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Gila

Expert Witness Report

The Lower Gila River:
A Non-Navigable Stream on February 14, 1912

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On June 10, 1913, Howard S. Reed, an employee of the U.S. Reclamation Service,[1] responded to an inquiry from fellow worker, Louis C. Hill, about stream flow in the Gila River in southwestern Maricopa County. "On the 10th of August, 1911," he wrote, "I made a current meter measurement, the original notes which are herewith enclosed, when I found a discharge of 103 feet per cubic second and this with no flow at all below Buckeye Dam. In fact, one could walk across the river and hardly dampen the shoes."[2] This vivid depiction of a meager, almost ephemeral, stream, in many ways, encapsulates what contemporaries described as an "undependable and unpredictable" water course, that, over time, flowed intermittently and infrequently during the early decades of the twentieth century. In

[1] The U.S. Reclamation Service, established in 1902 as part of the Newlands Reclamation Act, was renamed the U.S. Bureau of Reclamation in 1923.

[2] The correspondence between Reed and Hill concerned a proposal for a dam at Gila Bend, but this in-house exchange provided information directly pertinent to the central question facing the Arizona Navigable Stream Adjudication Commission (ANSAC) concerning the characteristics of the Gila River at, or around Statehood, February 14, 1912. In fact, though the June 10, 1913 letter was written in response to a missive from Hill dated June 3, 1913, the latter letter indicated a historical depiction of the Gila. Louis C. Hill to Howard S. Reed, June 3, 1913; Howard S. Reed to Louis C. Hill, June 13, 1913, 37-A-5 Straights, Preliminary Investigation-Sentinel Project 37-A-5, General Correspondence File (Straights) #37 A, Record Group (RG) 115, U.S. Bureau of Reclamation, National Archives, Rocky Mountain Region, Denver, Colorado [LRA Box/File: 12/1]; Douglas R. Littlefield, "Assessment of the Navigability of the Gila River From Its Confluence With the Salt River To Its Mouth On The Colorado River Prior To And On The Date of Arizona's Statehood, February 14, 1912," (Littlefield and Associates, April 24, 1998), 102-103.

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effect, a thoroughgoing analysis of hundreds of published and unpublished documents and accounts, including federal reports, scientific surveys, land settlement records, journals, pioneer diaries, oral histories, and a host of other records, taken together, suggest that prior to and at the time of Arizona's statehood, the Gila River was not navigable or susceptible to navigation. As one recent analysis of the Gila River concludes, "the Gila River was highly erratic, subject to flooding and major channel changes, blocked by obstacles (both natural and man made), and diverted for irrigation needs. In short, the Gila River was not navigable on February 14, 1912."[3]

The assessment and historical analysis of the lower Gila River discussed below holds profound significance for residents living along this tributary of the Colorado River, from Buckeye to Paloma, into Yuma County and to the river's confluence with the Colorado River. Through historical oversight, Arizona's pioneer legislatures, preoccupied with transforming a territory into a state, overlooked the issue of navigability of Arizona's watercourses. This omission went unnoticed for nearly 75 years, when two claimants to Verde River streambed property asked a local court to decide the rightful owner. The judge responded that he could not address the matter because he had no information about the Verde's navigability or non-navigability at statehood. As a result, in the early 1990s the cumbersomely named Arizona Navigable Stream Adjudication Commission (ANSAC) was formed to determine the navigability of Arizona's 39,039 watercourses as of statehood, February 14, 1912. The determination of navigability

[3] The fundamental purpose of this analysis is to determine navigability or non-navigability of the Gila River at the time of Arizona's Statehood, February 14, 1912, and to assess whether the stream prior to or on that date was commercially navigable. See also Littlefield, "Assessment," vii, 2.

or non-navigability of Arizona's streambeds holds enormous implications for private landholders in the State of Arizona.

The question of navigability is directly related to the "Equal Footing Doctrine" which asserts, among other things, that each state added to the union should be included on an equal footing with preceding states.[4] Thus each new state may own the tidelands and the beds beneath its navigable streams. Put another way, the Equal Footing Doctrine suggests that the State of Arizona may own the streambeds within its boundaries that were navigable, or susceptible to navigation, at statehood. Therefore, it is essential that ANSAC determine which streams were navigable or susceptible to navigation as of statehood, and which were not.[5]

As the area's earliest European occupants, Spanish priests, soldiers, and civilian explorers of the seventeenth and eighteenth centuries took note of the

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[4] The basic U.S. Supreme Court case affirming this doctrine is *The Steamer Daniel Ball v United States,* 77 U.S. 999 (1871). A sound explanation for this concept can be found in Jon A. Souder and Sally K. Fairfax, *State Trust Lands: History, Management, and Sustainable Use* (Lawrence: University Press of Kansas, 1996), 17-36. Historically, this legal concept stems from the original colonies' relationship with the English Crown. Over several centuries English common law had evolved to establish that the Kings owned the beds of commercially navigable waterways in order to protect their accessibility for his subjects. This power had evolved as a block against parties building structures such as wharfs, docks, or mill dams that might interfere with commercial boat traffic. The beds of non-navigable waterways where transportation was not an issue were owned by adjacent landowners. This principle was well-understood and established in English common law long before the American Revolution, and it applied to the American colonies as well as to English subjects. After the American Revolution, the rights and duties of the Crown passed to the newly independent states, thus making them owners of the beds of commercially navigable streams and lakes within their boundaries. The U.S. Constitution subsequently mandated that all new states enter the Union on the same footing as the original thirteen states. Therefore, as new states joined the Union they became owners of the beds of the waterways within their borders that were navigable at the time of statehood.

[5] In Arizona's case, this "Equal Footing Doctrine" means that if any stream or lake within the state was navigable on February 14, 1912—the date Arizona joined the Union—its bed was Arizona's sovereign property. If non-navigable, ownership of the bed remained in the United States government's hands until lands adjacent to the body of water were patented or otherwise disposed of. At that time the bed of the stream or lake became the property of the individual land owners next to the body of water. Moreover, research suggests there are at least 100,000 clouded property titles related to streambeds in Arizona, and determining which watercourses were navigable at statehood—and which were not—is one of ANSAC's two primary objectives. The Commission's other chief goal is to determine the public trust values associated with those watercourses determined to have been navigable or susceptible to navigation at statehood. Jack L. August, Jr., "Arizona Stakeholders Wage High Stakes Battle Over Stream Navigability," *Arizona Water Resource* 12 (September-October 2003), 6.

inhospitable arid environment and inadequate water supplies in the lower Gila River system. "With few major exceptions," according to the distinguished historian Michael Meyer in his pioneering book, *Water in the Hispanic Southwest: A Social and Legal History, 1550-1850,* "the water sources (the Rio Grande, the Colorado, the Fuerte, the Yaqui, and the Gila being among the most notable) which the Spanish dignified with the word "Rio" were scarcely rivers at all. Not even the largest (the Rio Grande) proved valuable for transportation and commerce either before or after the Spanish conquest. Although scientific evidence suggests forcefully that they carried a larger flow than they do now, most rivers were not perennial; they ran only part of the year, trying their best to carry the excess of sudden summer rain or capturing the excess from an exceptional winter snow cover in the surrounding mountains." The more common pattern, according to Meyer, was for the water that reached them to sink quickly into the sandy bed and within a short distance to disappear from human sight. On occasion, however, they ran partly on the surface, then underground, protected from the evaporative powers of the environment, to be forced to the surface again by the geological structure of a given area.[6]

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[6] Michael C. Meyer, *Water in the Hispanic Southwest: A Social and Legal History, 1550-1850* (Tucson: University of Arizona Press, 1984) 23. See, also, Roger Dunbier, *The Sonora Desert: Its Geography, Economy, and People* (Tucson: University of Arizona Press, 1970). For its importance to the natural and human history of the American Southwest, the Gila River has inspired surprisingly few books. Two of the best known are Edwin Corle *The Gila: River of the Southwest* (New York: Holt, Rinehart, and Winston, 1951) and Ross Calvin, *River of the Sun* (Albuquerque: University of New Mexico Press, 1951). Corle's book is useful but dated, reflecting an ideology of conquering the wilderness. Other noteworthy accounts are M. H. Salmon, *Gila Descending* (Silver City, New Mexico, 1985); Edmund Andrews, et. al., *Colorado River Ecology and Dam Management,* (Washington, D.C.: National Academy Press, 1991); Arizona Rivers Coalition, *Arizona Rivers: Lifeblood of the Desert* (Phoenix: Arizona Rivers Coalition, 1991); Richard L. Berkman and W. Kip Viscusi, *Damming the West* (New York: Grossman, 1973); Charles Bowden, *Killing the Hidden Waters* (Austin: University of Texas Press, 1977); Philip L. Fradkin, *A River No More: The Colorado River and the West* (New York: Alfred A. Knopf, 1981): Paul Horgan, *The Great River: The Rio Grande in North American History* (New York: Rinehart and Company, 1954); H.B.N. Hyne, *The Ecology*

To place the concept of aridity in regional and historical context, with the exception of eastern Texas, the Mexican north, which the Spanish first encountered in the sixteenth century, was generally arid, semi-arid, and, on occasion, extremely arid. The availability of water spelled the difference between desolation and abundance with countless variations between the two. This vast desert region had been occupied continuously for several thousand years, but, in the mid-sixteenth century, the population density was low, perhaps less than two people per square mile. Significantly, aridity increased as one moved west from Texas and Coahuila to New Mexico and Chihuahua, and then to Arizona and Sonora and southern California and Baja California. With the exception of the higher elevations and coastal zones of the north, evaporation was high and humidity low. The topography and natural vegetation doubtlessly reminded the first Spaniards of southern Spain. They were not surprised that the sun could blister the land and crack the soil. They fully understood the meaning of moisture deficiency and knew the critical challenges of aridity conditioned development of a special kind of human society. They, like their successors, the nineteenth century Anglo-American pioneers, were not surprised to learn that the labor of controlling the water and putting it to

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of Running Waters (Toronto: University of Toronto Press, 1977); Ed Marston, *Water Made Simple* (Covelo, CA: Island Press, 1987); Frank H. Olmstead, *Gila River Flood Control* (Washington, D.C.: Sen. Doc. No. 436, 65 Cong. 3 Sess, Government Printing Office, 1919); Rich Johnson, *The Central Arizona Project, 1918-1968* (Tucson: University of Arizona Press, 1977); Tim Palmer, *Endangered Rivers and the Conservation Movement* (Berkeley and Los Angeles: University of California Press, 1986); John Wesley Powell, *Lands of the Arid Region of the United States* (Washington, D.C.: Government Printing Office, 1879); Marc Reisner, *Cadillac Desert: The American West and its Disappearing Water* (New York: Viking Press, 1986); Salt River Project, *Taming of the Salt* (Phoenix: Salt River Project, 1979); John Walton, *Western Times and Water Wars* (Berkeley and Los Angeles: University of California Press, 1992); Frank Welsh, *How to Create a Water Crisis* (Boulder: Johnson Books, 1985); Donald Worster, *Rivers of Empire* (New York: Pantheon, 1985).

beneficial use could occupy much of the working day in the continuous struggle to forge an existence.

This vast region--this new desert into which the Spaniards ventured--was much more varied and capricious than its counterparts in Andalucia and Castile. It had a wider range of altitudes, soils, animal life, drought resistant vegetation, and even more unpredictable cycles of annual rainfall. The mountains were more rugged and towering, and the barrancas (canyons) were more impenetrable. Erosion and sedimentation bequeathed a physiography at once harsh and captivating—frightening yet alluring. The rainy season extended from July to September but few areas of the desert received more than twelve or thirteen inches of precipitation per year. In the drier parts, like the Gila River Valley, years of less than seven or eight inches were not uncommon. The mountains of this inhospitable land captured most of the moisture carried by prevailing Pacific or Gulf of Mexico winds, and left the valleys parched for most of the year. The winter snow cover in the mountains was almost always insufficient to provide the lower elevations with a reliable source of water, except during the early spring thaw.[7]

If these rivers, like the Gila, did not always carry sufficient water to reflect the desert sun, they nevertheless proved amazingly attractive, drawing the surrounding

[7] See Thomas D. Hall, *Social Change in the Southwest, 1350-1880 (*Lawrence: University Press of Kansas, 1989); Donald W. Meinig, *Southwest: Three Peoples in Geographical Change, 1600-1970* (New York: Oxford University Press, 1971). Specialists in Southwest history, who are numerous, have yet to concur on cultural consequences or chronology, and the overall prehistory of North America. The field undergoes substantial revision every decade. The longtime dean of Southwestern archeology is Emil Haury, who was one of the first scholars to present large-scale studies of the region. See Emil Haury, *Hohokam: Desert Farmers and Craftsmen* (Tucson: University of Arizona Press, 1976); Emil Haury, *Prehistory of the American Southwest* (Tucson: University of Arizona Press, 1986); Emil Haury, *The Archeology and Stratigraphy of Ventana Cave, Arizona* (Tucson: University of Arizona Press, 1966). Also, one should consult Suzanne K. Fish, et. al., eds., *The Marana Community in the Hohokam World* (Tucson: Anthropological Papers of the University of Arizona No. 56, 1993).

animal life and providing a modicum of moisture required for desert flora. It was along rivers like the Gila, arroyos, and quixotic streams that most Indian populations (like the departed Hohokam) adapted to desert life. The alluvial plains, ranging in width from a few feet to several miles were rich, and an unreliable source of water. Here, too, Spanish towns, missions, and presidios would cling to a precarious existence. And, as these two groups—the Spaniards and the Indians—were forced by physical and historical circumstance into increasingly closer contact; precious water soon came to dominate the varied contests for power and survival.

Indeed, from the time of Fr. Eusebio Francisco Kino's extension of the "Rim of Christendom" into the lower Santa Cruz and Gila Valleys in the 1690s, the Gila River played a prominent role as a transportation route—a land route--in furthering Spanish aims.[8] Often, diarists noted the remnants of the Hohokam civilization that marked much of the lower reaches of the Gila from its confluence with the Salt. Sergeant Juan Bautista de Escalante, on a reconnaissance of the Gila River Basin, in November of 1697, took note of ruins on the north side of the "irregular" river: "On the 18th we continued west over an extensive plain, sterile and without pasture; and at the end of five miles, we discovered, on the other side

[8] The literature is extensive concerning Spanish exploration in the region. Without question Herbert Eugene Bolton's work during the first half of the twentieth century set the standard. See, for example, Herbert Eugene Bolton, *Anza's California Expeditions* 5 vols. (Berkeley: University of California Press, 1930); Herbert Eugene Bolton, "The Early Explorations of Father Garces on the Pacific Slope," *The Pacific Ocean in History,* ed. Morris Stevens, (MacMillan: New York, 1917); Herbert Eugene Bolton, *Guide to the Materials for the History of the United States in the Principal Archives in Mexico* (Washington, D.C.: Carnegie Institution, 1913); Herbert Eugene Bolton, "The Mission as a Frontier Institution in the Spanish American Colonies," *American Historical Review* 23 (1917), 42-61; Herbert Eugene Bolton, *Rim of Christendom: A Biography of Eusebio Francisco Kino, Pacific Coast Pioneer* (New York: MacMillan, 1936). See, also, Edward H. Spicer, *Cycles of Conquest: The Impact of Spain, Mexico, and the United States on the Indians of the Southwest, 1533 to 1960* (Tucson: University of Arizona Press, 1962); Francisco Garces, O.F.M., *Diario de exploraciones en Arizona y California en los Anos de 1775 y 1776,* ed. John Galvin (Mexico, D.F.: Universidad Nacional Autonoma de Mexico, 1976).

of the river (the Gila), other houses and edifices. The sergeant…swam over with two companions to examine them; and they said the walls were two yards in thickness, like those of a fort; and that there were other ruins about, but all of ancient date."[9]

Later, in 1775-76, Don Juan Bautista de Anza led a colonizing expedition from Tucson to San Francisco. Fr. Pedro Font, who irritated Anza greatly, nevertheless kept the best diary of this historic expedition which followed the Santa Cruz to the Gila, then down to its confluence with the Colorado River. The Gila River portion of the journey, which lasted from October 30 to November 28, 1775 and covered 231 miles, brought forth noteworthy observations of the Gila's flow. According to Font, there were Indian agricultural systems diverting water, dry stretches, and occasional deep reaches that coursed slowly down the streambed. In effect, the Gila, in the fall of 1775, was intermittent and erratic, and in many reaches, dry.[10] References to the Gila from the period of the Mexican Revolution (1810-1821) and through the Mexican period (1821-1848) vary little from the accounts of anemic flow with occasional destructive flooding and spring freshets.[11]

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[9] See Emil W. Haury, Harold S. Gladwin, E.B. Sayles, and Winifred Gladwin, *Excavations at Snaketown, Material Culture* (Globe, Arizona: Medallion Papers No. 25, 1937); SWCA Consultants, Arizona Geological Survey, and Arizona State Land Department, *Gila River Navigability Study* (Phoenix, 1996), IV-1; John L. Kessel, *Friars, Soldiers, and Reformers: Hispanic Arizona and the Sonora Mission Frontier, 1767-1856* (Tucson: University of Arizona Press, 1976), 1-10.

[10] Kessell, *Friars, Soldiers, and Reformers,* 90-115; Arizona State Land Department, *Gila River Navigability,* IV-1; Sidney B. Brinckerhoff and Odie B. Faulk, *Lancers for the King: A Study of the Military System of Northern New Spain, with a Translation of the Royal Regulations of 1772* (Tempe: Arizona Historical Foundation, 1965). The expedition, comprising roughly 200 people, traveled from Horcasitas, Sonora to San Francisco via the Gila River. The party traveled the Gila from the Casa Grande ruins to the Colorado River.

[11] A solid source for this transitional period is James Officer, *Hispanic Arizona, 1536-1856* (Tucson: University of Arizona Press, 1987). Also, a good general source is Thomas Sheridan, *Arizona: A History* (Tucson: University of Arizona Press, 1996).

Historians of American expansionism are unanimous in their interpretation of the primary objective in the War with Mexico (1846-1848): the acquisition of California. With the Treaty of Guadalupe Hidalgo (1848) and the subsequent Gadsden Purchase (1853) affirming American title to the land bisected by the Gila River, much changed in a legal, political and social context. Yet, the Gila continued to serve, as it had for centuries, as an *overland* transportation route. For the Mormon Battalion in 1846, and shortly thereafter for thousands of gold seekers, it worked well as a thoroughfare to California as the westward tilt of American civilization commenced in earnest. And with that, research in collections detailing American settlement and organization of these western territories lends insight into nature of the Gila River during the period 1848-1912. One of the largest and important groups of records created in relation to the Gila River prior to statehood were those of the U.S. government, particularly federal surveys conducted by the U.S. General Land Office, predecessor to the U.S. Bureau of Land Management.

Indeed, when the United States became the owner of the vast territory acquired from Mexico at the end of the Mexican War in 1848, they were anxious to determine the value of these new lands. Moreover, they hoped to prepare the region for an orderly system of settlement. Thus, the federal government undertook formal surveys conducted by the U.S. General Land Office. Because of the nature and specific detail of those surveys, the original plats of the area near

the Gila River and the related survey field notes contain much information about the nature of that stream.[12]

The U.S. government, seeking accuracy and consistency, issued a series of manuals beginning in 1851, to direct surveyor's in their work. The books' provisions and how they changed over time, provided insight into the Gila's navigability. The 1851 *Instructions to the Surveyor General of Oregon: Being a Manual for Field Operations* directed how some of the earliest public land surveys were done in the American West. The U.S. General Land Office adopted this manual to standardize survey work in California and Oregon which were the most significant areas of western American settlement in the 1840s. The manual was the first formal federal survey handbook to provide guidance to surveyors mapping the public domain acquired from Mexico. Previously, the government issued directions to surveyors in the field on an individual basis through Surveyors General assigned to specific territories.[13]

The first manual directed that public lands were to be subdivided into a series of ever-smaller grids within grids to allow the precise location of individual tracts. This system accomplished two things; it facilitated the disposal of the public domain in an orderly fashion and it recorded the characteristics of that land in specific detail. The largest grids were to be six miles square and were to be created by the creation of township and range lines. The process provided for the

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[12] Littlefield, "Assessment," 11, 12.

[13] *Instructions to the Surveyor General of Oregon* is reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983) 433-456. White's work was published by the U.S. government as a review of all practices used by the federal government surveyors on public lands since the initial surveys of the Old Northwest (today, Ohio and other parts of the Upper Midwest) were undertaken in the late 1700s. In addition to a detailed history of those procedures, White reprints many of the original surveying instructions.

establishment of these large blocks were derived from the same procedures used in earlier public land territories and states. The size of the blocks, moreover, were based on Thomas Jefferson's original estimate that each block, composed of many small farms, would be the proper size to support a town at its center.[14]

Surveyors were also required to maintain field notes that were to include any notable features of the land including streams, lakes, roads, irrigations ditches, or other prominent landmarks. Furthermore, the 1851 instructions contained several provisions that were relevant to navigable bodies of water and other obstructions and therefore were important in considering the navigability or non-navigability of the Gila River. First, the instructions stated that when surveyors encountered impassable obstacles, such as ponds, swamps, marshes, lakes, rivers, creeks, etc." they were to extend the survey line from the opposite side of the obstacle using triangulation or other surveying techniques. Also, they were to take note of all of the particulars involved in the process.[15]

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[14] In fact, Jefferson's ideas were first enacted into law in the General Land Ordinance of 1785 and the first surveys under this legislation were completed in Ohio. It was this ordinance that provided for the rectangular land survey and the sale of western lands. It also initiated the program of land grants for schools, providing for lot number 16 in every township would be reserved "for the maintenance of public schools within said township." The Northwest Ordinance, passed two years later, provided a system for territorial governance and transition to statehood. See Souder and Fairfax, *State Trust Lands,* 18. When the 1785 and 1787 ordinances passed, the nation was still operating under the Articles of Confederation; the Constitution did not come into effect until 1789. And, the most important strand in these policies is the "Equal Footing Doctrine," which has become so ingrained that many people erroneously look for it in the Constitution. Both the Land Ordinance of 1785 and the Northwest Ordinance of 1787 have become entwined since new states could not gain the land for schools that had been set aside in the 1785 Ordinance without satisfying the prerequisites for statehood defined by the Northwest Ordinance.

[15] The instructions directed, "...at the intersections of the lines with both margins of impassable obstacles, you will establish a Witness Point (for the purpose of perpetuating the intersections therewith) by setting a post, and giving in your field book the course and distance therefrom, to two trees on the opposite sides of the line, each of which trees you will mark with a blaze and notch facing the post; but on the margins of navigable water courses, or navigable lakes, you will mark the trees with the proper number of the fractional section, township, and range. *Instructions to the Surveyor General of Oregon; Being a Manual for Field Operations* (1851), reprinted in White, *A History of the Rectangular Survey System,* 439.

Importantly, Land Office administrators provided surveyors with specific instructions when they encountered navigable bodies of water. Special survey markers called "meander corner posts" were to be "planted at all those points where the township or section lines intersect the banks of such rivers, bayous, lakes, or islands, as are by law directed to be meandered."[16] Similarly, where township, range, section, or fractional section lines encountered bodies of water, witness posts were to be established if those watercourses were non-navigable.[17]

The U.S. General Land Office revised its manual in 1855 and 1864, with the latter year modifying instructions concerning how surveyor dealt with navigable and non-navigable bodies of water. Because surveys in Arizona began in 1868, it was these set of instructions that governed how bodies of water in the Arizona Territory were recorded.[18] Significantly, regarding meanders and navigable streams, the 1864 amendments added some important criteria to which streams would be meandered: "Rivers not embraced in the class denominated "navigable" under the statute...but which are well defined natural arteries of

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[16] Federal legislation directing that navigable bodies of water be meandered was first passed in 1796, but that law did not specify what constituted navigability. See White, *A History of the Rectangular Survey System*, 30.

[17] However, meander corner posts were to be placed where the lines intersected navigable bodies of water: "intersections by line of water objects. All rivers, creeks, and smaller streams of water which the survey line crosses; the distance on line at the witness points of intersection and their widths on line." In cases of navigable streams, "their width will be ascertained between meander corners, as set forth under the proper heading." See White, *A History of the Rectangular Survey System*, 444.

[18] For the 1855 discussion of how bodies of water were to be recorded see the cumbersomely titled *Instructions to the Surveyors General of Public Lands of the United States, for Those Surveying Districts Established in and Since the Year 1850; Containing Also, A Manual of Instructions to Regulate the Field Operations of Deputy Surveyors, Illustrated by Diagrams* (1855), in White, *A History of the Rectangular Survey System*, 458-465. For the 1864 revision see *Instructions for the Surveyors General of the United States, Relating to Their Duties and the to the Field Operations of Deputy Surveyors* (1864) in White, *A History of the Rectangular Survey System*, 504.

internal communication, and have a uniform width, will be meandered on one bank."[19]

During Arizona's territorial period (1863-1912), the U.S. General Land Office promulgated several modifications that further refined the meandering system and the delineation between what surveyors' concluded was navigable or non-navigable streams. In 1881, 1890, 1894, and 1902 administrators sharpened their definitions of what bodies of water should or should not be meandered.[20]

In the context of evolving methods of assessing navigable and non-navigable bodies of water between 1851 and just prior to Arizona statehood in 1912, a variety of areas along the Gila River were surveyed and resurveyed. The internal surveys relevant to this discussion took place in 1868, 1871, 1874, 1877, 1878, 1882, 1883, 1890, 1910 and 1911.[21] Significantly, nine federal surveyors who mapped the Gila between the Salt River and its confluence with the Colorado prior to 1912 found the Gila River to be non-navigable. Indeed, while these surveys were conducted under different survey manuals, all concluded in their field notes and plats that they did not consider the Gila River to be navigable.[22]

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[19] The instructions added that for the sake of consistency, one bank meanders were to be done on the right side—looking downstream—unless obstacles made it necessary to switch to the left bank. If a change to the left side were made, it was to be done at a point where a survey line crossed the stream and recorded in the field notes.

[20] See *Instructions of the Commissioner of the General Land Office to the Surveyors General of the United States Relative to the Survey of the Public Lands and Private Claims* (1881); *Manual of Surveying Instructions for the Survey of the Public Lands of the United States and Private Land Claims* (1890); *1894 Manual of Surveying Instructions for the Survey of Public Lands of the United States* (1894); *Manual of Surveying Instructions for the Survey of the Public Lands and Private Claims* (1902). The 1902 revisions were the most substantive and significant departure from earlier, modest revisions and updates. See, also, Littlefield, *Assessment,* 21-26.

[21] A resurvey of part of one township was undertaken in 1907 and several townships were not surveyed until after statehood; one in late 1912, and the others in 1915 and 1936.

[22] Littlefield, *Assessment,* 27.

Some selections from the surveyors' notes illustrate convincingly the Gila's non-navigable status. G.P. Ingalls, for example, on June 22, 1868, surveyed the interior subdivision lines of township 1 north, range 1 west. His field notes reveal that he encountered the Gila in ten different places and he set no meander corners as he would have been required to do under the 1864 surveying instructions. He mentioned a rapid current and a sandy bottom, but not much more.[23]

Fifteen years later, R.C. Powers surveyed the interior subdivision lines of township 1 north, range 2 west and gave no indication that he considered the Gila to be navigable. The river ran through the southeast corner of this township and Powers set no meander corners. He noted that the stream was "shallow" and maintained a "rapid current." Powers' plat of this township was noteworthy. He gave no suggestion that the Gila was navigable. There were no meander lines, there was no surveyor identified as having done meanders, and the box in the right margin labeled "meanders of" had no entries for meander data. The plat indicated, however, that roads ran parallel to the stream on both banks, suggesting that commerce and communication in the valley was conducted by land and not water.[24]

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[23] "Field Notes of the Survey of Township 1 North, Range 1 West, Gila and Salt River Meridian," 1868, vol. R1, 375-376, 387, 398, 408, 409, 423, U.S. Bureau of Land Management, Phoenix, Arizona [LRA Box/File: 35/13]. Additionally, Ingalls plat of township 1 north, range 1 west further confirms his conclusion that the Gila was non-navigable. There were no meander lines on the plat, and in the box at the bottom of the plat identifying which surveyor had conducted various parts of the survey, there was no indication that anyone had conducted meander surveys. Finally, there was no survey data recorded in the margin of the plat, as there would have been if meanders had been done. See, also, Littlefield, *Assessment*, 47.

[24] "Survey Field Notes of Township 1 North, Range 2 West, Gila and Salt River Meridian," 1883, vol. R1006, 7, 22-24, 92; "Survey of Plat Township 1 North, Range 2 West, Gila and Salt River Meridian,

Seven years later, in September-October1890, further downstream in township 8 south, range 21 west, James H. Martineau, surveyed this subdivision of the township. The Gila River ran east to west through parts of sections 1, 2, 3, 4, 9, 8, 17, 18, and 19, and at each place where Martineau encountered the Gila on lines between these sections, he set meander corners on both banks, pursuant to the new instructions in the 1890 manual. He noted that the Gila was in some places well over "five chains wide" and in other places it was so deep that he was forced to swim to the other bank to continue running his section lines. In spite of these notations, Martineau did not consider the Gila navigable because that his setting of meander corners on both banks was consistent with the new January 1890 instructions directing surveyors to meander both banks of non-navigable bodies of water if on average they were less than three chains wide. Further evidence of his conclusion of non-navigability was the presence of the road from Yuma to Gila City on the north side and the presence of the Southern Pacific Railroad on the south side, both of which paralleled the stream. In his general description, Martineau allowed that "The only water in the township is that in the Gila River, which is sometimes dry for three months in summer, but at the date of this survey and during all [the past] summer a large stream has constantly flowed into the Colorado near Yuma."[25]

1883, U.S. Bureau of Land Management, Phoenix, Arizona [LRA 35/14]. See, also, Littlefield, *Assessment,* 48.

[25] "Field Notes of the Subdivision Lines and Meanders of Township 8, South, Range 21 West, Gila and Salt River Meridian" 1890, vol. 1213, 34-35, 38-39, 44-46, 47, 49-54; vol.1214, 56-59, 62-64, 91-92, U.S. Bureau of Land Management, Phoenix, Arizona [LRA Box/File 22/2]; "Survey Plat of Township 8, South, Range 21 West, Gila and Salt River Meridian, 1890, U.S. Bureau of Land Management, Phoenix, Arizona [LRA Box/File 22/2].

As Arizona approached statehood, in May-June 1907, a resurvey of township 1 north, range 2 west was completed by John F. Hesse. He recorded no meander data in his field notes, but indicated that the stream was eighteen inches to two feet deep. In his general description he wrote that the soil was "1st rate, and if supplied with water would raise abundant crops....The southwestern cor. Of the township is settled and is well watered by the Buckeye Canal which runs through the township." Equally compelling evidence concerning the marginal nature of the Gila River in 1907, was that the plat of this resurvey maintains no meander lines and no surveyor was identified as having done meanders. Additionally, no meander data appeared in the margins of the plat. Finally, roads appeared paralleling the river, and several irrigation ditches are portrayed, including the Buckeye Canal. Clearly, the water was being put to agricultural use and transportation was conducted on land and not water.[26]

As part of their duties, federal surveyors assessed and reassessed the navigability or non-navigability of the Gila River from its confluence with the Salt River to its mouth on the Colorado River between 1868 and 1912. Moreover, the manuals and instructions were precise about how they conducted their work and how a navigable body of water was distinguished from a non-navigable one. The areas along the Gila River were surveyed and resurveyed many times, at varying times of the year, in different years, and by many individuals. Without

[26] "Resurvey Field Notes of Township 1 North, Range 2 West, Gila and Salt River Meridian," 1907, vol R2055, 105, 109, 133, U.S. Bureau of Land Management, Phoenix, Arizona, [LRA Box/File 35/14]; Resurvey Plat of Township 1, North, Range 2 West, Gila and Salt River Meridian, 1907, U.S. Bureau of Land Management, Phoenix, Arizona [LRA Box/File: 35/14]. See, also, Littlefield, *Assessment,* 49.

variation from an overall theme, the repeated conclusion was that the Gila River was a non-navigable stream.

Other agencies, state and federal, as well as other sources—reminiscences, newspaper accounts, and independent studies—further attest to the Gila's non-navigability at statehood. While the U.S. General Land Office records provide important evidence, the published and unpublished accounts of the U.S. Geological Survey and the U.S. Bureau of Reclamation (this agency was called the U.S. Reclamation Service for the period under consideration), further affirm and duplicate the conclusions of Land Office surveyors that the Gila was a non-navigable stream. These agencies, both within the Department of Interior, were involved primarily with water resource development in the American West during the nineteenth and early twentieth centuries, and their records cover the nature of the Gila River before and at the time of Arizona statehood.[27]

The U.S. Geological Survey (USGS) and its predecessor agencies began analyses of the West's resources in earnest in the early 1870s. In 1871, for example, George Montague Wheeler, an ambitious engineer in the Engineer Corps in the U.S. Army, commenced what became known as the United States Geographical Surveys Beyond the 100th Meridian. Wheeler's Survey was an attempt to divide the West into ninety-four enormous geodetic quadrangles and within this framework to construct, in systematic fashion, a definitive map of the

[27] See Jack L. August, Jr. *Vision in the Desert: Carl Hayden and Hydropolitics in the American Southwest* (Ft. Worth: Texas Christian University Press, 1999) 43-68; Norris Hundley, Jr. *Water and the West: The Colorado River Compact and the Politics of Water in the American West* (Berkeley: University of California Press, 1975); Jr., Jack L. August, Jr., "Carl Hayden's 'Indian Card': Environmental Politics and the San Carlos Reclamation Project," *Journal of Arizona History* 34 (Winter 1993); Telephonic interview, Douglas Littlefield, Oakland, CA, June 20, 2004.

country. Each of these measures, though necessarily involving a degree of duplication, was thought by the War Department to be important in its own right and the best service it could afford to the cause of western expansion. In many ways, Wheeler's Survey, which was commissioned to accomplish the tasks outlined above in gaining topographical information about Nevada and Arizona, also assessed the region's resources, climate, and other qualities that might affect homesteaders under the Homestead Act of 1862.[28]

In his report to Congress, Wheeler noted several streams in Arizona, including the Gila. He omitted any mention of navigability for this river, but commented that boats had made it upriver all the way to Camp Mohave. That observation notwithstanding, Wheeler remained pessimistic about reliable river transportation in the arid Southwest: "River transportation upon our western coast, is to a great extent, a failure....that furnish somewhat irregular avenues of connection with the interior, no streams of considerable magnitude exist; river transportation, even in this very American age, loses its great power when pitted against the railroads."[29]

Thereafter, the USGS annual reports addressed the conditions of rivers in the arid west and in 1888, the agency's director, John Wesley Powell, commenced the "Powell Irrigation Surveys." The sum and substance of these surveys found their way into the annual USGS reports and some representative selections reflect

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[28] As noted, the Wheeler Survey was conducted under the auspices of the U.S. Army in the post-Civil War period, when the nation turned its attention from North-South issues, to East-West concerns. The USGS was created in 1879, and Wheeler's Survey is considered part of that agency's predecessors. See the Pulitzer Prize-winning, William Goetzmann, *Exploration and Empire: The Explorer and the Scientist in the Winning of the American West* (New York: Norton, 1967), 392.

[29] George M. Wheeler, *Report on Exploration of the Public Domain in Nevada and Arizona,* Ex Doc. 65, 42 Cong. 2 Sess. (Washington, D.C.: U.S. Government Printing Office, 1872), 17-20, 53 [LRA Box/File: 8/18]; Littlefield, "Assessment," 91-92; Goetzmann, *Exploration and Empire,* 392.

the nature of the Gila River at the end of the nineteenth and the beginning of the twentieth century. *The Twelfth Annual Report of the U.S. Geological Survey*, published in 1891, for example, addresses directly the Gila and its erratic nature: "water is derived from the Gila River and its tributaries by means of canals and ditches, which distribute it to the fields of each farmer...these fields fluctuate greatly, being at times subject to sudden floods, especially during summer rains, when they often sweep out bridges, dams and canal head works, while at other times they may diminish until the water almost disappears."[30]

Concerning floods, the report referenced above described massive torrents and dramatic shifts in the flow of the river: "The floods of the Gila are usually short and violent....During a freshet the river rises in some places 8 to 12 feet, and increases in width from 300 feet to a mile and one-half. It is sometimes impassable for weeks, and has the appearance in places of a sea of muddy water. The season of low water occurs during the months of June and July, the river bed being then dry in places."[31]

In addition to annual reports, USGS published a series of well-known "Water Supply Papers." These studies further affirm the erratic, undependable, and unpredictable nature of the Gila. *Report of Progress of Stream Measurements for the Calendar Year 1905, Part XI, Colorado River Drainage Above Yuma,* U.S.

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[30] *Twelfth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1890-91, Part II-Irrigation* (Washington, D.C.: U.S. Government Printing Office, 1891), 292 [LRA Box/File: 9/91]; Littlefield, "Assessment," 93. As has been well documented in numerous accounts, including, August, *Vision in the Desert,* chapters 2 and 3, for example, floods in the years 1891 and 1905 were especially destructive throughout the lower Colorado River Basin. These floods were especially dramatic on the Gila.
[31] *Twelfth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1890-91, Part II-Irrigation* (Washington, D.C.: U.S. Government Printing Office, 1891), 295 [LRA Box/File: 9/9].

Geological Survey Water Supply Paper No. 175,[32] revealed that the river "flows in a channel fully 1 mile north of the original channel...At every flood the channel shifts. The valley at its narrowest is half a mile wide and the waters may occupy any part or all of it.... [the river] contains an enormous amount of mud and sand. At times the waves of sand traveling along the bed of the stream are so large, the current so swift, and the stream so shallow, that the water is broken into a uniform succession of waves 2 feet high and over."[33]

Doubtlessly, the most significant and detailed description and analysis of flooding on the Gila was published as U.S. Geological Survey Water Supply Paper No. 162, published in 1906, adding further information about the Gila's eclectic and erratic character. *Destructive Floods in the United States in 1905, with a Discussion of Flood Discharge and Frequency Index to Flood Literature* assessed and analyzed the pernicious floods that occurred throughout the western U.S., including five floods on the Gila. In assessing the five floods of 1905, the authors asserted, "The total run-off for the five months is 2,957,400 acre-feet. To appreciate the magnitude of the run-off on this stream during this period it is necessary to remember that this stream is usually dry at this place about ten months of the year....[The streambed] not only scours out during a flood and fills in after it, but [the channel] changes from one side of the bottom to the other....This continual changing of the river bed has made it exceedingly difficult

[32] A table recording the discharge at Gila City (Dome) accompanied this report. It further elaborated upon the erratic nature of the Gila. On February 8, 1905, for example, the discharge was 82,000 cubic feet per second, but just eight days later, on February 16, no discharge at all was recorded.
[33] See description of this 1905 report in Littlefield, "Assessment," 94; Telephonic interview with Douglas Littlefield, Oakland, CA, June 30, 2004.

to secure reliable estimates of the rate of flow, and some of the estimates may be largely an error."[34]

Additional compelling evidence concerning the non-navigability of the Gila is found in U.S. Geological Survey Water Supply Paper No. 1049. This study provided an overall summary of the records of surface waters for the lower Colorado River basin between 1888-1938; a fifty year period embracing statehood. Importantly, these records included records for the Gauging station near Dome, Arizona (Gila City), close to the mouth of the Gila River. There, the discharge ranged from nothing to well over 100,000 cubic feet per second. And, to the point of this analysis, at the mouth of the Gila, in February 1912, there was no flow at all and none appeared until May 1912.[35]

A final, yet equally telling, dimension to the USGS materials pertaining to the Gila are the unpublished records. The notes and the unpublished progress reports of George M. Wheeler, mentioned earlier, exemplify further the non-navigability of the Gila prior to or at the time of statehood.[36] Later unpublished USGS records confirmed Gila's inability to support commercial navigation. The

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[34] See August, *Vision in the Desert,* 52; Edward Charles Murphy, et. al. *Destructive Floods in the United States in 1905, with a Discussion of Flood Discharge and Frequency and an Index to Flood Literature,* U.S. Geological Survey Water Supply Paper No. 162 (Washington, D.C.: U.S. Government Printing Office, 1906), 48 [LRA Box/File: 10/27].

[35] *Summary of Records of Surface Waters at Stations on Tributaries in Lower Colorado River Basin, 1888-1938,* U.S. Geological Survey Water Supply Paper No. 1049 (Washington, D.C.: Government Printing Office, 1947) 230-237 [LRA Box/File: 18/9]. See also, W.B. Freeman, et. al., *Surface Water Supply of the United States—Colorado River Basin,* U.S. Geological Survey Water Supply Paper No. 289 (Washington, D.C.: U.S. Government Printing Office, 1912), 200 [LRA Box/File: 26/26]. This study, written about water supply in 1910, provided additional useful information on the character of the Gila. It labeled the river "torrential" and further described it as "sometimes impassable for weeks...and has the appearance of a muddy sea of water." The paper added that "the season of low water occurs in June and July, the river bed being dry in some places."

[36] See the unpublished report, George M. Wheeler, "Progress Report upon Geographical and Geological Explorations and Surveys West of the 100th Meridian in 1872," Box 1, Entry 20, RG 57, Records of the U.S. Geological Survey, U.S. National Archives II, College Park, Maryland [LRA Box/File 18/15].

Director, writing on February 14, 1911—exactly one year prior to statehood—reported upon the application of the Southwestern Arizona Fruit and Irrigation Company to dig a canal from the Gila. Referring to a survey made earlier and a subsequent report concerning another canal company, the director concluded: "The same conditions exist regarding the Southwestern Arizona Irrigation Company's project, and in brief are that no power possibilities exist, but the sufficiency of the water supply is extremely questionable. On account of the appropriations above, the only water available at this site is that of occasional extreme floods, and the underflow and seepage water from upstream, the amount of which is very uncertain. The proposed reservoir is of such small capacity as to have little value for storing flood waters."[37]

E. C. Murphy's USGS survey—an unpublished report dated April 1915 on potential hydroelectric power sites in Arizona--depicts the Gila's non-navigability at statehood. The report was based on data accumulated immediately prior to statehood but drafted after Arizona joined the Union. Moreover, this report had been written to conform to the 1910 Enabling Act allowing Arizona to join the other forty-seven states. Part 2 of the report dealt with the Gila River. Murphy noted that the Gila drained about 70,000 square miles in Arizona, New Mexico, and Mexico but allowed that it had "a very small run-off at the mouth except during very wet periods." He continued, "On account of the erratic character of the precipitation, the use of the water for irrigation, and the depth and porosity of

[37] Department of the Interior, General Land Office, Affirming R&R Decision, February 24, 1912, "37-A-5 Straights Preliminary Investigations-Sentinal Project 37-A-5" General Correspondence File (Straights) #37-A, RG 115, U.S. Bureau of Reclamation, National Archives—Rocky Mountain Region, Denver, Colorado [LRA Box/File: 12/1]; Littlefield, "Assessment," 98.

the valley fill the minimum flow in the valleys along the Gila is very small and uncertain." He added: "In all these valleys there is no surface flow at certain places during the low water period of dry years. The surface flow may be 0 at one place there may be several second feet at some distance below due to seepage from irrigated lands, or a reduction in cross section of the ground water channel."[38]

In assessing water supply for hydroelectric power, Murphy viewed the Gila with a degree of skepticism. The river, he explained, "was partly an underground stream rising and sinking according to local formations. There is abundant evidence of this fact from Clifton…to Gila Bend, Arizona. In each of the valleys between these places the Gila is dry for a few days nearly every year…" He elaborated upon this: "The stream flows through a broad, flat valley in a broad, sandy channel. It is dry for a month or longer each year at Florence, and below Gila Bend it is dry all the time except for the large and long continued floods."[39] The implications of Murphy's narrative can scarcely be ignored; the Gila River was an erratic, unreliable stream at statehood, and in no way susceptible to commercial navigation.

Adding to this volume of evidence are the records of the U.S. Reclamation Service during the period under discussion. Following congressional passage of the New lands Reclamation Act (1902), many of the duties of the hydrographic

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[38] See E.C. Murphy, "Water Power Utilization in Arizona," April 1915, Part II, Salt River Project Archives, Phoenix, Arizona [LRA Box/File: 6/4]. Introduction, 1.

[39] Murphy, "Water Power Utilization in Arizona," passim. Murphy concluded this section: "There are many ditches diverting water from the Gila in this part, and the area that can be irrigated is very large, but the area actually irrigated is comparatively small on account of small and uncertain supply. As stated previously, there may be several years in succession of very small run-off. During these years only groundwater is available for some of this land.

branch of USGS passed to the newly created Reclamation Service. The new agency was charged with the responsibility of selecting reservoir and flood control locations throughout the West, as well as constructing the attendant dams and irrigation works. The Gila, like most western streams, received Reclamation Service scrutiny.[40]

Significantly, the first Annual Report of the Reclamation Service, published in 1902, maintained that irrigation in the drainage basin of the both the Gila and Salt, had already been developed to such a point that there was insufficient water for lands. The initial report, furthermore, was representative of subsequent reports throughout the decade and specified that the Gila was a particularly poor candidate for reclamation efforts: "The sources from which water may be obtained for reclamation of the arid lands in Arizona are, taken as a whole, the most erratic or irregular in the entire country. There are comparatively few rivers which flow throughout the year. Most of the tributaries of Gila River, beginning in the mountains as perennial streams, lost their waters in the broad open valleys."[41]

A U.S. Department of Agriculture study corroborates the records of the U.S. Land Office, USGS, and Reclamation Service. The University of Arizona's

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[40] For early Reclamation Service activities see, August, *Vision in the Desert,* 30-153; Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920* (New York: Atheneum Press, 1975) passim; Hundley, *Water and the West*, passim. Like the Geological Survey, the Reclamation Service drafted annual reports delineating its activities, and these contain descriptions of the Gila River. During the period under discussion, the Reclamation Service focused on the eventual San Carlos Reservoir site above the Gila's confluence with the Salt. Nevertheless, the reports address the Gila below the Salt. For material on this topic see, Jack L. August, Jr., "Carl Hayden's Indian Card: Environmental Politics and the San Carlos Reclamation Project," *Journal of Arizona History* 34 (Winter 1993).

[41] *First Annual Report of the Reclamation Service from June 17 to December 1, 1902* (Washington, D.C.: U.S. Government Printing Office, 1903), 75 [LRA Box/File 9/1].

Agricultural Experiment Station, which was overseen by the Department of Agriculture, undertook a study that was completed in 1911. It addressed Arizona's major industries, transportation, climate, water supply, and agricultural land. Crafted by R. H. Forbes, this report first addressed the territory's industries, and then turned to the transportation entities. The transportation section was noteworthy because it bore upon the Gila River at about the time of statehood. "By reason of its isolation," Forbes mused, "Arizona is dependent upon its transportation facilities to an unusual degree. These consist chiefly of three great railroad systems, which, in order of their construction, are the Southern Pacific, the Santa Fe, and the El Paso and Southwestern. The Santa Fe crosses the northern tier of counties from east to west, and with its branches opens up the mining and lumbering districts of the more elevated half of the Territory." Importantly, he added, "The Southern Pacific runs a roughly parallel course south of the Gila River, and its feeders tap the rich mining districts and the warmer irrigated valleys at lower altitudes. The El Paso and Southwestern road affords an outlet for the copper mines of southeastern Arizona and northern Mexico. A few steamboats of shallow draft ply the Colorado River, and in remote localities freighting with teams is still practiced." Thus, as of 1911, Forbes listed only the Colorado as having any type of regular navigation. Additionally, his comment that the Southern Pacific ran south of the Gila indicated that Forbes concluded that the Gila was not navigable.[42]

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[42] R. H. Forbes, *Irrigation and Agricultural Practice In Arizona,* University of Arizona Agricultural Experiment Station (Washington, D.C.: Government Printing Office, 1911), 14-15 [LRA Box/File: 9/7]; See also, Littlefield, "Assessment," 105-106.

Forbes also addressed directly the nature of surface streams in his 1911 report. The Gila, he wrote, was "a comparatively small and irregular stream, due to its arid watershed and uncertain rainfall, although occasionally it carries enormous floods. Since the appropriation of its upstream waters for irrigation its lower courses (from the confluence of the Salt to the Colorado) are often dry for months in succession....It may be stated summarily that the fluctuations in water supply become more and more extreme from the source to the mouth of the Gila."[43]

Another layer of proof concerning the Gila's non-navigability concerns U.S. congressional actions regarding homestead laws, particularly the Homestead Act of 1862 and the Desert Land Act of 1877, that were designed to facilitate the settlement of newly acquired land in the West. These laws resulted in thousands of federal patents being issued to settlers who were determined to establish homes and farms in the arid reaches of the West.[44] Importantly, from 1862 to 1912, none of the federal patents that overlay the Gila River maintain any provisions for reserving the bed of the river to Arizona. And, according to Douglas Littlefield, "There is no evidence that Arizona, upon statehood, chose lands in lieu of those previously patented upon the river bed—which the state would have been entitled to do had the river been navigable.[45]

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[43] Forbes, *Irrigation and Agricultural Practice in Arizona,* 32, 46-48.
[44] The most important of these acts was "An Act to Secure Homesteads to Actual Settlers on the Public Domain," 37 Cong. 2 Sess., ch. 75 (1862). This law was widely known as the Homestead Act.
[45] See White, *A History of the Rectangular Survey System*, 434-437; Littlefield, "Assessment," 57-60. Littlefield provides several sound examples of this dimension of the issue. Another reason why these patents are important in helping determine whether the Gila River was navigable at the time of statehood relates to their supporting files. Since a settler had to sign an affidavit about improvements and similar documents had to be secured from an eyewitness, a patent file not only reiterated acreage, but also it conveyed details whether a settler/farmer conveyed water from the Gila River or whether improvements

In the years following statehood in 1912, Arizona's officials confronted the enormous task of disposing millions of acres given to the state by the federal government. To facilitate this, the Arizona State Legislature, in special session in 1915, created an initial version of the Public Land Code, laying out the manner in which the state would dispose of its public land. In Township 1 North, Range 1 West, Section 32, State Patent number 219, for example, was sold to the Buckeye Irrigation Company on September 24, 1918. The appraisers' report indicated that the "intake and sand gates of the Buckeye Irrigation Co's canal lie upon this tract." The application also reported that "the grazing land is in the river bottom." Moreover, the "Gila River flows over south part of forty." These comments make it clear that the Gila River ran through this parcel. Nevertheless, the state did not reserve any acreage for its sovereign rights under the Equal Footing Doctrine, patenting the entire forty acres for the company. A contiguous tract, Patent 6353, south of the Buckeye Irrigation Company's land, also did not have any acreage reserved for the state's sovereign rights. Finally, the only patent overlaying the river in Section 31 was to James L. King by the State of Arizona on March 30, 1978. King received 159.66 acres lying in the north half of the northeast corner. Notably, the Gila River ran directly through this parcel, yet none of its acreage was reserved for the sovereign right of Arizona.[46]

In nearly one-hundred separate patents that the federal government granted to private citizens and private entities, in not one case did any of these

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were made for other purposes. Noting in these documents suggested that the Gila was navigable or that the settlers used the river to convey commercial goods.

[46] State Patent 219, 1918; State Patent 6353, 1976; State Patent, 6566, 1978, Arizona State Land Department, Phoenix, Arizona

patents or the supporting files suggest that acreage was withheld due to possible ownership of the bed by the State of Arizona. In each case where patents were applied for, several parties expressed implicit opinions on the navigability of the Gila through a request for lands through which the river flowed. They were awarded these lands. Significantly, literally hundreds of people—federal employees, patentees, witnesses—made judgments concerning the Gila River's navigability, or rather, its non-navigability. Similarly, the patents awarded by the State of Arizona to private citizens and parties, like the Buckeye Irrigation Company, for land through which the river flowed provided another example and perspective. Indeed, if the state believed it owned the bed and banks of the river, it certainly would have considered the stream's navigability in disposing of those lands. Yet, according to State Land Department records, there were more than sixty instances in which Arizona chose to sell lands which lay in the river bed. Thus, collectively, federal patents, Congressional grants to Arizona, and state patents to individuals and private parties, lead to the conclusion that the federal government and the state government considered the Gila River non-navigable.

To further buttress the preponderance of evidence above, a variety of documents, press accounts, military records, unpublished manuscripts, and personal memoirs suggest the lack of commercial navigability of the Gila River. Gregory McNamee, a noted environmental writer, in his well-received 1994 book, *Gila: The Life and Death of an American River*, cites several examples of the river's non-navigability at statehood. According the McNamee, the Gila began to dry up with the arrival of Anglo American farmers whose thirsty crops included

plants not well suited to the desert: Egyptian cotton, soft wheat, and eventually citrus and nuts. The effect, according to McNamee, was instantaneous. Further, he asserts that within a few years of the river being diverted by Mormon planters upstream, "the bed of the middle and lower river was dry."[47]

Sue Summers, who arrived in the desert oasis town of Florence, Arizona with her attorney husband in 1879, wrote of her first stagecoach ride from Casa Grande to their new home along the Gila River. She noted that this was shortly after "the Mormon dams" had been built: "I had heard so much of the raging Gila River, which I now understood we would have to cross before reaching our destination, that I must confess I had a feeling of fear at the prospect of fording it—imagine my astonishment when we came to a halt within a short distance of Florence, and my husband, with an amusing smile, announced that the huge valley of sand on which we were resting was the bed of the Gila River."[48]

Moreover, industrialized farming changed the nature of the Gila River and the Gila Basin. Beginning with the Mormon colonization of the fertile middle river, agriculture had provided a strong lure for settlement and exploitation. The pacification of the Apaches in the late 1870s and 1880s proved the last disincentive. The farmers came, founding towns like Coolidge and Casa Grande, swelling the populations of Phoenix and its surrounding agricultural communities. Coupled with the Homestead Act and the Desert Land Act, referenced earlier in this report, the Gila soon sported a patchwork of small farms that produced beans, corn, tomatoes, melons, pumpkins (Phoenix's original name was Pumpkinville),

[47] Gregory McNamee, *Gila: Birth and Death of an American River,* (New York: Orion Books, 1994) 125.
[48] Quote in *ibid.,* 126.

and other goods. This vigorous exploitation and use of the rivers resources further depleted the river's flow downstream along the lower Gila.[49]

When Anglos first came to the Southwest in large numbers, after 1850, the Gila "no longer carried enough water to float a raft." For newcomers who had read of the abundant waters of the desert, this was a source of no small amount of confusion. One government inspector charged with Indian Affairs who came to Arizona Territory in the 1880s, carried with him an "official map" showing the Gila as a live, flowing river. He asked at Yuma when the next boat would sail for the Pima Villages and was told, "Well, when the Gila gets water, we'll be sure to get a line of boats running for your convenience." The inspector thereupon produced his map and declared that the surveyors of the U.S. government could not possibly be wrong. Eventually, frustrated at his interlocutor's refusal to admit that the river was navigable, he took a stagecoach. At the stage stop at Maricopa Wells, he related his Yuma story to the driver, who told him, "You must have fallen in with a damned lot of liars working in the interest of the stagecoach line. The Gila is navigable. A boat leaves Yuma every day for the Pima Villages. Look, there's one now!" He pointed to a column of whirling smoke like dust a few miles distant. The inspector grabbed his bags and went off toward the column of smoke. An hour later the driver wandered into the saloon and bragged about his prank. Fortunately for an inspector, a good Samaritan retrieved the inspector who had fainted of thirst in the desert. The tale relates how contemporaries viewed the river; it was literally a joke concerning navigability.

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[49] See, for example, Thomas Sheridan, *Arizona: A History* (Tucson: University of Arizona Press, 1996) 21, 31, 37, 51, 53, 130, 138, 152, 190. 196; McNamee, *Gila,* 127.

Similar to this untoward prank, two days before Christmas in 1944, twenty-five German sailors who had been interned as prisoners in Papago Park, on the banks of the Salt River, tunneled out with the intention of stealing a boat and sailing down the Gila and Colorado to Mexico. They too carried maps that showed the Gila to be perennial river, but when they reached its banks and saw a trickle of water, they abandoned the plan and set downriver on foot. Within days most were rounded up and returned to prisoner camp. Their leader, Captain Wolfgang Clarus, later complained, "I only wish the Gila really had been a river. If it has no water, why do the Americans show it on their maps?"[50]

Odie Faulk, a prolific and popular historian of the Southwest whose most productive years spanned the 1950s-1970s, addressed the Gila River in a number of his works. The importance of the river as a trail across the Southwest, according to Faulk in his classic account, *Destiny Road: The Gila Trail and the Opening of the Southwest,* was undeniable, but the river itself, was not useful for transportation. He allowed, "That the Gila Trail should be of such importance was incomprehensible to men in the eastern United States during the 1850s, for there rivers had provided the natural highways for pioneering; these in turn had carried the canoes, flatboats, keelboats, and steamboats, and along their banks men had planted their farms and built their cities." Faulk continued, "In the arid reaches of the American Southwest, however, no such water route was available

[50] See McNamee, *Gila,* 145-146.

and a road, such as the Gila Trail, became the route of exploration, conquest, transportation, and communication."[51]

Despite Faulk's, and others' assessment that transportation along the Gila went by land and not water, there were a few efforts to use water craft on the Gila. Some nineteenth century military ventures not only underscore Faulk's conclusions, but also demonstrate that attempts were made to float the Gila. The account of Lieutenant Colonel Phillip St. George Cooke, leading his Mormon Battalion from Santa Fe, down the Gila Trail toward California, has been well-documented. Just beyond Gila Bend, Cooke noted in his journal a failed attempt to float down the Gila. "Sixty or seventy miles above the mouth of the Gila," he began, "having more wagons than necessary, and scarcely able to get them on, I tried an experiment, with very flattering assurances of success, of boating with two pontoon wagon beds and a raft for the running gear....The experiment signally failed, owing to the shallowness of the water on the bars; the river was very low."[52]

Lieutenant Nathaniel Michler, who worked with William H. Emory on another famous military reconnaissance in 1847-1848, echoed Cooke's observations. "The Gila becomes so low," he wrote, "that a sand-bar forms at its mouth during the summer, and at no times does it supply much water....The

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[51] Odie B. Faulk, *Destiny Road: The Gila Trail and the Opening of the Southwest* (New York: Oxford University Press, 1973, introduction. Littlefield uses this example in his analysis. See Littlefield, "Assessment," 109-110.

[52] Phillip St. George Cooke, *Report of Lieutenant Colonel Phillip St. George Cooke of his March from Santa Fe, New Mexico to San Diego Upper California,* House Ex. Doc. 41, 30 Cong. 1 Sess. (Washington, D.C.: Government Printing Office, 1848), 558.

Colorado on the contrary is navigable for small steamers, drawing two and two and a half feet water as high up as Fort Yuma."[53]

One of Arizona Territory's most notable pioneers, Lieutenant Sylvester Mowry, a southerner who championed separate territorial status for Arizona, provided yet another picture of the Gila. In March 1859 he gave a speech before the American Geographical and Statistical Society regarding his various proposals to create the Territory of Arizona out of what was then the Territory of New Mexico. He noted with some exaggeration that the existing territory "embraces within its borders three of the largest rivers on the continent west of the Mississippi...the Rio Grande, the Gila, and the Colorado of the West. The Colorado is the only navigable stream...."[54]

A selection of newspaper accounts punctuate the material above and further testify to the Gila's non-navigability prior to and at statehood. Arizona's territorial newspapers without exception served as community boosters, not only because of civic pride, but also to attract settlers to help grow the economy. And such benefits as the fertility of the soil, extended growing seasons, good schools, churches, and healthy business climates were all touted in the territorial press. Significantly, the ability to market crops to distant markets was written about often, and with respect to that, railroads and wagon roads received many column inches. Press reports omitted mention about the navigability of the Gila, something they doubtlessly would have done in order to benefit local residents.

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[53] William H. Emory, *Report on the United States and Mexican Boundary Survey,* (reprint, ed., Austin: Texas State Historical Association, 1987) 21, 102-103. Michler wrote chapter 7 of the report.
[54] Sylvester Mowry, "TheGeography and Resources of Arizona and Sonora," *Journal of the American Geographical and Statistical Society* 1 (March 1, 1859) 66. See also Littlefield, "Assessment," 115.

As Littlefield and others have noted in their studies, there were a few non-military attempts to navigate the Gila, but the accounts of these were reported more for their novelty than their being practicable on a reliable basis.[55]

In late November-December 1881, the *Arizona Gazette* reported on the celebrated "Yuma or Bust" expedition of the Salt and Gila Rivers. "The 'Yuma or Bust' party," the first story began, "which left Phoenix recently for the purpose of exploring the Salt and Gila rivers were seen yesterday, only twelve miles from here, all waiding [sic] in mud and water up to their knees, pulling the boat, and apparently as happy (?) as mudturtles." Four days later, the final outcome was reported: "The officers of the 'Yuma or Bust' returned on to-day's stage. They report having arrived safely at Yuma six days out from this port. We have advice, however, that the boat reached Gila Bend and 'busted'... [The crew] endured great hardships, being compelled to wade in the water the greater portion of the time and push the craft ahead of them."[56]

Thus, from a representative collection of miscellaneous accounts--military reports, personal reminiscences, newspaper accounts—the Gila River was not navigable prior to or at the time of statehood. Fluctuating flows, channel changes, and dams—especially with the completion of Roosevelt Dam on the Salt River in 1911--all combined to serve as impediments to travel or commerce on the Gila River.

The overwhelming evidence suggests that since modern settlement began in Arizona in the mid-nineteenth century, the Gila River was a non-navigable stream. The

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[55] Littlefield, "Assessment," 117; Arizona State Land Department, "Gila River Navigability Study," IV-15-IV-19.

[56] *Arizona Gazette* (Phoenix) November 30, December 3, 1881.

documentary evidence, daunting in its size and scope—from unpublished and published sources, federal, state, and territorial records, diaries, newspapers, journals, and a variety of other archival sources—is irrefutable. To reiterate, some of the most significant sources for interpreting and analyzing the Gila River prior to and at the time of statehood are the survey field notes and plats created by the surveyors of the U.S. General Land Office. Importantly, the surveys—and resurveys—were conducted by many different parties at different times and under varying seasonal conditions, none of these federal employees wrote in his field notes or plats that the Gila River was navigable. And, while some sections of the stream were meandered, these were done to conform with surveying instructions not related to the navigability of the Gila. Finally, the notes and plats indicated that roads and railroads paralleling the Gila were for transportation that was conducted by land and not water.

Supporting evidence that the Gila was not navigable was found in homestead patents, U.S. land grants to Arizona and Arizona's disposition of lands after statehood. In all cases, neither the U.S. government nor the State of Arizona made efforts to obtain in-lieu selections for the acreage covered by the stream's bed as it would have been entitled had the Gila River been navigable. Moreover, after statehood, when Arizona disposed of lands acquired from the federal government through which the Gila flowed, the state made no indication that it would withhold the bed of the river due to navigability and the public's interest. In short, none of the processes described herein indicated that federal or state administrators found the Gila navigable.

Further buttressing the conclusion that the Gila was non-navigable at statehood are the published and unpublished record of the USGS, Reclamation Service, and

Department of Agriculture, which labeled the Gila as erratic, unreliable, with shifting channels, and subject to severe floods. Similarly, Spanish explorer and missionary accounts, State of Arizona records, scholarly books and articles, the journals of American scientific and military surveys, personal reminiscences, newspaper accounts, and other archival materials, noted the Gila's lack of navigability. Taken together, this multitude and variety of sources—voluminous in extent and covering a variety of disciplines and perspectives—adds further credence to the only plausible conclusion; that the Gila River was not navigable or susceptible to navigation on or before February 14, 1912, when Arizona entered the Union.