Salt River are of equal size, but run through sandy soil, constantly changing position and size. (p. 355) Notes "luxuriant" grass both on mesa and in bottomland, and potential for irrigation, especially on bottomland, which "resembles that which the Maricopa and Pima Indians have under cultivation" on the Gila. (p. 354)

T1N,R4E: (Ibid.)
The river enters Tp on east in sec. 12. Separates into two channels in sec. 17, "each having about the same amount of water...banks are generally 5 to 10 feet high, but occasionally...they are low and sandy. There are two esecas (acequias) taking water from Salt River in sec. 7 and runs westward into T1N,R3E which is used by the farmers for irrigating their land." (p. 283)

T1N,R3E: (Ibid.)
Width of river at line between secs. 23 and 24 is 4.49 chains.

(p. 145) At corner of secs. 13, 14, 23, 24, notes, "land is...sandy, unfit for cultivation and interspersed with numerous sloughs and at times portions of it are overflowed from 4 to 6 feet..." (p.146) This is a typical comment for many areas along the river. Between secs. 11 and 12 an irrigation ditch runs west. (p. 149) Land on line between secs. 16 and 21 is sandy and "washed or shifted about every season." (p. 183) General description of the township states there are two channels, continually changing course. Also notes "a settlement called Phoenix was formed in NE part of the township during the winter of 1867 and 1868. It now contains about 50 persons who have displayed great energy in the construction of irrigation ditches and the clearing of their land...the land bears every evidence of having been under cultivation at some former time." (pp. 212-213)

T1N,R2E: (Ibid.)
River enters Tp. in three channels in secs. 13, 24 and 25. They unite and leave Tp. in sec. 30. Cottonwood on banks and between channels. Most of Tp. covered with dense mesquite, esp. north of the river. (p.138)

T1N,R1E: (Ibid.)
On line between secs. 34 and 35, width of river is 6.40 chains. On line between secs. 33 and 34, width is 7.27 chains. On line between 32 and 33, width is 3.9 chains. On line between 31 and 32, width is 6.08 chains. (pp. 15, 26, 36, 43) "There is a good ford in sec. 35." (p. number missing) General description: land north of river is above average; south of river, second and third rate. Timber is cottonwood on riverbanks, also mesquite, sagebrush and arrowweed. All surveyors noted dense brush and timber in the entire area around the Salt-Gila-Agua Fria junctions.

T1N,R1W: (Book 1, 2/1868)
"The Gila River runs west through the Tp at the northern base of (the Estrella Mountains). It is a fine stream about 10.00 chains wide...and has a rapid current generally. (p. number missing)

T1N,R2W: (Book 1006, 2/1883)
North between secs. 25 and 26 "shallow water and rapid current." (p.7) "If the waters of the Gila River could be carried to the land...the land could be made very valuable and productive." (p.92)

T1S,R2W: (Book 1166, 1/1883)
"There is plenty of water in the Gila for irrigation." (p.97)

T1S,R3W: (Book 1167, 1/1883)
On line between secs. 11 and 12, "deep water, low banks." (p.18)

T1S,R4W: (Book 1168, 12/1882)
Width on line between secs. 23 and 24: 3.20 chains. (pp. 11-

13) General description: plenty of water. (p. 97)

T1S,R5W: (Book 1169, 12/1882)
On line between secs. 25 and 26, measured "across deep water." (p.8)

T5S,R9W: (Book 1157, 1/1887)
"The river contains an abundance of water not yet utilized." (p.61) "Soil good, a few trees." (p.9)

T5S,R10W: (Book 1158, 1/1877)
At western border of Maricopa County. Between secs. 13 and 14, river is about 3.50 chains wide. "Rich bottom land can be readily irrigated from the Gila River." (p.61)

These notes indicate that some portions of the Salt River had a flow of sorts in 1868. The notes show also that water was already being diverted from the river for irrigation purposes. It seems there was more water in the Gila than the Salt at the time they were surveyed.

SETTLEMENTS

TABLE 2
EARLY SETTLEMENTS ALONG THE SALT AND GILA RIVERS

NAME	DATE	TYPE
(Salt River)		
Lehi	1877	Agricultural
Mesa	1878	Agricultural
Tempe		Commerce/Agricultural
Phoenix	1868	Agricultural
Cashion	1900	RR Stop/Agricultural
Avondale	1896	Stage Stop/Agricultural
Liberty	1895	Stage Stop/Agricultural
Buckeye	1888	Agricultural
(Gila River)		
Arlington	1900	Agricultural
Gila Bend	1871	Stage Stop/Agricultural
Agua Caliente	1870-1880	Health Resort

Salt River Settlements

Lehi: Mormon settlers moving southward from Utah founded the town of Lehi on March 6, 1877. The community quickly became a self-contained agricultural settlement, and like many Morman communities, its inhabitants resisted contact with nearby non-Mormon communities--thus trade between the communities was almost nonexistent. Within the first year, Lehi residents constructed a diversion dam and canal off the Salt River to irrigate their crops. The Mormon farmers were the first to develop and use old Indian irrigation canals: many of the canals had been dug by the Hohokam, the Pima and Maricopa Indians. The town never grew to a significant size, and was absorbed by the city of Mesa in the early years of the twentieth century.(1)

Mesa: Mesa, originally known as Mesa City, was also established by Mormons in October 1878. It, too, was a self-sufficient agricultural community. The settlers almost immediately organized the Consolidated Canal Company which undertook the building of a diversion dam and irrigation canal. The Mesa farmers had access to a reasonably steady supply of water from the Salt River. During periods of insufficient water supply, which were frequent, downstream farmers accused the Mesa farmers of taking more than their share of water. (2)

Tempe: Tempe was first called Butte City, then Hayden's Ferry. The town, located at a point where the Salt River flows between two Buttes, soon became an agricultural and trading center. During periods of high water in the Salt, travellers

from Phoenix to Mesa and the mining districts to the west crossed the Salt via a ferry operated by Charles Hayden, a prominent Tempe resident. The first bridge across the Salt was constructed at this same site. (3)

Phoenix: Phoenix, the largest community on the Salt River at the time Arizona achieved statehood, was settled in 1868 at the site of ancient Hohokam canals. It was first called Mill City. Like other nearby communities, Phoenix was an agricultural town, linked to the growing system of irrigation canals in the area, and to nearby communities by the Maricopa and Phoenix Railway, constructed in 1887. Phoenix grew rapidly, and soon became the political, economic and administrative center for the valley. (4)

Cashion: Cashion was established as a railroad stop in 1900. It later developed into an agricultural settlement, drawing water from the Agua Fria and Salt Rivers. The community had little connection with the Salt or Gila Rivers other than its proximity. (5)

Avondale: Avondale was founded in 1896, and was known as Coldwater Station in its early years. It was a stage stop on the Wells Fargo stage route along the northern banks of the Salt River, and was later a railroad stop. Avondale developed into an extensive agricultural region, drawing water from the Agua Fria and Salt Rivers as well as the underground water table. (6)

Liberty: Originally called Altamont, Liberty was founded in 1895. It was also a stop on the Wells Fargo route, and later became an agricultural community. At statehood, well drilling and canal building activities were underway at Liberty. (7)

Buckeye: The town of Buckeye was founded in October 1888 as an agricultural community, originally called Sydney. After the Buckeye Canal was completed in 1895, the town's name was changed to Buckeye. The arrival of the railroad in 1910 linked Buckeye to Phoenix, and was used to transport agricultural products to market not only in Phoenix but to markets further away. (8)

Gila River Settlements

Arlington: Arlington, yet another agricultural community, was founded during the construction of the Arlington Canal, in January 1900. The town was founded at the site of the diversion dam. The Santa Fe railroad later connected Arlington with outside markets for agricultural products. (9)

Gila Bend: Gila Bend was the site of an ancient Indian settlement. Located on the south side of the Gila River, the settlement was an important stage station on the Butterfield stage line; it was originally called the Gila Ranch Stage Station. In 1871, the Gila River Ditch Company built a 16 mile canal and a diversion dam, and began offering inducements to

settlers seeking land. The resulting settlement was nearer the river than the stage route. By 1878, the Southern Pacific Railroad passed through Gila Bend on its route to Tucson from the West Coast, and the community became an important railroad and automobile stop for east-west traffic.(10)

Agua Caliente: In the late nineteenth and early twentieth century, Agua Caliente was a hot springs resort. King S. Woolsey, an Army trailblazer, established a residence in the area around 1870. Natural hot springs flowed under the region, and Woolsey sold his holdings to a man who built a resort and advertised the hot springs for their healing properties. Woolsey had built a ferry to cross the Gila to connect Agua Caliente with Sentinel, the major stop on the Southern Pacific Railroad. This ferry operated well into the twentieth century. (11)

Agua Caliente drew health seekers from various parts of the country. Tourists took the train to Sentinel and boarded a wagon which took them to the ferry to cross the Gila. A local resident who moved to the area in 1910 said of the many visitors to Agua Caliente: "All the passengers came from Sentinel in those days. Every day they took a boat across the river to ferry across the passengers and the freight." (12) In 1926, the railroad reached Hyder on the north side of the river, so people no longer needed to cross the river to reach Agua Caliente. In the 1950s, a nearby farmer accidentally stopped the flow of the hot springs by drilling a well on his property.(13)

Several other communities sprang up in the late nineteenth century on or near the Salt and Gila Rivers. They included Heaton, Enid, Estrella, Ocapos, Bosque, Cole, Painted Rock, Sentinel, and Stanwix. All were stops on the Southern Pacific Railroad, built during the 1870s.

It is clear that early settlements in the Salt River valley were primarily agricultural. Many towns that were originally established as stage stops later became agricultural communities when irrigation canals were constructed in the area. Because of the mild climate and fertile land, farmers irrigated the land heavily, realizing they could grow crops year round. After 1909, the number of agricultural settlements increased because the soon-to-be-completed Roosevelt Dam would insure constant supplies of water. The dam would control much of the flooding of the Salt and Gila, which had previously destroyed many of the small diversion dams.

Prior to 1900, little commerce took place among the new communities along the Salt and Gila Rivers. The railroad acted as a catalyst for trade in the area by providing inexpensive and easy access to markets for the valley's agricultural produce.(14) There is no evidence the Salt or Gila Rivers were ever used as highways for transporting goods; in short, they were not used for commercial purposes.

RIVER USES

For the residents of the Phoenix area around the turn of the century, the primary role of the Salt and Gila Rivers was to provide irrigation water for agricultural projects. The rivers were used in isolated instances to transport people, but for the most part they were a hindrance to transportation. This section of the report documents the crossing of the Salt and Gila Rivers by ferries and gives historical accounts of boating down the rivers.

TABLE 3
"NAVIGATING" THE SALT AND GILA RIVERS

DATE	TYPE CRAFT	CIRCUMSTANCES	OUTCOME
(SALT RIVER)			
1874-1909	Ferry (Hayden)	Across Salt at high water	Usually successful; often dangerous
1875	Logs	Down river; a test	Logs jammed in box canyon
1885	18'x 5' Boat	Down river; a test	Boat wrecked but repaired; safe
1905/1915	Rowboats	Rescue efforts, flood times	One drowning; always dangerous
(GILA RIVER)			
1846	Rafts/flat boats	Down river; Mormon Battallion	Problematic
1849	Rafts	Down river; Peoria Company	Successful
1874-1891	Ferries	Across river	Successful
1879	Row boat ($10)	Down river	Successful
1889	Boat	Down river	Lost boat but rebuilt
1889	Ferry	Down river	Craft broke up
1895	Houseboat	Down river	Successful

Ferries

The ferryboat business and boating in general on the Salt and Gila Rivers was seasonal, depending primarily on unreliable rains and the rivers' intemperate flow. In the best years, two months' ferrying was considered good business by operators. Ferries, which were used strictly to ferry goods and passengers back and forth across the river, could only be used when the rivers were their most violent and dangerous, that is at flood stage; and travellers considered them only as a last resort. Before the building of highway bridges, fording on foot, by wagon or on horseback was the preferred way of crossing the rivers. (15)

The Salt River had a number of established ferry businesses, a few of which remained in operation until the construction of highway bridges in the early twentieth century. The first and most well-known of these enterprises was that established by Charles T. Hayden in 1874. Built of cottonwood trees and large enough to carry a wagon and team of horses, the ferry crossed the river attached by ropes to a cable suspended across the river. By lowering the rear of the craft, it could be propelled through the water by the current. The ferry was used only when flood waters made other types of fording impossible. Frequently the violent flow during floods would tear the raft from its cable mooring and hurtle it downstream, and the vehicle would then have to be retrieved or rebuilt. Hayden's Ferry continued to operate until 1909. (16)

Ferrying on the Gila also began in 1874. On January 31, James Moore launched the first boat for crossing the river at Morgan's Ferry. Later that year, on March 21, King S. Woolsey began using a ferry near his ranch at Agua Caliente. The same ferry was later used to transport vacationers to the hot springs resort at Agua Caliente.(17)

In 1891, a Gila ferry operator boasted a craft large enough to transport a six-horse team safely across the river. In 1908, citizens put pressure on the local government to establish a ferry located somewhere between the mouth of the Salt River and Agua Caliente on the Gila. In 1916, Arizona governor George W.P. Hunt crossed the Gila by ferry, perhaps on one of these larger craft. (18) (See Figure 1)

Other "ferries" on the Gila were not commercial ventures but were more on the order of makeshift improvisations. An item in the Arizona Citizen, dated August 7, 1881, reported that "The Gila River is now so high as to require use of boats in crossing. A flat boat that Superintendant Stewart had made a year and one half ago...now comes in handy." (19) One account of the 1891 flood on the Gila indicates that the usual method of crossing the river was in wagons, but that when rains made the river too high the best bet was to wait until the river went down again. (20)

Figure 1. Crossing the Gila River by Ferry, 1916.
(Hayden Library Arizona Collection)

Boating

Boating down the Gila, even before the construction of dams, appears to have been an unusual activity; during most months of the year the river could easily be forded in wagons or on horseback, and there were decent roads and railroads for travel between Yuma and Phoenix.

The earliest recorded attempts at boating down the Gila in Anglo history took place in the 184 s. In 1846, the Mormon Battalion, under Lieutenant Colonel Philip St. George Cooke, floated 70 miles down the Gila to Yuma. The expedition was beset with problems, but it provided invaluable information for later travellers. (21) The California gold rush of 1849 brought thousands of gold seekers down the Gila Trail or Cooke's Wagon Road. Some, like Cooke, attempted to navigate the Gila. One such group, the Peoria Company, attempted to use the Gila River as transportation when the majority of their animals died in the desert. The company made rafts from their wagons, loaded their goods aboard, and set off in three separate groups to reunite at the Colorado River junction. They floated 100 miles to the mouth of the river without loss of life.(22) Still, river trips down the Gila did not become commonplace; most considered the river's flow too unpredictable, even during the rainy season.

Other instances of trips down the Gila River are recorded. The Arizona Sentinel of January 25, 1879 includes an article entitled, "Phoenix to Yuma by Water." It asks the question, "Is the Gila River navigable?", and chronicles the successful navigation of the Gila from Phoenix to Yuma by three citizens of Phoenix. The three built a boat in Phoenix for ten dollars, loaded it with supplies, and successfully paddled the boat downstream. The Sentinel writer claims, "the advocates of navigation of the Gila obtained a solid fact" from the feat of the three adventurers. The only obstacle to clear navigation of the river, claimed the three men, were rocks in the Gila Bend area which could easily be blasted away to provide clear passage.

The Sentinel then called on enterprising Phoenicians to begin using the river as a means of transporting goods produced in the farms around the city. It states that "a flat-boat loaded with grain, pumpkins, or other fruits of the `Orchard of Arizona' and drawing two feet of water" could easily be floated down to Yuma. Phoenix's produce could then be shipped to New York or London as well as other world markets. The writer claims that by using the river for transporting goods, it can break the monopoly of the railroads and stage lines that charge "extortionate fares." (23)

In 1889, the Tombstone Prospector reported the attempt by a group of men to float a large ferry boat from the Maricopa crossing on the Gila River to Gila Bend. The Maricopa Crossing was directly south of Phoenix and was a major link on the Tucson to Phoenix route. The men had no trouble until they reached a

point on the Gila about forty miles below Phoenix, where the boat hit a "snag" in the river. The current was flowing at about fifteen miles per hour, and the men lost control of the boat, which was subsequently cut in half. (24)

On April 3, 1889, a pair of Clifton prospectors set off from the Gila headwaters in the Black Range, New Mexico, on their way to the Colorado junction in Yuma. The pair lost their boat in the February, 1891 flood, but built another and finally arrived in Yuma in April 1891. They claimed to be the first to navigate the entire length of the Gila River. In 1895, a Graham County man sailed 400 miles down the Gila to Yuma in a houseboat. (25)

In the years just after these successful trips down the Gila, conditions on the river changed dramatically. Numerous communities began to spring up on both sides of the river, and they built diversion dams and canals for purposes of irrigation. The dams and canals obstructed the river and took water out of the main channel, hampering further attempts at navigating its length.

Although rare, incidences of successful navigation of the Salt River are also recorded. In June, 1885, five men set out from Tonto in a craft measuring 18 feet by 5 feet to sail down the Salt. The purpose of the venture was to determine whether logs could be floated from Silver Bell to Phoenix. If successful, one of the men, William Bunch, planned to build a sawmill at Silver Bell. After six days, the group landed safely at Tempe. Although at one point their boat wrecked in turbulent waters, it was the opinion of the sailors that logs could indeed be floated to the lower Salt River. (26)

It should be noted that a previous attempt to float logs down the Salt failed. In 1875, Charles Hayden wanted to build a lumber mill in Tempe, but the venture fell through when the logs he attempted to float down the river became lodged in a box canyon. (27)

As time passed and more water was diverted from the Salt River by diversion dams and irrigation ditches, boating on the Salt became more and more rare. The Arizona Republic of March 30, 1905, reported somewhat tongue-in-cheek that a 76-year-old man, Jacob Shively, built a boat at the Chamberlain Lumber Company in Phoenix, and carried it to the river in a two horse wagon with the intention of sailing the boat to Yuma. There is nothing further on the story in succeeding issues; if Mr. Shively had successfully completed the voyage it would have been newsworthy. Mr. Shively obviously intended to take advantage of the continuing high waters on the Salt during the floods of 1905.

In subsequent years there were several attempts at navigating the Salt River during floods. In the major flood of 1905, a widow and her children were rescued from an island in the Salt River by a sheriff's deputy and and "experienced boatman."

The husband had drowned attempting to rescue his family when his boat hit a barbed wire fence and capsized.(28) Navigating the river in this and other floods was extremely dangerous not only because of the velocity of the flow but because of the debris in the water.

During the flood of January, 1915, a sheriff and deputies braved the violent waters of the Salt in a rowboat to rescue a woman whose home had been isolated on a sandbar.(29) In June, 1941, another severe flood brought an aviation tower in the riverbed near collapse, forcing a group of law officers and linemen onto the river to repair the structure. Regarding the voyage, a reporter for the Arizona Republic wrote, "If the Nazi military machine had as much trouble crossing a river, the war would have ended long ago." (30)

The flood of January, 1966 inspired a south Phoenix businessman, Sark Deradourian, to charter the South Phoenix Yacht Club and lay claim to the river in the name of south Phoenix. To make good his claim, Deradourian launched a flagship at Central Avenue. It floated a few yards onto the river, was caught up in the strong current, and promptly sank, leaving its captain to swim for his life. Deradourian survived, as did the South Phoenix Yacht Club, which was incorporated in 1974. (31)

These isolated incidences of boating on the Salt and Gila Rivers indicate that the rivers were difficult to navigate at any time. The main use of the rivers was for irrigation purposes. The wording of two early court cases demonstrate this fact. In an 1896 case aimed at determining water rights for the Phoenix area, the court stated, "(E)ntering the valley from the northeast is the Salt River, a non-navigable stream." (32) A case filed in 1919 for the same purpose stated that "at times there is more than sufficient water flowing in said Gila River than can be diverted by all of the canals that supply water to the lands in this suit." (33)

TRANSPORTATION

If the residents of the Salt and Gila River Valleys did not use the rivers for transportation, how did they get around? In this chapter on transportation, the stage lines and railroads that served the Phoenix area are described. In addition, a listing of bridges over the Salt and Gila is provided.

Stage Lines and Railroads

Stage transportation was begun in the area after the Gadsden Purchase in 1854. The Butterfield Overland Stage followed a route on the south side of the Gila River. It operated only three years prior to the U.S. Civil War. The stage stop at Gila Bend was established to serve this route. After the Civil War, stages again began to travel from Tucson to Phoenix and Yuma. To the north, Wells Fargo ran a stage line that went from Prescott to Wickenburg and on to Phoenix. Stage travel proved difficult, costly and unprofitable, and was replaced by railroads in the 1870s. (34)

In 1877 the Southern Pacific began construction of the rail lines that crossed the southern half of Arizona. Beginning at Yuma, t e line travelled an easterly course, following the south bank of the Gila River, until it reached Gila Bend. At that point it headed towards Tucson, then the largest community in the territory. The route from Yuma to Gila Bend was completed in the spring of 1878, and reached Maricopa in the summer of 1878. Travellers took a stage north to Phoenix and Prescott from Maricopa, necessitating the crossing of both the Gila and Salt Rivers. (35)

The Maricopa and Phoenix Railroad was built in 1887, and connected Phoenix with Maricopa. This linked the city with the Southern Pacific Railroad. In 1895 the Santa Fe, Prescott and Phoenix Railroad arrived from the north, connecting Phoenix with Prescott along a route that went from Phoenix through Avondale to Wickenburg and then to Prescott. Later the Southern Pacific built a route along the north bank of the Gila, which connected Buckeye and Phoenix. (36)

Bridges

The first bridges over the Salt and Gila Rivers came with the railroads. The first bridge over the Salt was constructed for rails in 1891 (some references say 1887) at Tempe by the Maricopa, Phoenix & Salt River Valley Railroad. In 1895, another rail bridge was erected in Tempe with the arrival of the Santa Fe Railroad. When the flood of 1891 destroyed both bridges, the Santa Fe withdrew from Tempe and only the original rail bridge was restored, this time by the Phoenix & Eastern Railroad (later the Arizona Eastern, then the Southern Pacific). This bridge was twice again destroyed (in the floods of 1905 and 1907) and was twice rebuilt. The bridge remained the only structure to span

the Salt River until the concrete and steel Center Street highway bridge was completed in 1911. Two years later, in 1913 (some sources say 1909), the 1400 ft. Tempe highway bridge was erected.(37)

The only bridge over the Gila River (before 1912) in Maricopa County was constructed at roughly the same time as the Tempe rail bridge by the Maricopa, Phoenix & Salt River Railroad. It was located approximately two miles northeast of Sacaton Station.(38)

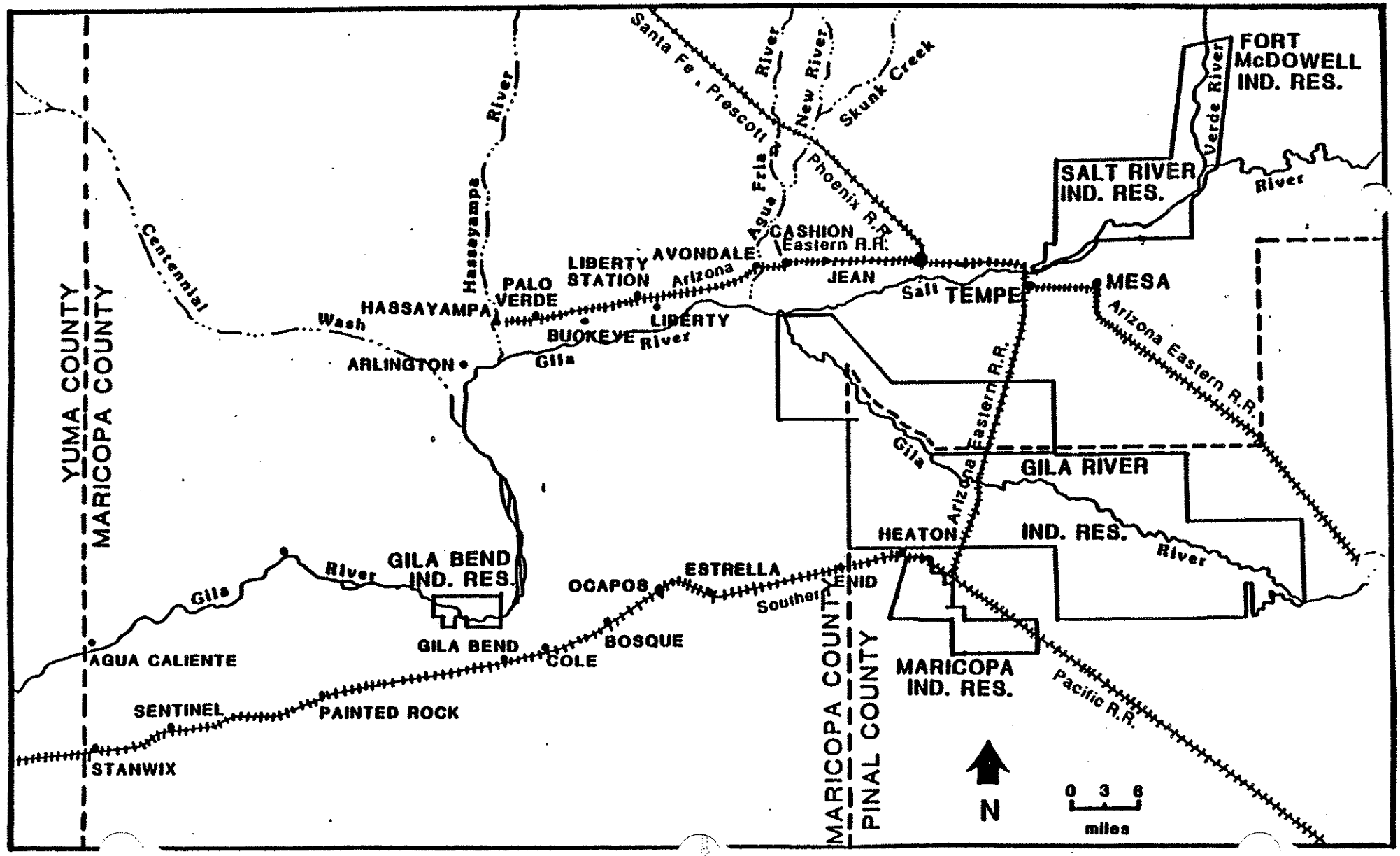

Figure 2. . owns and Railroads, Salt and Gila Rive.. 1900.

IRRIGATION CANALS/DAMS

Almost immediately after settling the Salt and Gila River Valleys, residents began appropriating the seasonal water supplies for irrigation purposes. This section of the report documents the construction of major irrigation ditches and diversion dams in the early years of valley settlement.

Salt River

The first water rights claim was filed in 1867, and the first irrigation ditch off the Salt River was begun that same year. Over the next few years farmers and speculators filed on 365,650 miners' inches of flow of the Salt, many times its capacity. At the same time, the farmers of the valley went "ditch mad," according to the Salt River Herald. (39) Some of these early ditches are listed in Table 4.

The significance of these canals is that implicit in the creation of a canal head on the river was the construction of some structure to raise the level of the water so that it would flow steadily into the canal--i.e., a dam. What is not always clear is whether or not the diversion dams impeded navigation. Some systems used a small dam which helped push water into a ditch cut below the river's level; other systems dammed the entire width of the river. The dams were easily destroyed and rebuilt during and after floods.

A government report of 1887 describes a typical dam: "Stakes are first driven across the channel, and between these bundles of willow trees...are laid, with butts down stream, and weighted with a layer of bowlders (sic); tule reeds in bundles are also used, mixed with willow and cottonwood trees. In alternate layers the dam is built up to a height of 5 feet. The willows sprout and the whole forms a mass of living brush and bowlders." (40) Obviously this type of structure would present a formidable obstacle to navigation.

The oldest diversion dam was the Swilling (Jointhead) Dam. Jack Swilling, an ex-Confederate soldier, dredged a ditch for irrigation purposes in 1868. The dam began to be called Jointhead when the Swilling ditch was expanded in the 1870s by the addition of a branch called the Maricopa Canal. At that time the Swilling Ditch was called the Salt River Valley Canal.(41) The users of this canal had some of the most valuable water rights in the valley (confirmed by the Kent Decree of 1910), and would have been the most likely of all valley settlers to outlast floods and droughts. William Code refers to the dam in 1900, noting that the canal received water during dry seasons from the Crosscut Canal which was constructed in 1889. He reported a flow of about 60 cfs at the dam, mostly from seepage from the "sixty-odd thousand acres" of irrigated land above the headgate. (42)

The Jointhead Dam was washed away several times during floods, but was continuously rebuilt. In 1911 work was begun on a new Jointhead Dam as part of a series of improvements the U.S. Reclamation Service was making in the delivery system of the Salt River Project.(43) The work was completed in November, 1913. Figure shows the dam upon completion.

Small canals, including the Wilson, Griffin, Chivari, Monterey, Little Giant, and others, were probably not used after the 1890s. According to historian A.J. McClatchie, "As more and better dams were constructed above the heads of these smaller canals, less and less water reached their heads, and they were necessarily gradually abandoned." (44)

The major improvement in the canal system prior to the Salt River Project was the combination of the delivery systems under the Arizona and Consolidated Canals. The Arizona Dam was rebuilt in 1887 after being destroyed by flood, and became the only permanent dam on the river until it was partially destroyed again in 1905. During times of low and medium river flow the Arizona Dam intercepted the entire flow of the river, except for a small amount which seeped beneath it. (45) All of the northside canals normally received their water from the Arizona Canal through the Crosscut by the early 1890s. Furthermore, after the construction of the Consolidated Canal in 1891, all the water for southside canals also came through the Arizona Canal for about four miles, then was diverted through the McDowell Crosscut south across the bed of the river and dumped back in the main channel just above the Consolidated Dam, which fed all the southside canals. (46)

Thus after about 1891 the entire normal flow of the Salt was diverted for irrigation. The only water in the bed after that time was seepage water, flood water, or water turned into the river in connection with canal repairs or dam construction.

Gila River

Three diversion dams were constructed on the Gila River within the study area which could be considered permanent. There were also a number of canals which were out of use before statehood. See Table 5 for a listing of irrigation ditches on the Gila River.

The Buckeye Dam was completed in 1888, and remained in place well into the twentieth century. It was damaged in several floods, but was repaired each time. The Phoenix Herald reported in 1898 that 100 ft. of the dam had been torn out by a flood and that a large crew was at work on repairs. In 1902 owners of the dam constructed a tramway to the area from a local rock quarry in order to supply stone for dam repairs and improvements. The continuous supply of rock was useful in subsequent repairs. Later that year, the dam withstood a flood of six feet over its top with only minor damage. The dam was repaired again in floods

of 1907 and 1914.(47)

The Arlington Canal was begun in 1890, probably with a typical rock diversion dam. A notice of appropriation was filed by the Arlington Canal Co. in 1907. A permanent concrete diversion dam was built in 1913-1914. At that time, about 4800 acres were irrigated by the canal, diverting substantially all the water in the river at that point.(48)

Gila Bend Dam was started in 1892. Sloping down into the river bed at an angle, the dam was 2,400 feet long and was initially constructed of rocks and timbers. Like most of these dams, it was damaged by floods several times. In 1897 the canal company was in receivership, and another dam and heading was built 1 1/2 miles upriver in 1902. Thereafter it was known as the Enterprise Canal, and operated continuously through at least 1914, when it was diverting 15 to 25 cfs. Gillespie Dam was built at this site in 1921.(49)

Other canals on the Gila included the Lower Gila Bend Canal, the East Riverside or Peoria Canal, the Aztec Canal, the Citrus Canal and the Palomas Canal. Most had short life spans and temporary dams that were not replaced after flood damage.(50)

Granite Reef Dam

Because the crude brush diversion dams used to divert water into canal headings were so often damaged or destroyed by floods, the government built the Granite Reef Diversion Dam, 30 miles east of Phoenix, in 1908. This was the first permanent dam on the Salt River. Granite Reef Dam diverted all the water of the Verde and Salt River except flood waters.

Roosevelt Dam

The violent flood and drought cycles in the Salt River Valley led local farmers and landowners to recognize that a water storage system was necessary if agricultural development in the area was to continue. More water was claimed by farmers for irrigation than flowed in the Salt River annually; the farmers began to call for government reclamation as early as 1900. Roosevelt Dam was begun in 1905 and completed in 1910. It was constructed to irrigate 200,000 acres of land.

The permanent dams, diversion dams and canals constructed on the Salt and Gila Rivers are important factors in determining the rivers' regimes. The diversion dams in many cases impeded navigation of the rivers by their very structures, especially in cases where they were replaced with more substantial building materials, as in the case of the Jointhead Dam on the Salt and the Buckeye Dam on the Gila. In addition, the diversion of river flow into the irrigation canals reduced the amount of water in the rivers substantially, especially in the Salt River. What

little water flowed through the bed was diverted for agriculture from the earliest days of settlement of the valley. The permanent dams of course had the same effect; water flowed down the channel of the Salt only at times of major flooding. The effect of diversion of the seasonal flow of the Salt and Gila Rivers was a dramatic change in the nature of the rivers.

TABLE 4
IRRIGATION DITCHES, SALT RIVER
1867-1890

(Note: Ditches are listed moving downstream from the upper study area on the Salt)

DITCH	DATE	LOCATION OF HEAD
Tempe	1870	South bank, sec. 34, t2n, r5e
Hayden	1870	South bank, sec. 15, t1n, r4e
Grand	1878	North bank, near Scottsdale Rd
Swilling	1867	North bank, about 40th Street
San Francisco	1870	South bank, west of Hayden Mill
Wilson	c.1872	North bank, about 4 mi west of Swilling head
Juan Chiviri	1869	North bank, sec. 17, t1n, r3e, about 1 mile south of Phx
Prescott	1872	South bank, sec. 20, t1n, r3e, (opposite Juan Chiviri)
Monterey	1871	North bank, sec. 23, t1n, r2e
Farmers	1871	Same as Monterey
Mexican	c.1872	Downstream from Monterey head, exact location unknown
St. Johns (Maricopa)	c.1890	Several miles above Gila confluence

TABLE 5
IRRIGATION DITCHES, GILA RIVER
1882-1892

(Note: Ditches are listed moving downstream from confluence with Salt River to Maricopa County Line)

DITCH	DATE	LOCATION OF HEAD
Buckeye	1888	4 miles below Salt junction
Arlington	c.1889	13 miles below Buckeye head
Gila Bend (Enterprise)	1892	25 miles north of Gila Bend
Lower Gila (Riverside)	1885	15 miles north of Gila Bend
Citrus	c. 1882	Gila Bend Indian Reservation
Aztec	1885	Unknown
Sentinel Bend	1892	Agua Caliente
Palomas	1887	Agua Caliente

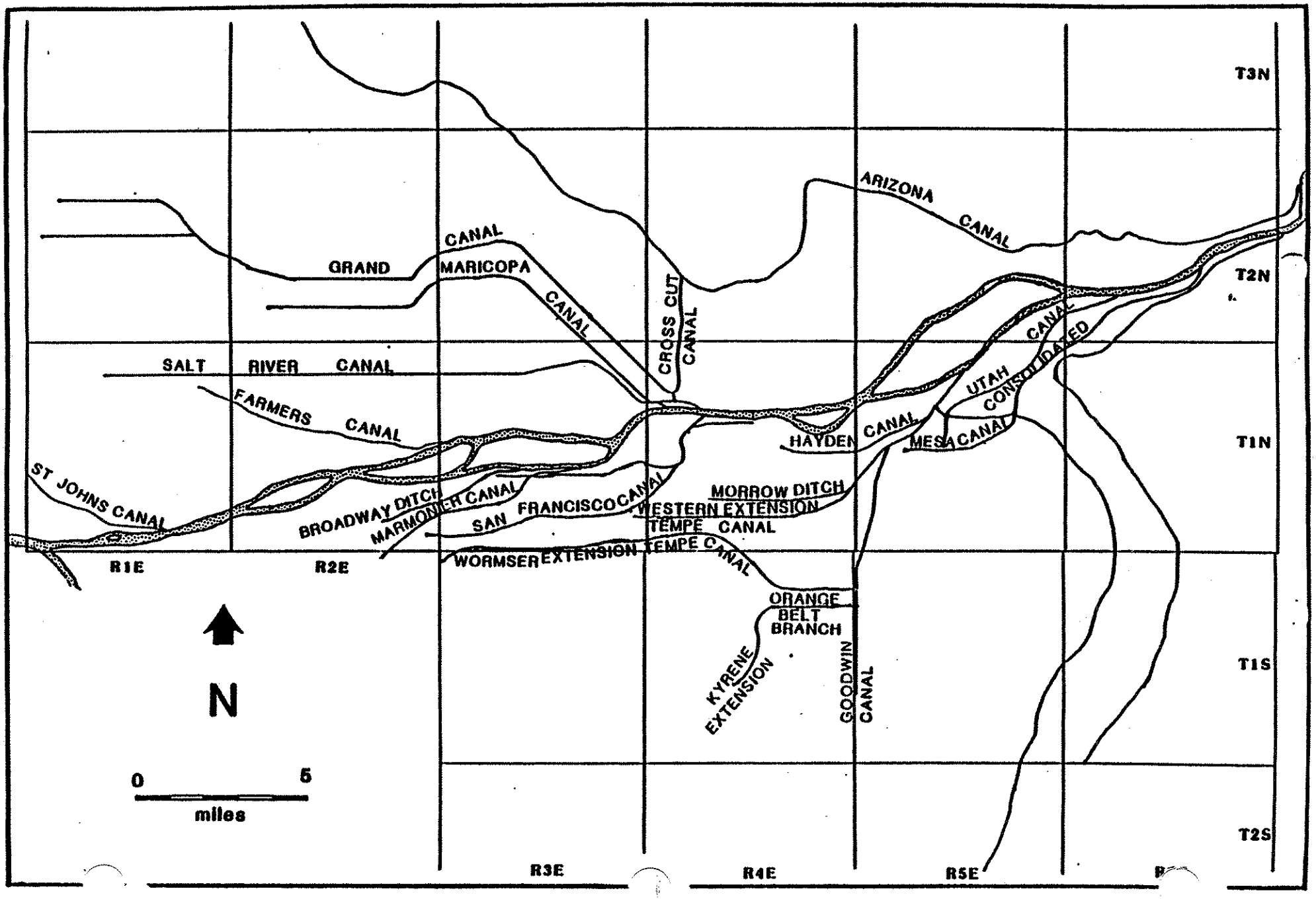

Figure 3. Irrigation Ditches, Salt River.

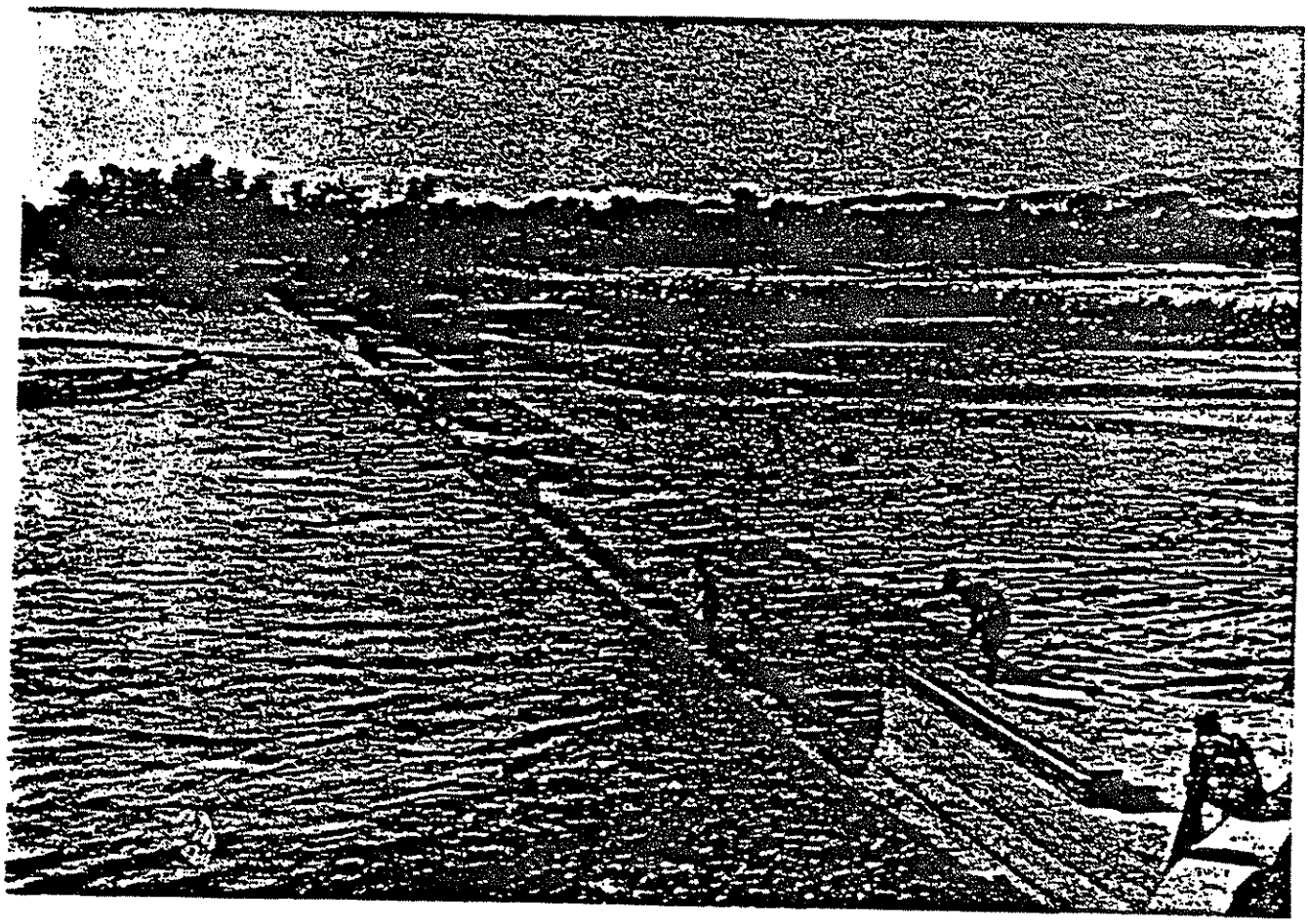

Figure 4. Jointhead Dam, 1919.
(Hayden Library Arizona Collection)

FLOODS

All major floods of record on he Salt and Gila Rivers occurred from late September through ebruary. The causes of flooding were almost always heavy ainfall for an extended period, warm weather after a perioc of heavy snowfall, or excessive rainfall on snow.

Reliable data on flood severity rior to 1905 are scarce. Sources indicate floods occurred in 183 , 1862, 1869, 1880, 1883, 1884, 1889, 1891, 1895, and 1896, ut in none of them was discharge measured. For the most part, sources of information on these floods are newspaper records, an the severity and nature of the flood differs with each reporter (51)

A prolonged rainy spell in 189(caused the Salt to rise almost 17 feet above normal, and the empe railroad bridge and miles of railroad track were washed awa . The following year was a wet one in all areas of the Southwe t. In February 1891 a major flood hit the Phoenix area. The railroad bridge in Tempe was lifted from its piers by the flood (52) Both the Salt and Gila Rivers flooded their banks and did extensive property damage. The Salt rose 18 feet ab ve normal, tearing out irrigation ditch heads and causing canals to break their banks. The flood of 1891 is generally consider d the most damaging flood in Arizona history. Estimated discharge was 250,000 cfs. (53)

The next major flood appears to have been in February 1905. Phoenix reported the heaviest annual rainfall ever: 19.13 inches. On the night of April 12, 1905, the Salt River again roared out of control. The Santa Fe Railroad bridge went down and the Arizona Dam was damaged. Floodwaters reached as high as Jefferson Street in Phoenix. (54) In November of 1905, rains falling on snow in the Verde watershed caused more extensive flooding. A newspaper report claimed the Salt was higher than at any time since the flood of 1891. (55)

The last flood to top Roosevelt Dam flowed through the low notch in the unfinished dam almost every day from May to November, 1909. (56) Thereafter all the water of the Salt River watershed was captured behind Roosevelt Dam until 1916 when the reservoir reached capacity.

The last flood in the study area before statehood occurred in January 1911, when a flood of the Verde sent four feet of water over Granite Reef Dam. (57) (Another flow of the Salt was created in the river bed later that month when the Arizona Canal was closed for enlargement work for ten days. The water in the river bed "at the crossing" --probably Tempe--was described as "hub deep." After the canal was reopened, the river returned to its "natural size," i.e. a minimal flow. (58)

Throughout the remainder of 1911, 1912 and 1913, drought conditions prevailed. There was a storm in mid-March, 1912, which briefly closed the river bed to wagons at Tempe. There were also unofficial reports of water topping Granite Reef Dam. Once again all the water above Roosevelt Dam was caught behind the dam (59). The drought was not completely over until a week of rainy weather hit the watershed in November 1913, followed in February 1914 by a strong flood on the Verde which sent two feet of water over Granite Reef. (60)

Flow

There was very little water in the Salt River on the day Arizona became a state. At that time concrete foundation piers were being poured for the Tempe bridge, and water in the riverbed presented a minor inconvenience. On February 13, 1912, the Republican reported that the work had been going smoothly: "One of these (piers) will be in the main channel, and it is hoped to be able to switch the stream above the old P&E bridge and run it nearer the south bank (leaving) dry ground for the pier....and the work will thereby be made less difficult."

In all likelihood the water in the Salt on February 13, 1912 was some of the return flow mentioned by Code in 1900. Increased irrigation and seepage would make the amount of water in the channel slightly above what Code reported in 1900, or 60 cfs. The water could not have been the normal undiverted flow of the Salt or Verde, since all normal flow of these rivers was being diverted to the Arizona and Consolidated Canals, which now both headed off Granite Reef Dam. Any excess flow of the Salt was being added to storage behind Roosevelt Dam, which would not reach capacity until 1916. The Verde River was not at that time controlled by a storage dam, but it was possible to coordinate releases from Roosevelt depending on the measured flow of the Verde, to minimize flooding while assuring a supply for irrigation.

During this period the Arizona Republican reported contents of Roosevelt reservoir almost daily, as well as the normal flow of the Salt at Granite Reef Dam and at Jointhead. For example, on February 1, 1912, the following was reported:

Normal flow at Joint Head, miners inches	3,975 (66 cfs)
Normal flow at Granite Reef, miners inches	20,800
Contents of reservoir, acre feet	431,725
Contents of reservoir 1 year ago	144,032

Not wrong = 99 cfs

Since no water flowed past Granite Reef Dam, any water in the bed of the Salt within our study area after 1908 would have come from flooding, underflow or return flow. In 1900, Code stated that all the water in the Salt was diverted at the head of the Utah Canal, yet a flow of about 60 cfs (2,400 miners' inches) was usual at Jointhead. The bed was dry below this point, but at Buckeye head, 24 miles downstream and just below the mouth of the Salt, average volume was 150 cfs. Twenty miles farther down, at

Arlington head, 50 cfs was normal. (61)

In 1905, Willis Lee also noted the substantial return flow. The water was diverted at the Tempe Canal head north of Mesa. Near Jointhead, Lee estimated the flow at 35 cfs. West of Phoenix, water returned to the surface in a flow of about 15 cfs. Lee estimated the volume of return flow from irrigation at 100,000 acre feet a year passing out of the Salt River Valley into the lower Gila Valley. He estimated the total subterranean flow through the Salt River Valley at 287,000 acre feet per year. (62) J.D. Schuyler (1903) noted that the water table was so close to the surface along the river banks that in some places it emerged from springs, or could be brought to the surface by digging a shallow ditch. This was true especially in the Buckeye area. (63)

138 cfs

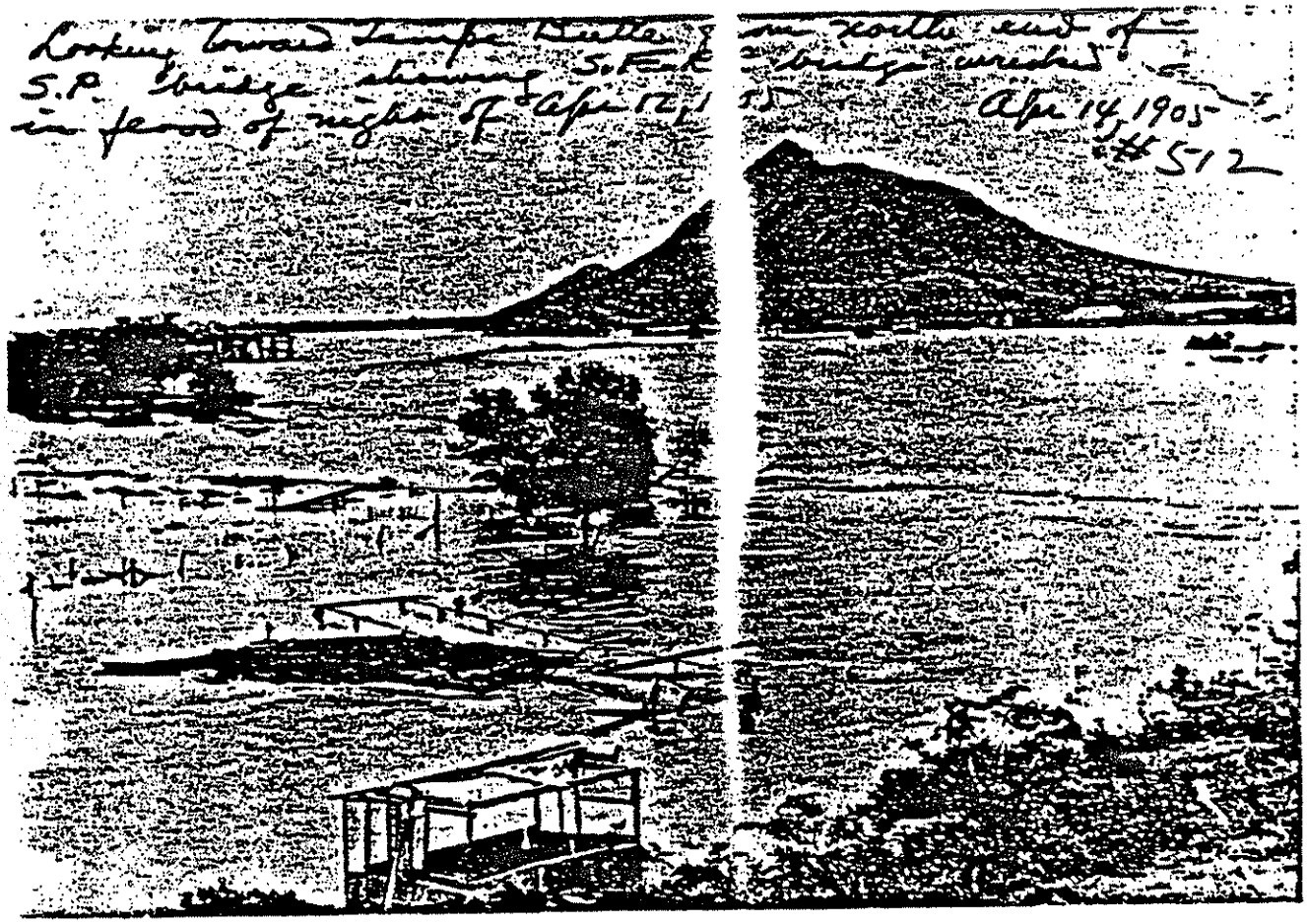

Figure 5. Flood on the Salt River, 1905. Note railroad bridge. (Hayden Library Arizona Collection)

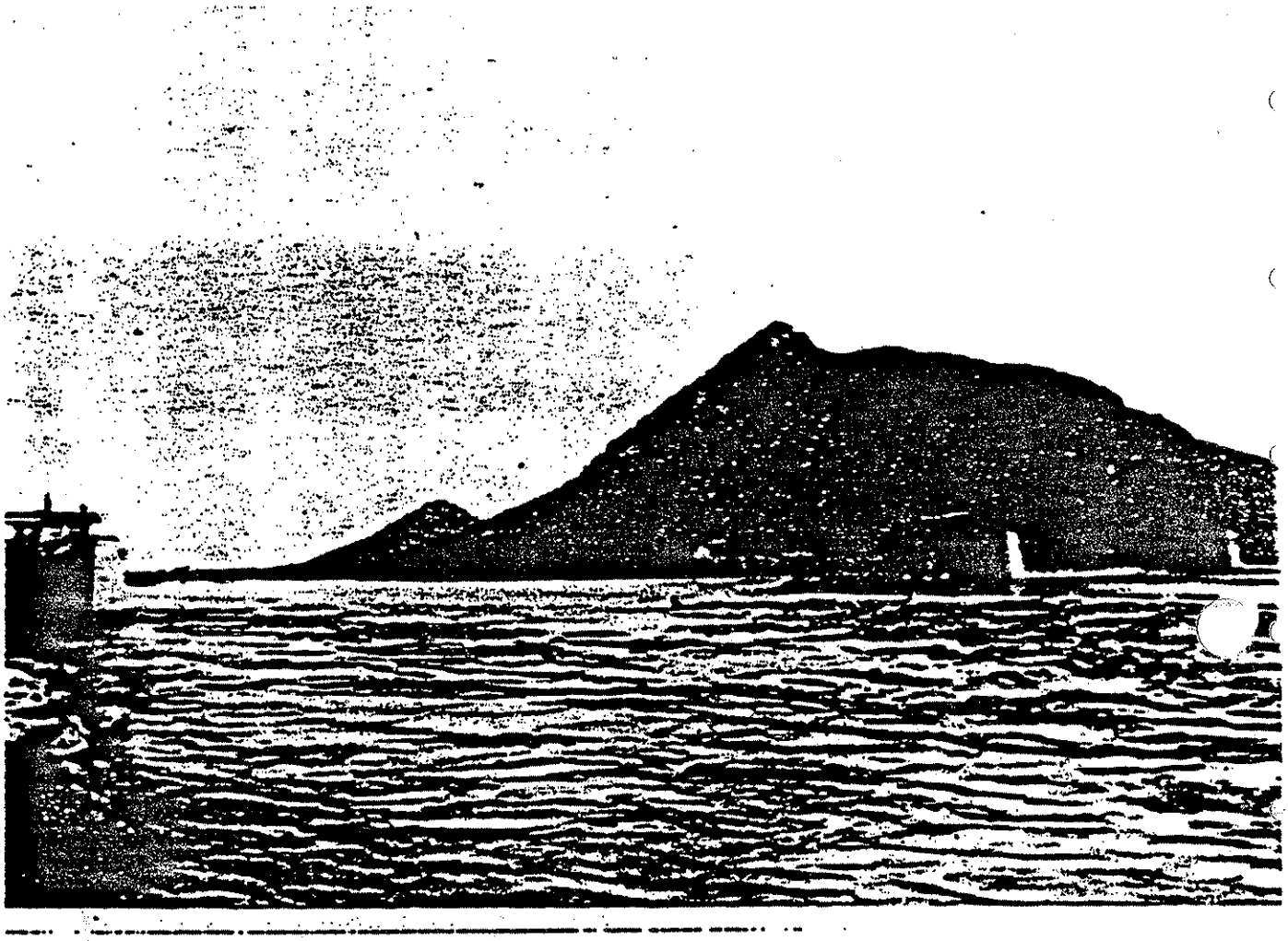

Figure 6. Flood on the Salt, 1905. Note velocity of flow. (Arizona Historical Foundation)

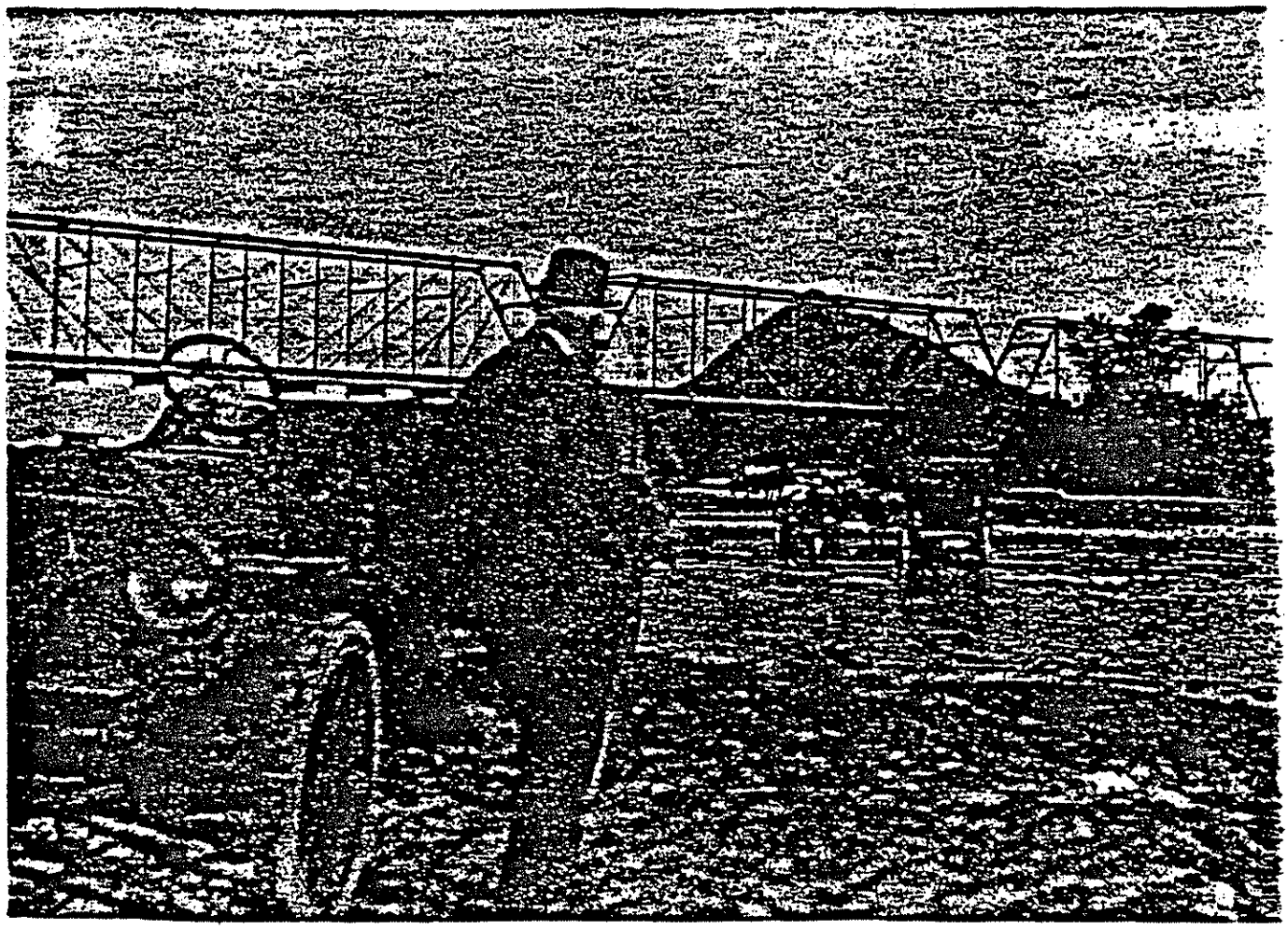

Figure 7. Fording the Salt River at Tempe, 1911.
(Arizona Historical Foundation)

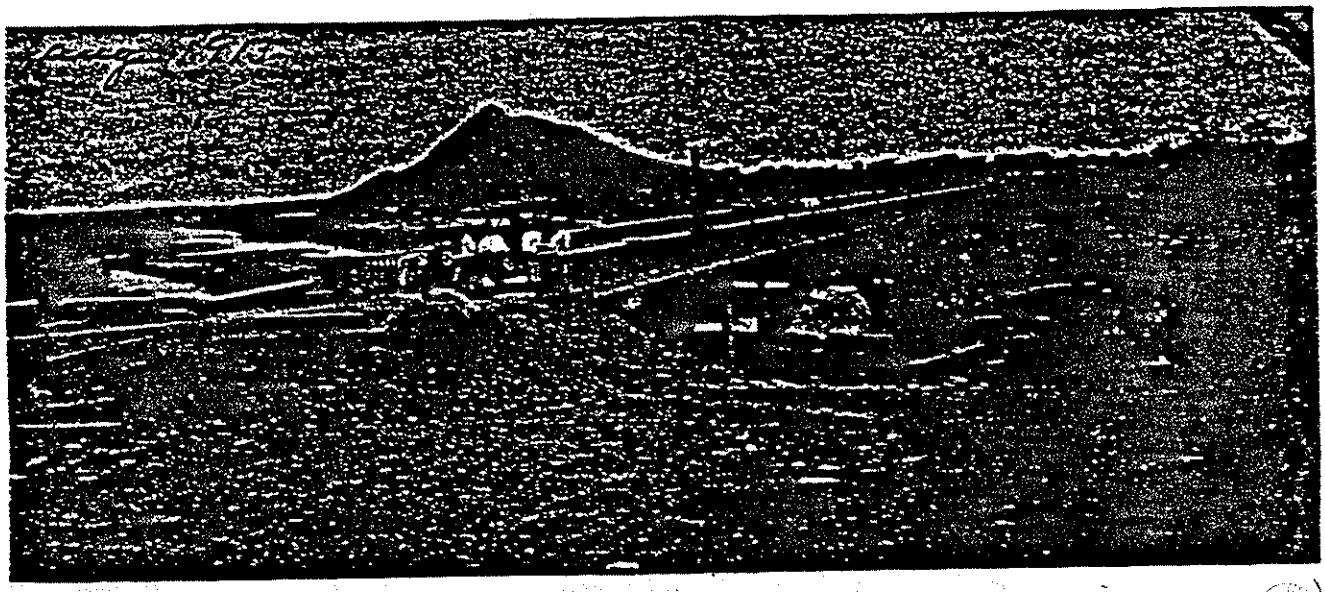

Figure 8. Old Tempe Bridge, 1913. Note meagre flow of water in non-flood time.
(Hayden Library Arizona Collection)

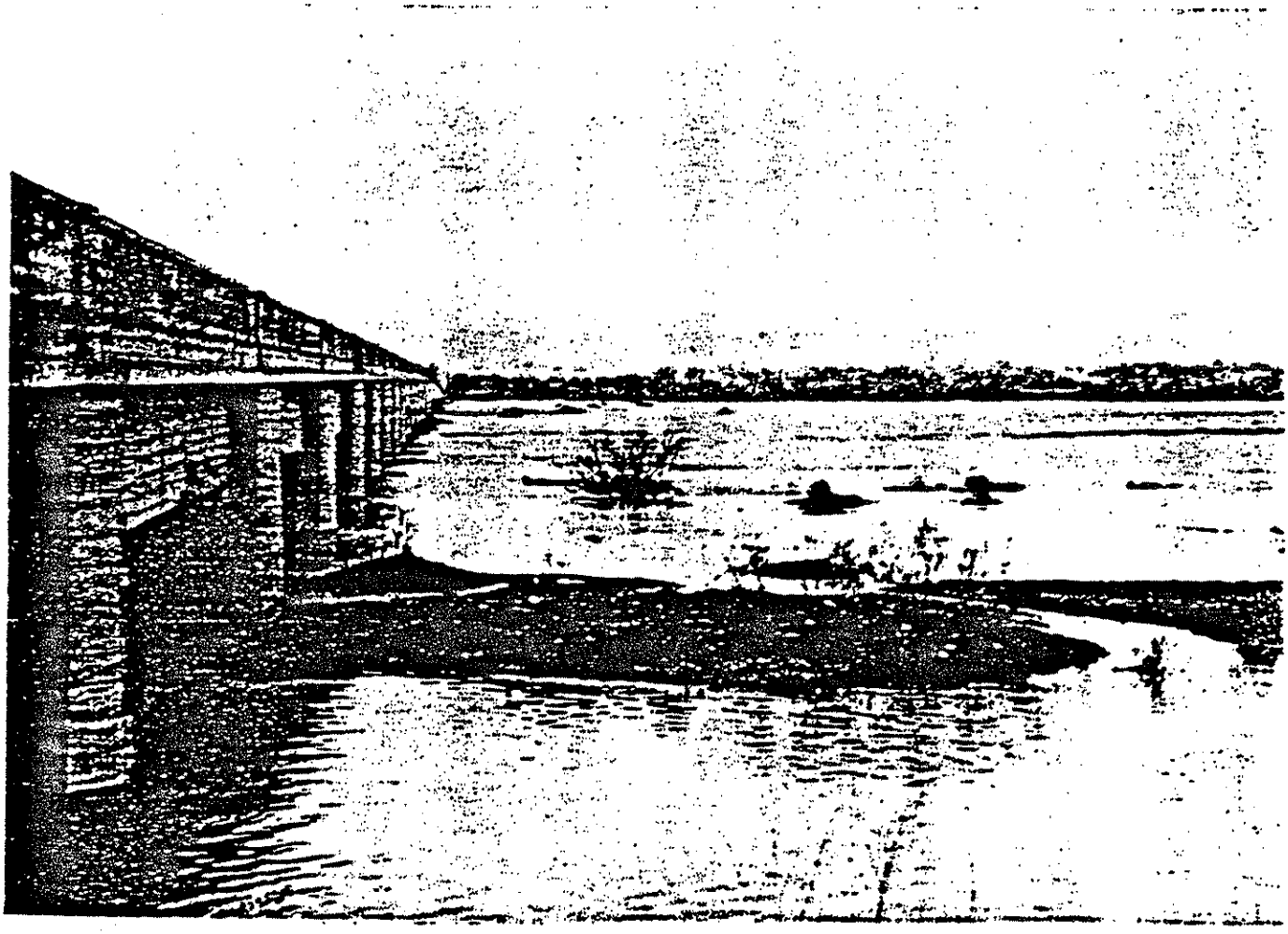

Figure 9. Flood on the Salt River, 1921.
(Arizona Historical Foundation)

CONCLUSIONS

Topographical surveys of portions of the Salt and Gila Rivers undertaken between 1868 and 1883 indicate that the Salt River had shifting, sandy channels, often overflowed its banks, was easily forded, and was used for irrigation purposes as early as 1868. The Gila was wide, had a rapid flow, and tended to be more shallow in the area near its confluence with the Salt. Surveyors remarked on the river's suitability for providing irrigation water.

White men settling the Salt and Gila River Valleys in the last half of the nineteenth century established agricultural communities. The mild temperatures in the region were an inducement to grow crops year round, but because of the desert setting, these early settlers recognized that the land would have to be irrigated in order to develop the region agriculturally. Many farmers constructed irrigation canals at sites where Indians had built irrigation ditches centuries earlier.

Many of the early communities along the Salt and Gila Rivers were self-contained. We found no evidence that extensive commerce took place between these communities until the coming of the railroad. We found no record of commerce taking place via rivers.

The flow pattern of the Salt and Gila Rivers was seasonal. During most of the year, the rivers were easily forded either on foot, on horseback, or in wagons. During periods of high water, roughly one or two months of the year, ferries were used to cross the rivers at various locations. Perhaps the most often used ferry on the Salt was the Hayden Ferry at Tempe, which was in use from 1874 to 1909. Ferries crossed the Gila between 1874 and 1891. It appears that the usual method of crossing the Gila was by wagon or on horseback.

There were isolated attempts to navigate long stretches of the Salt and Gila Rivers during periods of high water. (The Salt River was dry or had miniscule amounts of water most of the time, and the Gila was easily forded.) The fact that such attempts were recorded in the local newspapers shows that such incidences were rare, often dangerous, and thus newsworthy. The only account of a successful navigation of the Salt was that of a group attempting to discover if logs could be floated down the river. The party wrecked their boat, but either repaired or rebuilt it, and successfully completed their journey. An earlier attempt to float logs down the Salt proved unsuccessful. There is no record that logs were ever floated down the Salt. Most other records of attempted navigation of the Salt describe rescue attempts during flooding.

Almost every voyage down the Gila appears to have been a dangerous feat. Even before the construction of diversion dams,

the river had shallow sections and boulders, and was unpredictable. Most of the vessels that successfully completed their journey were wrecked at one time or another, or encountered obstacles of some sort. Had trips downriver not been so dangerous or difficult, it seems obvious that such voyages would have been undertaken with more frequency.

Irrigation canals began diverting Salt and Gila waters as early as the 1860s. By about 1890 virtually all the water of the Salt River was used for irrigation purposes. Numerous diversion dams on the Salt and Gila Rivers and two permanent dams on the Salt were constructed prior to 1912. The permanent dams, Granite Reef Dam and Roosevelt Dam, made it possible for farmers of the region to irrigate on a more permanent basis (given the irregularity of river flow and the severity of floods.) Roosevelt Dam decreased the frequency and severity of floods on the Salt and Gila. A comparison of photographs of the 1905 flood (see pages 27 and 28, above) and of the flood of 1921 (page 21) demonstrates this fact.

The construction of these dams also ended even the possibility of navigating the lower reaches of the Salt and Gila Rivers; they actually stopped the flow of the Salt and most of that of the Gila. Any water in the Salt riverbed after 1910 was the result of underflow, return flow, or a release of water into the riverbed while a dam was being repaired. The photographs of 1911 and 1913 (pages 29 and 30, above) show the Salt with only trickles of water. The bed was usually completely dry.

Given the lack of evidence of commercial use of the Salt and Gila Rivers in the study area, and the fact that the flow was scanty and unreliable, it is doubtful that either the Salt or Gila River was considered navigable even before the construction of dams on the rivers. The infrequency of attempts to sail down either river, the newsworthiness of such attempts, and the difficulties encountered by those who made those trips indicates that the rivers were not generally considered navigable at the time. Diversion dams, irrigation canals, and the permanent dams on the Salt effectively ended even the possibility of river navigation by 1910.

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January 31, 1874

James Moore builds boat to cross Gila; launches it at Morgan's Ferry.

Arizona Citizen (Phoenix Herald), 2:2
March 21, 1874

King S. Woolsey builds boat for crossing Gila.

Weekly Arizona Miner, 4:1
February 5, 1875

Morgan's Ferry, on Gila River. (Advertisement)

Arizona Sentinel, 3:3
January 25, 1879

Discussion of navigation of Gila from Phoenix to Yuma. Arrival of a skiff and three bold navigators.

Arizona Citizen (Phoenix Herald), 3:7
August 7, 1881

"The Gila River is now so high as to require use of boats in crossing. A flat boat that Superintendant Stewart had made a year and a half ago...now comes in handy."

Phoenix Daily Herald, 3:1
March 11, 1885

"The stage from Maricopa had some delay in crossing the Gila this forenoon consequent upon shifting quicksands impeding the ferryboat and was nearly two hours late."

Mohave County Miner, 2:3
April 13, 1889

Prospectors left Clifton for Southern California. "It's many a forced bath they will take before reaching this end of their journey."

Mohave County Miner, 2:2
May 11, 1889

"Party of Clifton voyagers floating down the Gila got to Florence in one piece. Only difficulty...a box canyon below San Carlos....had to get out and transport goods by wagon at rapids....Below rapids to Colorado...smooth sailing."

Arizona Sentinel, 3:2
March 28, 1891

Ferryboat ready for crossing of Gila large enough to carry a loaded six-horse team safely.

Arizona Enterprise, 1:2
April 18, 1891

Two prospectors floated a boat from the Gila's headwaters in the Black Range, New Mexico, to Yuma. They lost their boat in the high waters from the February 1891 flood, but built another and continued to Yuma. Claimed to be the first to float the entire length of the river.

St. Johns Herald
May 7, 1891

Two guys claimed to have floated 800 miles down the entire length of the Gila and that they were the first to do so.

Phoenix Daily Herald, 3:2
September 7, 1893

"The ferry boat has again been called into use at Polomas, the Gila being so high that teams cannot cross."

The Oasis, 3:1
May 31, 1894

"The Gila is navigable a long distance up from Yuma at present due to the backing of the waters of the Colorado. In the Colorado the flow is very large, due to the meltage of the snows in Colorado and Utah. Steamboat excursions up the Gila from Yuma are the rage of late."

Arizona Sentinel, 3:2
March 9, 1895

A 400-mile trip was made by a houseboat on the Gila River. Trip started in Graham County and finished in Yuma County in 1895.

Arizona Republic, 7:4-5
April 9, 1908

"Board Needs Committee on Bridges and Ferries." Calls for the establishment of a ferry to be located somewhere between the mouth of the Salt River and Agua Caliente on the Gila River to be used three months out of the year.

SALT RIVER

Arizona Citizen (Phoenix Herald), 2:3
February 28, 1874

"Phoenix: A new ferry boat has been built at Hayden's ferry crossing on the Salt River so that in future passengers will not be caused delay due to rise in the river."

Arizona Citizen (Phoenix Herald), 2:7
May 3, 1884

Man (George E. Drew) nearly drowned when ferry he was on broke away from the cable. Was saved when someone pulled him out by the hair. (Was a miracle; Drew was nearly bald.)

Arizona Gazette, 3:2
June 3, 1885

Five men, including William Bunch, John Meadows and Lew Robinson, started in a boat from Eddy's Ranch to explore the Salt River Canyon through which a boat was never known to pass due to rapids and boulders. Their boat was 18 ft by 5 ft. Object was to ascertain whether logs could be floated from Sierra Anchas to Phoenix. If so, Bunch would begin a sawmill at Sierra Anchas. (Silver Belt)

Arizona Gazette, 3:1
June 5, 1885

Boat party arrived June 4 after six days journey. "Landed their craft in Tempe. They report having enjoyed a most exciting and

interesting trip--on one occasion they were wrecked. The object was to determine if saw logs could be rafted to the lower Salt River, and the undisputed conclusion is that they can. In fact, Mr. Bunch...has partially contracted for the delivery at Tempe of over 1,000 railroad ties."

Arizona Gazette, 3:2
June 6, 1885

A long column interview with one of the above party. They caught large quantities of Salt River trout (white salmon?)--"resemble the trout of California," weighed 8-10 lbs. They tied up at the dam of Grand Canal.

Tombstone Prospector, 3:2
January 24, 1889

Large ferryboat, used for years on the Salt River at the Maricopa Crossing, strikes willow snag in the middle of the river and is cut in two, January 9, 1889. Is valued at $1,000 by owners, Vol Gentry and William Cox.

Tempe News, 3:3
Shureman & Singletary operate a ferry above the bridge at Tempe. Round trip takes 5 minutes in 1893.

Tempe News, 3:2
March 27, 1897

Ferry operating on the Salt River in Tempe in 1897.

The Arizona Republican, 6:3
February 1, 1898

"The river is going down. The Hows & Finch Ferry was in readiness and would be running now had the river stayed up."

Arizona Republic, 8:2-5
April 18, 1941

Flooded Salt nearly causes collapse of 133 foot aviation tower in the riverbed near Jointhead. Makeshift "navy," made up of the sheriff's safety squad, ferried a dozen power linemen of the Salt River Valley Water Users Association to the falling tower to erect guywires and prevent its collapse. "If the Nazi military machine had as much trouble crossing a river the war would have ended long ago."

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