Crossing the Salt River near Phoenix, circa 1875. Source: Library of Congress, Washington, D.C.

REVISED AND UPDATED REPORT:

ASSESSMENT OF THE NAVIGABILITY OF THE SALT RIVER BELOW GRANITE REEF DAM PRIOR TO AND ON THE DATE OF ARIZONA'S STATEHOOD, FEBRUARY 14, 1912

by

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EXECUTIVE SUMMARY

The purpose of this report is to assess the navigability of the lower Salt River between Granite Reef Dam downstream to the Salt's confluence with the Gila River between the mid-nineteenth century and February 14, 1912 – the date Arizona became a state. This report is a revised version of a report on the same topic written by Douglas R. Littlefield and dated December 5, 1996.

This updated study is intended to add further information about the historical characteristics of the lower Salt River, especially now that internet resources have made digital access to historical newspapers and photographs substantially easier than before. This extra insight is helpful in responding to the opinion of the Arizona Court of Appeals' decision in *State of Arizona, et al., v. Arizona Navigable Stream Adjudication Commission, et al*. (1 CA-CV 07-0704, April 27, 2010) that a fuller awareness of how human activities and manmade structures on the lower Salt River may have affected that stream's ordinary and natural condition at or before statehood.

To make this evaluation, a large array of published and unpublished documents was consulted (discussed in greater detail in the Introduction to this report). This survey of thousands of primary and secondary sources yielded a wide spectrum of historical views of the Salt River, from federal surveys and reports, land settlement records created by the U.S. and Arizona governments, newspaper accounts, explorers' journals, diaries, early pioneer reminiscences, historical photographs, and many other records.

Taken as a whole, these records demonstrate that prior to and at the time of Arizona's statehood in 1912 the Salt River was considered *not* navigable by virtually every contemporaneous observer. While there were instances of boats being floated on the Salt River, these were the exception rather than the rule due to the extremely unpredictable nature of the river. Even when

man-made obstructions in the Salt River are taken into consideration, the historical record amply demonstrates that the Salt River was highly erratic, subject to flooding and major channel changes, and blocked by obstacles (both natural and man-made). Moreover, the Salt River frequently sank beneath its bed, leaving a dry channel for miles, and during floods the river became extremely dangerous, carrying logs and other debris. In short, the Salt River was not navigable in its ordinary and natural condition before or on February 14, 1912.

INTRODUCTION

A. Previous Report

This report is a revised version of a 1995 historical study of the Salt River's navigability at the time of Arizona's statehood in 1912. The original report was prepared on behalf of the Salt River Project and presented as an exhibit, together with related testimony by Douglas R. Littlefield, Ph.D., to the Arizona Navigable Stream Adjudication Commission (ANSAC) during hearings in 1996 and 2003. The original report and related testimony also was presented to a committee of the Arizona Legislature in 1998. While some of the current report is similar to the original study (particularly in relation to U.S. General Land Office surveys, and federal and state patents because those historical sources have not changed since 1995), this report has been expanded in relation to historical newspaper accounts and historical photographs. This additional material has been made possible by the growth of online historical newspaper collections (which permit key-word searching to locate relevant newspaper articles) as well as by online archival finding aids for pertinent historical photograph collections. By conducting additional historical research in these areas, it has been possible to provide more understanding about the nature of the Salt River prior to and at Arizona's statehood in 1912. This extra insight is useful to respond to the opinion of the Arizona Court of Appeals' decision in *State of Arizona, et al., v. Arizona Navigable Stream Adjudication Commission, et al*. (1 CA-CV 07-0704, April 27, 2010) that a fuller awareness of how human activities and manmade structures on the Salt River may have affected the stream's ordinary and natural condition before or at the time of statehood.

B. Purpose of Report

The purpose of this revised report is to examine what the Salt River was like in its ordinary and natural condition before and at the time of Arizona's statehood on February 14, 1912. As is the case with other bodies of water in Arizona, under the "equal footing doctrine" of the U.S. Constitution, title to the Salt River's bed depends upon whether the river was susceptible of, or used for, commercial navigation at the time of statehood. In general, if any body of water within any state was navigable at the time of statehood, title to the bed passed to that state when it joined the Union. If the stream was not navigable, ownership of the bed remained in the federal 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 river.[1]

C. Chronological and Geographical Limits of Report

The chronological time period covered by this report extends from the mid-nineteenth century, when there were only a minimal number of man-made obstructions on the Salt River, to the years shortly after Arizona's statehood on February 14, 1912. The geographic range covered by this report is from Granite Reef Dam downstream to the Salt River's confluence with the Gila River. Of course, some historical materials overlap these downstream and upstream boundaries, so to the extent they are relevant to the regions in between, those records will also be discussed.

D. Historical Research Locations

A wide variety of published and unpublished sources were utilized in creating this study. The vast majority of these documents are primary sources – documents created close in time

[1] The fundamental U.S. Supreme Court case confirming this doctrine is *The Steamer Daniel Ball v. United States*, 77 U.S. 999 (1871).

and/or geography to events that they describe – to obtain the most accurate descriptions of the Salt River. To locate relevant sources, Littlefield Historical Research developed a preliminary list of terms for searching many local, state, and national archives. We also used the list to search published primary sources such as government reports and newspaper accounts, and the list was supplemented as research brought to light new topics related to the Salt River. Since individual archives have different means of listing their holdings, we adapted our list to accommodate specific locations, and we utilized many online finding aids on the internet. Some of the terms most commonly used throughout the research were Salt, Granite Reef, Arizona Dam/Canal, navigation or navigable, irrigation, floods, Roosevelt, Consolidated Canal, Phoenix, Pima, Maricopa County, Apache Road, and Tempe.

In addition, individuals' names were used as search terms depending on the time period and archive involved. People whose names were searched include Charles Trumbull Hayden (one of the original settlers of the Phoenix area and owner of Hayden's Ferry), Carl Hayden (Charles Hayden's son, who represented the Phoenix area in Congress as a representative and as a U.S. senator following statehood), John W. Swilling (who constructed the first irrigation ditch in the Phoenix area), Benjamin Fowler (president of the Salt River Valley Water Users' Association), Joseph H. Kibbey (judge in the 1892 water rights case *Wormser, et al., v. Salt River Valley Canal Co.*), Edward H. Kent (author of the famous 1910 "Kent Decree" adjudicating priorities of water users on the Salt River), and many others.

In addition, a lengthy list of Arizona and federal government agencies' names was searched for records they may have generated regarding the Salt River. Agencies (and their predecessors) whose names were searched include the Arizona State Land Department, Maricopa County Water Commissioner's Office, Arizona Attorney General's Office, U.S. Congress, U.S. Geological

Survey, U.S. Bureau of Land Management, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, U.S. Department of Agriculture, and U.S. Bureau of Indian Affairs, among others.

Research began at Arizona State University. The university's main library houses the Archives and Manuscript Division (which focuses on Arizona and Southwest history), and the main library also used to contain the privately-funded Arizona Historical Foundation (which, since the time of the original research in the 1990s, has been disbanded and its materials distributed to other archives). These two archives contain (or held) excellent collections of source materials, both published and unpublished, as well as an extensive collection of books focusing on the history of Arizona.

The first step in research at Arizona State University was to search through the computer online manuscript database, which contains file titles from each manuscript collection at the library. Printed finding aids that were not online were also searched. The preliminary searches yielded over ten unpublished manuscript collections of prominent citizens and early settlers of the Phoenix area, including the extensive Hayden Family (Charles and Carl) papers and the Luhrs Family papers. The manuscripts in these collections provided many eyewitness accounts of the Salt River (such as descriptions of floods, the river's channel, and local activities taking place on or near the stream). The manuscript collections also provided useful insights on the development of the Phoenix irrigation system, including its reservoirs, diversion dams, and canals. Numerous photo collections were also searched, and relevant photos have been reproduced where relevant throughout this report.

Arizona State University was also useful for its collection of Arizona statutes. The statutes (mostly territorial) were searched for laws relevant to navigability and public land disposal. Furthermore, the library has an extensive collection of nineteenth and early twentieth-century

Arizona newspapers such as the *Arizona Gazette* and the *Arizona Republican*. Strong advocates for settlement of the evolving communities of Phoenix and Tempe, the newspapers extolled the virtues of life there as well as reported on uses of the Salt River. These two newspapers and others were searched for articles that might provide insight to the Salt River's characteristics. Supplementing this original work, a considerable amount of additional research in historical newspapers was conducted in online newspaper collections, many of which only recently became available to online key-word searching.

Additional and similar research was conducted at the University of Arizona in Tucson. There, many historical photographs were reviewed illustrating the nature of the Salt River in the late nineteenth and early twentieth centuries.

Also useful was the Water Resources Center Archives, which at the time of the original research, was located at the University of California, Berkeley, but has since been moved to the University of California, Riverside. Although located in California, this library is one of the premier depositories for both manuscript collections and published government reports relating to water resources in the entire United States (particularly the American West). The Water Resources Center Archives contains manuscript collections of the papers of prominent civil engineers, whose work dealt extensively with irrigation, flood control, and hydroelectric power. Included are the papers of Elwood Mead (head of the U.S. Reclamation Service in the 1920s), James Dix Schuyler (who undertook engineering work in the Salt River Valley), and other people active in solving the water problems associated with the arid and semi-arid West. The Water Resources Center Archives also holds many published government documents relating to water issues, including a complete set of U.S. Geological Survey Water Supply Papers and Bulletins (many of which are relevant to the

history of the Salt River Valley) as well as all of the U.S. Reclamation Service Annual Reports published around the time of Arizona statehood.

Another important archival research location was the Bancroft Library at the University of California, Berkeley. The Bancroft Library is one of the most important depositories for unpublished primary source materials and rare secondary source records on the history of the American West. Collections at the Bancroft relating to the Salt River area were reviewed as well as published reports of nineteenth-century explorations. Since many of the individuals who visited the Salt River region in the nineteenth century were there specifically to report on its potential, their reports are especially useful to ascertaining the historical nature of the Salt River.

Following research at the Bancroft Library and the Water Resources Center Archives, reports and studies conducted by U.S. government agencies were reviewed. Most of these reports covered such topics as flood control, irrigation, and the utilization of natural resources in the Salt River Valley. These documents provided descriptions of the Salt River at different points in time leading up to and shortly after statehood. Some of the reports are specific to the Salt River, but much of the information found was contained in larger studies on Arizona and the Salt River Valley. In addition, a computer search was done of files compiled by the Congressional Information Services (CIS) to find Congressional documents, hearings, and reports relevant to the Salt River.

In addition to the sources obtained at Arizona State University, the University of Arizona, the Water Resources Center Archives, and the University of California at Berkeley, documents held by the U.S. Bureau of Land Management in Phoenix were reviewed – records that are some of the most important concerning the Salt River around the time of statehood. The Bureau of Land Management holds nineteenth-century U.S. General Land Office surveys carried out to prepare the

public domain for homesteading; these records include original surveyors' plats and field notes. Since the U.S. Government required that federal surveyors "meander" all navigable bodies of water (measure by degree bearings and distances the irregular sinuosities of streams) and to keep detailed notes of these meanders, survey documents are vital to understand what the Salt River was like at the time of survey. While surveys took place for various areas along the Salt River at different times, initial surveys were done in 1868 (when relatively few man-made obstructions affected the Salt River). Resurveys prior to statehood also were carried out in 1888, 1899, and 1910-1911. Thus, the surveys and resurveys are especially useful to an historical study of the Salt River's characteristics, particularly in the years before the completion of Roosevelt Dam significantly altered the river's regimen. (See Chapter 1 for greater detail on these records.)

The Phoenix office of the U.S. Bureau of Land Management also provided copies of U.S. General Land Office Master Title Plats and Historical Indexes, although some of these records are now available online. These records were used to determine how the federal government disposed of the public lands in Arizona through which the Salt River flows. From this material, any U.S. patent that either overlaid or bordered the Salt River was obtained. Federal patents were critical in determining how the U.S. Government viewed public lands in Arizona. If federal officials had considered the Salt River to be navigable (which partly would have been determined by any meanders conducted by federal surveyors), they would not have deeded out land lying in the channel or bed of the river. However, there is no indication in over 225 federal patents overlying the Salt River in the study area that the U.S. Government hesitated to grant title to the bed and the banks of the Salt River to patent applicants.

The U.S. National Archives in Washington, D.C., provided the supporting paperwork for federal land patents such as applications and affidavits of witnesses (such affidavits were generally

required for "proving up," or finalizing, a patent and obtaining clear title. The affidavits in particular are useful to assess the Salt River's navigability because many homestead patent applicants and their witnesses commented on the Salt River, especially when the patent overlay the Salt River. Federal patents and their files, combined with historical maps obtained from the U.S. Geological Survey and the Bureau of Land Management, were used to create exhibit maps, which illustrate the location of all patents and federal land grants along the Salt River. (The maps and related discussion of patents appear in Chapter 2.)

Additional research at archives in the Phoenix and Tucson areas was carried out. This included contacting various local archives and the Arizona Historical Society (at two of its locations: Phoenix and Tucson) to determine their respective holdings. Considerable research was conducted at the Tucson branch of the Arizona Historical Society (which is the oldest branch, and therefore has the largest collections of records). In particular, at the Tucson branch many historical photographs were examined and relevant ones copied for this report.

Furthermore, the Arizona State Archives in Phoenix provided more rare state and territorial government documents and manuscript collections. These materials included the unpublished papers of agencies such as the Arizona State Land Department, the Arizona Water Commissioner, the Arizona State Planning Board, and the Arizona Secretary of State. The papers of the State Land Department were particularly useful for historical information on how the state disposed of the lands along the Salt River that had been granted to the state by the federal government.

After reviewing the historical records of the Arizona State Land Department at the Arizona State Archives, research was also done at the Arizona State Land Department's Phoenix office. Although most of the patent information for land along the Salt River was found at the U.S. Bureau of Land Management in Phoenix and the U.S. National Archives in Washington, D.C., the Arizona

State Land Department provided copies of patents issued by Arizona for parcels granted to the state by the United States. Approximately twenty-five state patents were eventually reviewed. (See the state patent map in Chapter 2.) The corresponding application files for the state patents were also obtained and reviewed.

The Salt River Project Archives in Tempe was also a critical location for research. The Salt River Project has an extensive historical document collection, including many documents copied from the U.S. National Archives' Record Group 75 (U.S. Bureau of Indian Affairs) and Record Group 115 (U.S. Bureau of Reclamation). These documents relate to the Pima-Maricopa Indians and the Salt River Project, respectively. In addition to collecting documents from the U.S. National Archives, the Salt River Project Archives also maintains an excellent collection of historical photographs of the Salt River. This collection was searched thoroughly and copies of particularly demonstrative photos have been reproduced in various parts of this report. Furthermore, the newspaper clipping collection housed by the Salt River Project is also extensive. The clippings supplemented newspaper research done at Arizona State University and in online sources.

The material found at the Salt River Project Archives was also useful as a lead-in to research at the U.S. National Archives in Washington, D.C. While at the National Archives, many federal agency files were searched, including those of the U.S. Bureau of Indian Affairs, the U.S. Army Corps of Engineers, the U.S. General Land Office, the Office of the Secretary of Interior, and the U.S. Geological Survey. These records contain unpublished paperwork substantiating the conclusions gleaned from published government documents.

The Rocky Mountain branch of the National Archives in Denver also was visited to undertake a more thorough search of Record Group 115 (U.S. Bureau of Reclamation). These records are organized into two chronological periods, with the 1902-1919 group containing material

most relevant to this study, including reports and other materials dating back into the nineteenth century. While in Denver, the Bureau of Reclamation's Salt River Project annual project histories, historical engineering data, preliminary investigations, and correspondence files were all searched. These records provided a rich source of information from an agency directly involved with management of the river around the time of statehood. Moreover, the Bureau of Reclamation's files contain historical data on the nature of the Salt River before Roosevelt Dam and Granite Reef Dam were constructed.

Further historical research was conducted at the Sharlot Hall Museum and Research Library in Prescott, Arizona. The Sharlot Hall Research Library holds an extensive historical photograph collection, and all photos related to the Salt River were reviewed. Relevant photos were copied for possible use in this report.

In addition to archival work, historical water rights cases were searched to determine the nature of the Salt River prior to Arizona's statehood. These included *M. Wormser, et al. v. Salt River Valley Canal Company* (1892) and *Patrick T. Hurley v. Charles F. Abbott, et al.* (1910). The two cases were especially important to the development of the Salt River Valley because they focused on dividing the river's resources among many concerned parties.

E. Computer Database and Methodology

As noted above, the scope of research undertaken for this project was extensive. Many thousands of pages of records were reviewed on-site at various archives, libraries, and government agencies, and tens of thousands of pages of documents, photographs, and newspaper articles were copied for later in-depth study. To manage this comprehensive research, a computer database was utilized in the research and writing of this report. That process was undertaken in the following manner. Relevant documents located during research were

abstracted into a database that could be sorted by subject matter, author, recipient, date, agency, or a wide variety of other possible combinations. When research and abstracting were completed, that database was sorted by subject matter and date, and the results were transferred directly into a word processing program to provide a rough draft of this report. The use of the database not only facilitated correlating information and organizing the rough draft, but transferring the organized material from the database directly to the word processing program also ensured accuracy by avoiding transcription errors. The computer database also was used to record accurately the original sources for all underlying documents used in drafting this report, and the database kept track of the location of copies of those documents in the author's files.

F. Stylistic Notations

One of the principal functions of a historian is to review and summarize in an accurate manner large quantities of historical information to yield a detailed and understandable record of the past so that others may readily understand it without the need to read and analyze all of the underlying data. That concept is a basic goal of this report. It is also the responsibility of a historian to present the past in an objective manner, no matter how unpleasant those events may have been or how unpopular the outcome may be with regard to modern-day concerns. For that reason, the underlying documents in this study were used in such a manner as to allow those documents to tell their own story. This was done in the following manner. Summaries of documents were sometimes used to condense material into a useable length, yet wherever possible, direct quotations from the underlying documents – especially those of particular importance – were also employed.

It is common practice for professional and scholarly historians to use footnotes, and this report employs that methodology. Footnotes verify accuracy by citing the original sources or, if

so desired, provide a means of beginning further research on various points discussed in the text. In this report, footnotes also specifically indicate materials relied upon. There are, however, the following exceptions to the use of footnoting in this report. This overall "Introduction" as well as the final "Summary and Conclusion" sections generally do not contain many footnotes because those sections of the report are synopses of everything contained in the intervening chapters. Documentation supporting the general statements found in this "Introduction" and in the "Summary and Conclusion" section can be found in the detailed paragraphs that appear within the individual chapters to this report. The same caveat applies to the introductory paragraphs and concluding paragraphs to each of the intervening chapters.

Individual footnotes appear at the end of phrases, sentences, or paragraphs indicating sources used for those statements. Where an individual footnote appears following several sentences or paragraphs, the note generally covers all of that material. Direct quotations are always provided with individual footnotes throughout this report. To facilitate ease of reference, the use of "ibid." and other terms denoting repetition of previously-cited sources has been eliminated and complete sources cited except in relation to repeated portions of citations within any given individual footnote. Also for simpler reference, footnote numbers run continuously throughout the entire report rather than using the conventional practice of starting each new chapter with footnote number 1.

G. Organization of Remainder of Report

Based on the wide-ranging research for this report, it became evident that some of the most important records dealing with the Salt River were the U.S. General Land Office original surveys and patent records (both federal and state). Therefore, the first two chapters of this report deal with the significance of those documents. Other U.S. Government documents (both

published and unpublished) are discussed in Chapter 3. Chapter 4 examines historical newspaper accounts of the Salt River. Following this in Chapter 5 is a review of miscellaneous documents (such as diaries, journals, reminiscences, and more modern histories of Arizona and the Salt River area). Chapter 6 examines the types of watercraft used on western rivers to assess whether such craft could have been utilized on the Salt River. Historical photographs and other illustrations appear throughout this report where especially pertinent. The last section of the report contains a general summary and conclusions. Following that section is an appendix containing the vita of Douglas R. Littlefield, Ph.D., who oversaw all research, reviewed all materials, and wrote the original study and this supplemental report.

CHAPTER 1: U.S. GENERAL LAND OFFICE SURVEYS

Some of the most important historical records created in the late nineteenth and early twentieth centuries in relation to the Salt River and the question of navigability are survey plats and related field notes by the U.S General Land Office (today, the Bureau of Land Management). When the United States took control of the vast territory acquired from Mexico in 1848 at the end of the Mexican-American War, federal officials were anxious to determine the value of what the U.S. had gained, and they wanted to prepare the region for orderly occupation by American settlers. Therefore, to record the lands' characteristics and to prepare the new region for homesteading, the U.S. Government undertook formal surveys. Because those surveys were highly detailed, the original plats of the area near the Salt River and the related field notes contain a wealth of information about the nature of that stream. Prior to statehood in 1912, the U.S. General Land Office conducted surveys (and some limited resurveys) in the Salt River area in 1868, 1888, 1899, and 1910-1911.

A. U.S. General Land Office Surveyors' Manuals

Due to the need for accuracy and consistency in carrying out the federal surveys, the U.S. Government issued a series of manuals designed to direct surveyors' work. These manuals first were published in 1851 (before then, instructions were issued separately to individual surveyors), and later revisions came out periodically. To grasp the significance of these manuals in relation to establishing whether bodies of water were deemed navigable or non-navigable, it is important to understand the books' provisions and how they changed over time.

1. The 1851 *Instructions to the Surveyor General of Oregon*

In 1851, the General Land Office issued the first of its surveying manuals, the *Instructions to the Surveyor General of Oregon; Being a Manual for Field Operations*. This manual directed how some of the earliest public land surveys were carried out in the American West. The U.S. General Land Office intended that the 1851 manual would standardize survey work in Oregon and California, which, at the time, were the most significant areas of American settlement.[2]

The *Instructions to the Surveyor General of Oregon* provided that public lands were to be divided into six-square-mile "townships," and within each township, into a series of numbered one-square-mile sections composed of 640 acres each. These sections could be further subdivided into fractional pieces such as half sections and quarter sections. This grid system permitted the precise location of tracts of land, thus creating accurate means of describing individual parcels. This system would facilitate the disposal of the public domain in an orderly fashion and at the same time record the characteristics of that land in substantial detail. The grid system stemmed from the process that had been used in other earlier public land territories and states, and the size of the townships was based on Thomas Jefferson's original estimate that each township, composed of many small farms, would be the proper size to support a small community at its center – an idea derived from some New England settlements where towns were surrounded by outlying farmlands. Jefferson's ideas were first enacted into law in the *Land Ordinance* of 1785, and the first surveys under this legislation were carried out in what is today

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

the state of Ohio. The grid procedure was used in most new territories added to the United States in the years that followed.

For these U.S. surveys, township and meridian lines were chosen as starting positions within the state or territory to be surveyed. In Arizona Territory (formed in 1863), the initial base line and meridian intersected at a point on a hill just south of the junction of Salt and Gila rivers. That location had been chosen in 1865 by John A. Clark, surveyor-general of New Mexico Territory, to begin the surveys for that territory as well as Arizona Territory.[3] Using the Gila and Salt River Base and Meridian to start, survey lines were run in Arizona Territory by federal surveyors working their way gradually north and south to create township lines and east and west to establish range lines. Each resulting "township" was numbered in relation to the initial base and meridian on the basis of being north or south and east or west. For example, the first township to the north and east of the intersection of the Gila and Salt River Base and Meridian was identified as township 1 north, range 1 east. The township directly north of that was township 2 north, range 1 east, and the township to the east of that point was township 2 north, range 2 east. All townships to the south and west of the initial base and meridian were identified in a similar fashion. In the region of concern to this report – the area along the Salt River from its confluence with the Gila River upstream to present-day Granite Reef Dam – the lands examined lie in townships 1 and 2 north and ranges 1 to 6 east. Simply translated, this means that the area of focus is in the first and second tiers of townships north of the Gila and Salt base line and in the first to the sixth tiers of townships east of the Gila and Salt meridian. With regard to the specific townships through which the Salt River runs, this study involves lands that lie in township 1 north, ranges 1 through 5 east, and township 2 north, ranges 5 and 6 east.

[3] C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), pp. 137, 147.

With exterior township and range lines established, federal surveyors subsequently divided each township into thirty-six sub-blocks called "sections," most of which were 640 acres, or one mile square. (Due to the curvature of the earth and other factors, some townships were sometimes slightly adjusted to be more or less than a square mile.) The sections were numbered within each township in an "S" fashion beginning with the northeast square and heading west for sections one through six. Section seven then appeared immediately south of section six, and sections then went east through section twelve. The remaining sections were numbered in the same "S" fashion until section thirty-six was reached in the southeastern corner of the township.

Surveyors laying out the township, range, and section lines were provided with very precise instructions for measuring these lines because accuracy was critical for these lands to be transferred out of the public domain in a reliable manner. In addition, for those areas remaining in the public domain, the precise rules for surveying and for noting the characteristics of the land gave the U.S. Government an extremely valuable record of what it owned through the field notes that surveyors were required to make while undertaking surveys. The field notes were to include any notable features of the land such as streams, rivers, lakes, roads, farms, trails, or other prominent landmarks. Using their field notes, surveyors were then to draw and forward original survey maps to the surveyor-general of the respective state or territory along with the accompanying field notes for final approval.

The *Instructions to the Surveyor General of Oregon* contained several provisions that are relevant to navigable bodies of water and other obstructions. First, the *Instructions* provided that when surveyors encountered "impassable obstacles, such as ponds, swamps, marshes, lakes, rivers, creeks, &c.," they were to extend the survey line from the opposite side of the body of

water using triangulation or other surveying techniques. In addition, the surveyors were to "state all the particulars in relation thereto in your field book." Moreover, the manual continued,

> at the intersection of 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 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.* [Emphasis added.][4]

The *Instructions to the Surveyor General of Oregon* also provided that when surveyors 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."[5] Federal legislation directing that navigable bodies of water be set aside for public uses was first passed in 1796, but that law did not specify what constituted navigability. Nonetheless, the law provided that all navigable rivers:

> shall be deemed to be, and remain public highways: and that in all cases, where the opposite banks of any stream, not navigable, shall belong to different persons, the stream and the bed thereof shall become common to both.[6]

Therefore, where township, range, section, or fractional section lines encountered bodies of water, witness posts were to be established if those bodies were not navigable, but meander corner posts were to be placed where the lines intersected navigable bodies of water. As the instructions explained, surveyors were to note:

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[4] *Instructions to the Surveyor General of Oregon; Being a Manual for Field Operations* (1851), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 438.

[5] *Instructions to the Surveyor General of Oregon; Being a Manual for Field Operations* (1851), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 439. On the federal legislation mandating meanders of navigable bodies of water, see White, *A History of the Rectangular Survey System*, p. 30.

[6] *An Act Providing for the Sale of the Lands of the United States, in the Territory Northwest of the River Ohio, and above the Mouth of Kentucky River*, 1 Stat. 468 (1796).

> [i]ntersections 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."

Surveying lines that intersected any navigable bodies of water, on the other hand, were to be carried out as follows:

> In cases of navigable streams, their width will be ascertained between meander corners, as set forth under the proper heading.[7]

Aside from these general directions, surveyors were also given precise instructions for measuring the sinuosities of navigable bodies of water, including rivers, streams, lakes, ponds, or bayous. Between the meander corner posts, the edges of the banks were to be measured going downstream by recording degree bearings. The details of this meander surveying were to be recorded in the surveyor's field book as a separate set of records from the surveys of township, range, and section lines.[8]

Finally, as if these instructions were not specific enough, the *Instructions to the Surveyor General of Oregon* contained detailed examples of surveying notes so that field surveyors would understand virtually any type of circumstance they might encounter.[9]

2. The 1855 *Instructions to the Surveyors General of Public Lands*

Between 1851 and 1864, the U.S. General Land Office published only one revised version of the 1851 work. The 1855 manual (bearing the lengthy title *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*

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[7] *Instructions to the Surveyor General of Oregon; Being a Manual for Field Operations* (1851), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 444.

[8] *Instructions to the Surveyor General of Oregon; Being a Manual for Field Operations* (1851), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 442.

[9] C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), passim.

the Field Operations of Deputy Surveyors, Illustrated by Diagrams) contained more detail than the 1851 instructions. Nevertheless, it remained virtually identical in substance with regard to recording navigable and non-navigable bodies of water.[10]

3. The 1864 *Instructions to the Surveyors General of the United States*

Nine years after the 1855 revised manual had been issued, the U.S. General Land Office began to modify its instructions for how surveyors dealt with navigable and non-navigable bodies of water. Therefore, the 1851 and 1855 instructions, as modified in 1864, defined how the earliest federal surveyors in Arizona recorded bodies of water because those surveys commenced in 1868. In 1864, the 1855 surveyors' manual was amended by *Instructions to the Surveyors General of the United States, Relating to Their Duties and to the Field Operations of Deputy Surveyors*. The 1864 revision made no changes to the section of the 1855 manual that dealt with "insuperable objects on line." In fact, the 1864 amendments did not discuss these instructions at all, presumably leaving this part of the 1855 manual intact.

Regarding meanders and navigable streams, however, 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 internal communication, and have a uniform width, will be meandered on one bank.

The instructions added that for the sake of consistency, one-bank meanders were to be undertaken on the right side (looking downstream) unless obstacles made it necessary to switch

[10] For the 1855 discussion of how bodies of water were to be recorded, see *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), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), pp. 458, 461, 464-465.

to the left bank. If a change to the left were made, it was to be at a point where a survey line crossed the stream and recorded in the field notes.[11]

4. The 1881 *Instructions of the Commissioner of the General Land Office*

On May 3, 1881, the U.S. General Land Office once again updated its directions to federal surveyors by issuing *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*. In this manual (which governed how the 1888 resurvey of part of the Salt River area was done), much of the instructions remained the same as in the 1855 manual as amended in 1864, including, for example, how surveyors were to establish witness posts at intersections with non-navigable "insuperable objects on line." Here, as in 1851 and 1855, surveyors were told that when they encountered obstacles such as ponds, swamps, lakes, rivers, and creeks, they were to use triangulation to establish the distance across those non-navigable obstacles on line. Also as in the 1851 and 1855 manuals, surveyors were to set a witness post on the line on each side of obstacle, and they were to measure to two trees on opposite sides of the line for each post. Each tree was to be marked with a notch and blaze facing the post, and the degree bearing and distance from the trees to their respective witness posts on line were to be noted in the field notes.[12]

For navigable bodies of water, as had been the case in the 1851 and 1855 manuals (as amended in 1864), the surveyors were told that "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." And similar to the 1851 and 1855 instructions, the 1881 manual provided

[11] *Instructions to the Surveyors General of the United States, Relating to Their Duties and to the Field Operations of Deputy Surveyors* (1864), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 504.

[12] *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), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 516.

that "[m]eander corners are established at all those points where the lines of the public surveys intersect the banks of such rivers, bayous, lakes, or islands as are by law directed to be meandered."[13]

In terms of how meanders were to be carried out, the 1881 manual repeated the information from the 1855 manual as well as the 1864 addition that rivers that were not navigable "under the statute" but that were "well-defined natural arteries of internal communication" were to be meandered on one bank only. The balance of the instructions for meandering was also drawn from either the 1855 instructions or the 1864 amendments.[14]

5. The 1890 *Manual of Surveying Instructions*

Nine more years elapsed before the U.S. General Land Office revised its surveying instructions. On January 1, 1890, the agency issued its *Manual of Surveying Instructions for the Survey of the Public Lands of the United States and Private Land Claims*. Many of the surveying instructions were identical or nearly identical to the previous work, including those for recording major obstacles. For example, the 1890 instructions about how to report "insuperable objects on line" continued to provide that surveyors were to use triangulation to measure across the obstruction. Surveyors were still instructed to set a witness post on line at the edge of the non-navigable obstacle and to give the course and direction to two nearby trees on opposite sides of the line, each of which were to be notched and marked with a blaze facing the witness post. And, as had been the case in the 1855, 1864, and 1881 manuals, the 1890 directions also stated

[13] *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), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), pp. 516-517.

[14] *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), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), pp. 523-524.

that for navigable bodies of water, meander posts were to be set where lines intersected those obstacles, and meanders were to be run following the course of the river.[15]

A significant change had been made to the instructions for what bodies of water were to be meandered, however. Whereas in 1881, surveyors were to meander navigable streams (both sides) and any non-navigable body of water used for "internal communication" (on one side only), the 1890 manual deleted the instructions to meander non-navigable bodies of water that were used for "internal communication." In addition, the 1890 manual no longer told surveyors to meander streams that were considered navigable, as the 1881 manual had provided "under the statute." Instead, the 1890 instructions stated:

> Both banks of navigable rivers, as well as of all rivers not embraced in the class denominated as "navigable," the right angle width of which is three chains [198 feet] and upwards, will be meandered on both banks by taking the general courses and distances of their sinuosities, and the same are to be entered in the field book. Rivers not classed as navigable will not be meandered above the point where the average right-angle width is less than three chains.[16]

In short, there had been two changes to what should be meandered: 1) navigable bodies of water (1881 – "as are by law directed to be meandered" and "under the statute"; 1890 – "embraced in the class denominated as 'navigable'"), and 2) non-navigable streams (1881 – used for "internal communication," one bank to be meandered; 1890 – no reference to use for "internal communication," but more than three chains (198 feet) wide, both banks to be meandered).

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[15] *Manual of Surveying Instructions for the Survey of the Public Lands of the United States and Private Land Claims* (1890), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 560.

[16] *Manual of Surveying Instructions for the Survey of the Public Lands of the United States and Private Land Claims* (1890), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 568.

6. The 1894 *Manual of Surveying Instructions*

On June 30, 1894, the U.S. General Land Office issued its 1894 *Manual of Surveying Instructions for the Survey of the Public Lands of the United States and Private Land Claims*. In relation to directions for meandering, the 1894 manual (which governed how the 1899 resurvey of some of the Salt River region was accomplished) had major changes in what bodies of water were to be meandered. The new instructions still called for bodies of water "embraced in the class denominated 'navigable'" to be meandered. In addition, as had been the case in the 1890 manual, all non-navigable bodies of water that were more than three chains wide were to be meandered, but here the 1894 manual added an important instruction. Both navigable and non-navigable streams (more than three chains wide) were to be meandered "at the ordinary mean high water mark," and their general courses and sinuosities were to be recorded in the appropriate field notebook. Furthermore, in another significant change, the 1894 manual provided that "[s]hallow streams, without any well-defined channel or permanent banks will not be meandered; except tide-water steams, whether more or less than three chains wide, which should be meandered at ordinary high-water mark, as far as tide-water extends."[17]

7. The 1902 *Manual of Surveying Instructions*

Shortly after the turn of the century, the U.S. General Land Office once again revised its surveying handbook, releasing on January 1, 1902, *Manual of Surveying Instructions for the Survey of the Public Lands of the United States and Private Land Claims*. There were significant differences between the 1902 manual (which dictated how the 1910-1911 resurvey of part of the Salt River area was carried out) and its 1894 predecessor regarding meandering. First, the 1902

[17] *1894 Manual of Surveying Instructions for the Survey of the Public Lands of the United States and Private Land Claims* (1894), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 621.

manual observed that the term "meander" had frequently been misapplied in the past by surveyors, which had important implications for lands adjoining the meander lines. The 1902 manual stated:

> The running of meander lines has always been authorized in the survey of public lands fronting on large streams and other bodies of water, but does not appear to have been proper in other cases. The mere fact that an irregular or sinuous line must be run, *as in the case of a reservation boundary*, does not entitle it to be called a meander line except where it closely follows a stream or lake shore. The legal riparian rights connected with meandered lines do not apply in case of other irregular lines, as the latter are strict boundaries. [Emphasis added.][18]

What the manual meant was that the beds and banks of bodies of water that were navigable (and thus meandered) were held by the states whereas the beds and banks of non-navigable bodies of water were held by the adjoining riparian land owners. Therefore, meander lines needed to be clearly identified and had to be distinct from other irregular survey lines, such as those utilized for marking the edges of Indian and other federal land reservations.

Regarding which bodies of water were to be meandered, the 1902 manual had one addition to the 1894 instructions. The new direction provided that streams less than three chains wide were not to be meandered:

> except that streams which are less than three chains wide and which are so deep, swift and dangerous as to be impassable through the agricultural season, may be meandered, where good agricultural lands along the shores require their separation into fractional lots for the benefit of settlers. But such meander surveys shall be subject to rejection if proved unnecessary by field inspection.[19]

The 1902 manual also retained the instruction that shallow streams "without any well-defined channel or permanent banks, will not be meandered; except tide-water streams, whether

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[18] *Manual of Surveying Instructions for the Survey of the Public Lands of the United States and Private Land Claims* (1902), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 717.

[19] *Manual of Surveying Instructions for the Survey of the Public Lands of the United States and Private Land Claims* (1902), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 718.

more or less than three chains wide, which should be meandered at the ordinary high-water mark, as far as tide-water extends."[20]

In short, during the second half of the nineteenth and the early twentieth centuries, there were substantial revisions to the instructions to federal surveyors concerning how they were to mark and record the intersection of survey lines with non-navigable and navigable bodies of water. Although initially only navigable bodies of water were to be meandered, that direction had been expanded over the years to include some non-navigable bodies of water.

B. Federal Surveys of Lands along the Salt River

During the second half of the nineteenth and the early twentieth centuries, various areas along the Salt River were surveyed and resurveyed several times, both in relation to exterior township and range lines as well as for interior section and subsection lines. Because surveyors whose work involved marking only exterior lines did not have the responsibility to undertake meanders where necessary, the field notes of those surveys are of limited value to this report and therefore will not be discussed here. Instead, the field notes of interior surveys and resulting plats will be examined in detail for information regarding those surveyors' judgments and descriptions regarding the Salt River's navigability or non-navigability.

The interiors of the townships through which the Salt River flows between the confluence with the Gila River and Granite Reef Dam were surveyed initially by federal surveyors (and brothers) Wilfred F. and George P. Ingalls in 1868 (Wilfred undertook the surveys for township 1 north, ranges 1 to 5 east, and George surveyed township 2 north, ranges 5 and 6 east). These

[20] *Manual of Surveying Instructions for the Survey of the Public Lands of the United States and Private Land Claims* (1902), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), p. 718.

surveys were carried out under the terms of the 1855 federal surveyors' manual as modified by the 1864 instructions.

Because of the importance of these initial federal surveys in relation to establishing the nature of the Salt River, they will be discussed in detail here. In general, the discussion will be in an up-river manner because the surveys were carried out moving away from the initial monument for the Gila and Salt River Base and Meridian. Within individual townships discussion will also be upriver by the location where the Salt River crossed interior lines. In terms of the field notes and resulting township plats, since surveyors' notes were compiled in the field and plats were later drawn based on the notes, the notes for each township survey will be discussed first followed by the corresponding plats.

1. 1868 Interior Survey of Township 1 North, Range 1 East (Field Notes)

Wilfred F. Ingalls surveyed the interior section lines of township 1 north, range 1 east, between March 4 and 12, 1868, under his contract dated February 18, 1868. The notes (and resulting plat, which is reproduced below) indicate that the Salt River (or its bed) lay in parts of sections 31 to 36, as well as sections 25 and 26. In all of his encounters with the Salt River in this township, Ingalls followed the rules laid down in the 1851 and 1855 manuals (as modified by the 1864 instructions) for denoting a non-navigable body of water in his field notes. No meander corner posts were set at any crossing of the Salt. Instead, Ingalls used witness posts indicating a non-navigable body of water (he referred to them as flags in some cases), and he employed triangulation to measure across the stream.[21]

[21] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N. Range 1 E. of the Gila and Salt River Meridian in the Territory of Arizona," March 12, 1868, pp. 1B-4, 14-17, 26-27, 38-39, 50, U.S. Bureau of Land Management, Phoenix, Arizona.

Following the survey of interior section lines, Ingalls added the general description of the township, which he was required to do by his surveying instructions. Here, he provided his perception of the Salt River and other characteristics of the entire township. Regarding the Salt, he stated that there was "a very good ford across Salt River in sec 35" (near the northeastern boundary of today's Gila River Indian Reservation), perhaps suggesting a relatively shallow stream at that point.[22]

2. 1868 Interior Survey of Township 1 North, Range 1 East (Plat)

On October 8, 1868, the official plat of township 1 north, range 1 east – as drawn from Wilfred Ingalls's field notes – was approved by the surveyor general's office in Phoenix, Arizona. The plat is reproduced below.

[22] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N. Range 1 E. of the Gila and Salt River Meridian in the Territory of Arizona," March 12, 1868, pp. 67-68, U.S. Bureau of Land Management, Phoenix, Arizona.

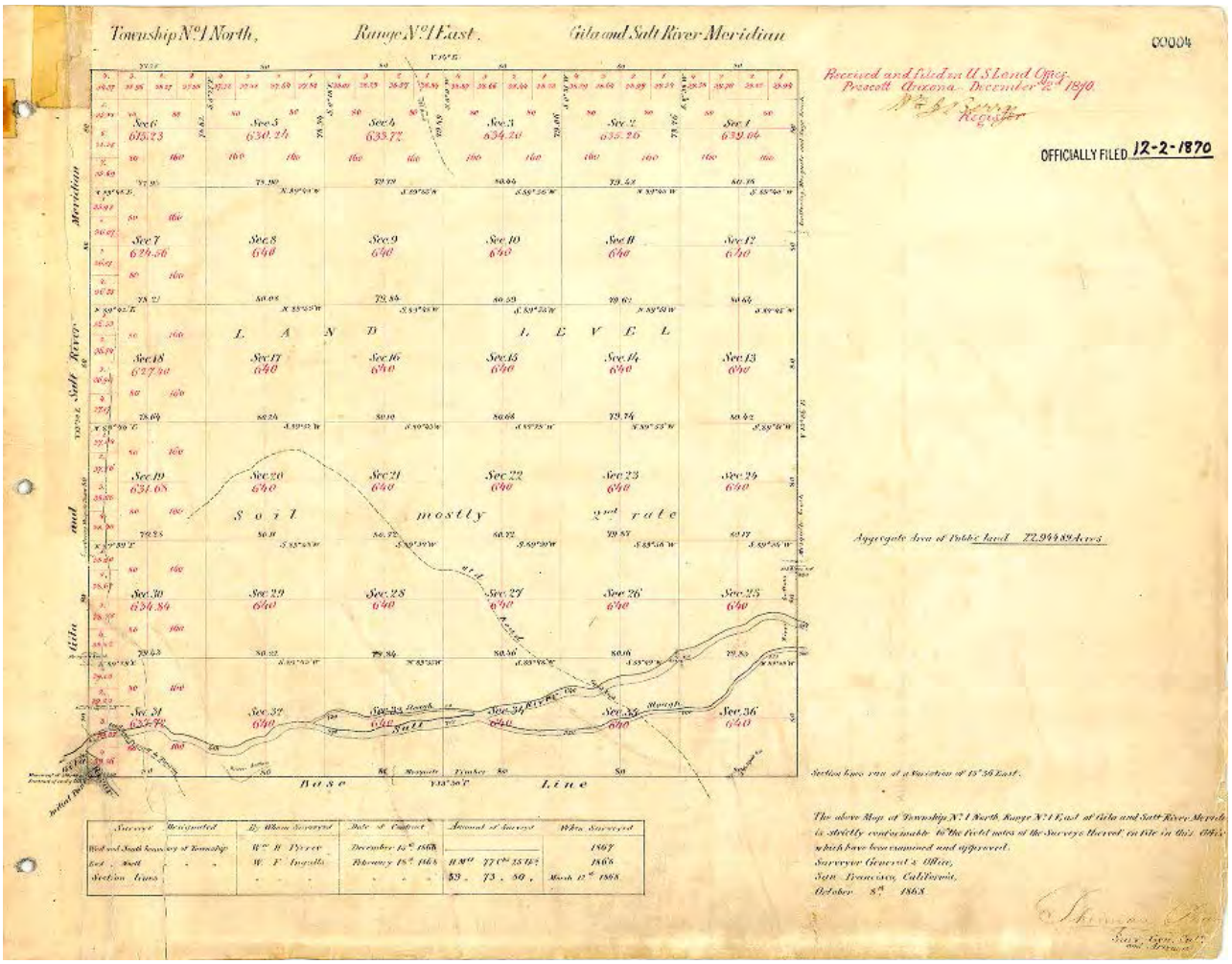

Figure 1: Survey Plat of Township 1 North, Range 1 East, Gila and Salt River Meridian, Oct. 8, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

While the map clearly shows the Salt River running along the township's southern edge, there is no indication of meander lines on either bank of that stream, nor are there any meander notes in the margins of the plat. Had the Salt River been deemed navigable, the data on meander degree bearings would have been recorded in the right-hand margin of the plat as well as in the respective field notes. No such notations appeared in either place for this township. Moreover, the map carries the notation: "Aggregate Area of Public land 22,944.89 acres." While 36 sections on a flat globe would contain a total of 23,040 acres, since the earth is rounded,

adjustments to the sections in the western and northern sections made this township's total acreage equal 22,943.89 acres (based on adding the acreages shown on the map in each section). While this is one acre less than the notation appearing in the margin of the map that the township contained 22,944.89 acres of public lands, the missing acre most likely is due to recording or mathematical error and is not because any land had been withheld from the public domain due to the navigability of the Salt River. Had the missing land been due to navigability, the acreage would have been substantially larger than merely one acre.[23]

3. 1868 Interior Survey of Township 1 North, Range 2 East (Field Notes)

Shortly after he had completed his survey of the interior lines for township 1 north, range 1 east, Wilfred Ingalls surveyed the interior lines for township 1 north, range 2 east. In the course of his survey, he encountered the Salt River in sections 13, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30. Throughout much of this township, the Salt River was divided into two channels, the north and south branches, although the two combined briefly between sections 22 and 23 before splitting again into a north and south channel. There were also places where sloughs split off from one of the main channels and then rejoined that channel further downstream.

There is no indication in the field notes that Ingalls considered the Salt River to be navigable in this township. He set no meander corners and ran no meander lines. In each of his encounters with the Salt River's branches and sloughs he treated them in his field notes according to directions in the 1851 and 1855 manuals (as modified by the 1864 *Instructions*) for

[23] U.S. General Land Office Survey Plat of Township 1 North, Range 1 East, Gila and Salt River Meridian, Oct. 8, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

describing and marking non-navigable bodies of water, setting witness posts and using triangulation to measure across the stream.[24]

Aside from this indication that Ingalls did not consider the Salt River in this township to be navigable, additional information can be gleaned from his descriptions as he crossed the stream in various places. For example, on the line between sections 22 and 23, Ingalls's characterization of the North Branch indicates that it probably was not navigable:

> 18.50 [chains] To left bank of North channel of Salt River – low sandy banks constantly shifting [river] runs S85W.[25]

Ingalls's depictions of the South Branch of the Salt River in this township, like those of the north branch, failed to indicate that that branch of the stream was navigable. No meander posts were set, and no meander lines were run. Moreover, the stream was so shallow in some locations that Ingalls could wade across it and did not need to use triangulation to measure its width. For instance, he encountered the South Branch of the Salt River on the line between sections 29 and 28. In his field notes, he recorded this branch as follows:

> 34.10 [chains] To South Channel of Salt River. 3.20 chs wide runs west – not too deep to prevent measuring across it on line.[26]

Likewise, Ingalls's description of the South Branch on the line between sections 27 and 28 was similar to that for the line just downstream (between 29 and 28), including the notation that the stream was "not too deep to prevent measuring across it on line."[27]

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[24] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N, Range 2 E of the Salt River Meridian in the Territory of Arizona," March 16, 1868, pp. 73, 99-100, 109, 111-112, U.S. Bureau of Land Management, Phoenix, Arizona.

[25] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N, Range 2 E of the Salt River Meridian in the Territory of Arizona," March 16, 1868, p. 99, U.S. Bureau of Land Management, Phoenix, Arizona.

[26] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N, Range 2 E of the Salt River Meridian in the Territory of Arizona," March 16, 1868, p. 109, U.S. Bureau of Land Management, Phoenix, Arizona.

[27] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N, Range 2 E of the Salt River Meridian in the Territory of Arizona," March 16, 1868, p. 97, U.S. Bureau of Land Management, Phoenix, Arizona.

4. 1868 Interior Survey of Township 1 North, Range 2 East (Plat)

The plat of township 1 north, range 2 east (shown below), which was approved by the surveyor-general on October 9, 1868, also gave no indication that Ingalls considered the Salt River's channels to be navigable.

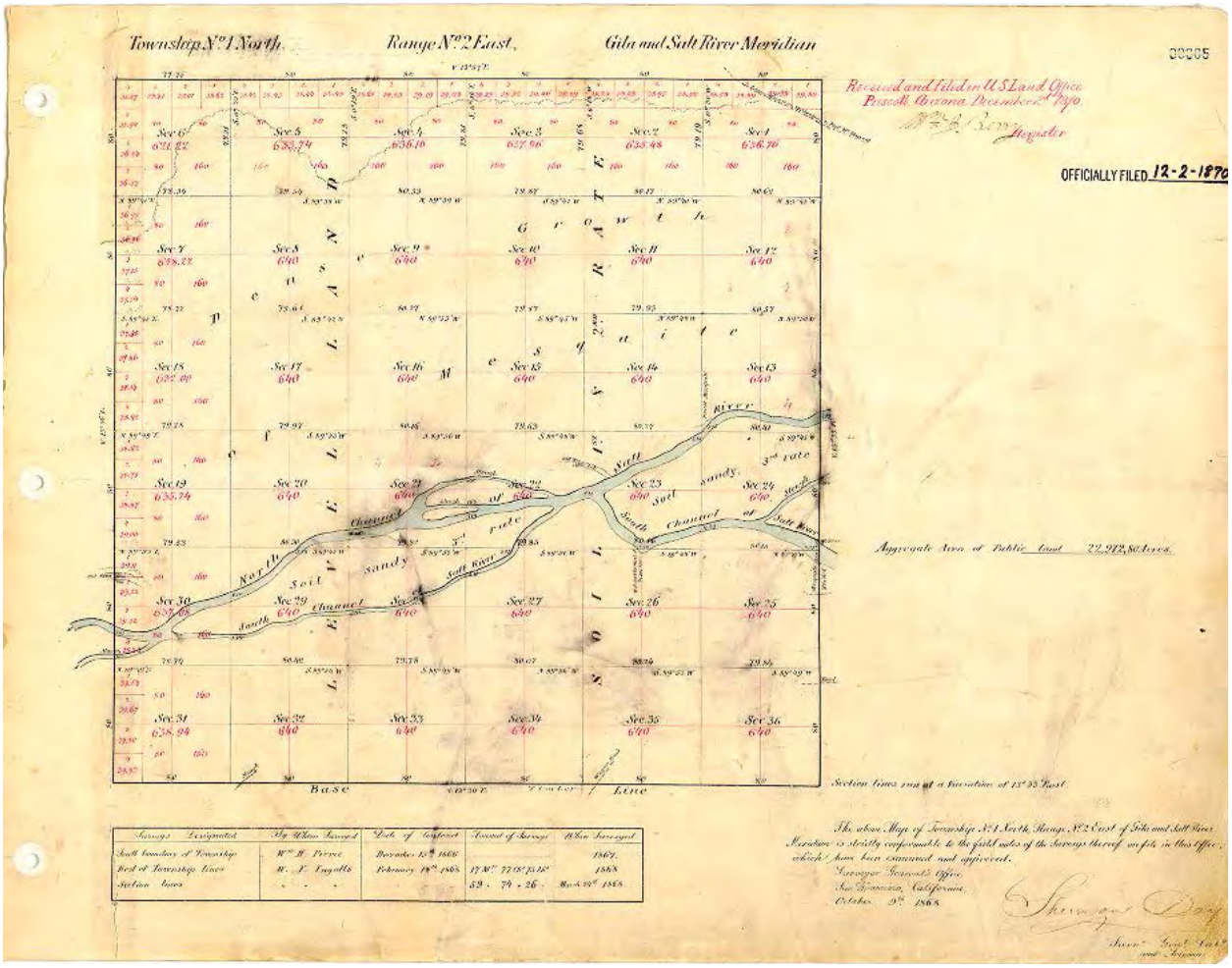

Figure 2: Survey Plat of Township 1 North, Range 2 East, Gila and Salt River Meridian, Oct. 9, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

No meander lines were drawn on the plat, and there were no meander details in the margins. Aside from this indication of the non-navigability of the Salt, other information on the plat supports the idea that the river was not used for commercial transportation. Roads on the map connecting Phoenix and Wickenburg to Fort McDowell suggest that the river was not used for

transportation. In addition, the total aggregate of public land indicated in the margin of the plat left no land outside the public domain due to the possibility of Arizona's future sovereignty as a state.[28]

5. 1868 Interior Survey of Township 1 North, Range 3 East (Field Notes)

When Ingalls had completed his survey of township 1 north, range 2 east, he began his work on the next township to the east – township 1 north, range 3 east. This survey was undertaken between March 27 and April 4, 1868. Throughout this entire township (which today includes downtown Phoenix), the Salt River flowed in two channels, identified by Ingalls respectively as the North Channel and the South Channel. One or both of these channels lay in parts of sections 13 to 24, and in every case where Ingalls recorded crossing the stream, he set no meander corner posts. Instead, he used witness corners, thus indicating a lack of navigability.[29] Certain section lines Ingalls found too difficult to survey due to their location either in the North or South channels or in the bottom lands between them. This precluded his determining whether to set meander corners or witness posts. Nevertheless, his explanation for why he did not survey these lines strongly suggests a stream (or streams) that were not navigable. For example, regarding the line between sections 16 and 21, Ingalls wrote:

> Note – Land on line bet secs 16 & 21 sandy – subject to overflow and unfit for cultivation a large portion of it being washed or shifted about every season more or less.[30]

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[28] U.S. General Land Office Survey Plat of Township 1 North, Range 2 East, Gila and Salt River Meridian, Oct. 9, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

[29] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N Range 3 E of the Gila and Salt River Meridian in the Territory of Arizona," March 27, 1868, pp. 171-172, 198, 203, U.S. Bureau of Land Management, Phoenix, Arizona.

[30] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N Range 3 E of the Gila and Salt River Meridian in the Territory of Arizona," March 27, 1868, p. 183, U.S. Bureau of Land Management, Phoenix, Arizona.

Again, for the line between sections 15 and 22, he explicitly stated that he did no survey there:

> Note: The line bet secs 15 & 22 running some distance in the river . . . subject to overflow and unfit for cultivation interspersed with numerous sloughs from the river. I do not run it.[31]

Such descriptions indicate that navigation on this part of the river would probably have been difficult, if not impossible. Ingalls offered no further explanation for not surveying the lines between sections 14 and 23 and 13 and 24 (near today's Sky Harbor Airport), but since those lines also ran along one or the other channels of the river or between those channels, the same description that Ingalls offered for the lines between 16 and 21, and 15 and 22, would have applied to the lines between 14 and 23, and 13 and 24.

Ingalls's general description of the township contained a considerable amount of revealing information about the two channels of the Salt River that continued to underscore Ingalls's opinion that the stream was not navigable:

> Salt River separates in two channels called North and South Channels with numerous sloughs running from one to the other runs through a loose sandy [illegible in original] in the middle of the township from East to west – It is continually washing away and changing its course. This Township is made fractional in consequence of the land bet the North and South channels being sandy and constantly washed and shifted by the river and unfit for cultivation.[32]

Finally, Ingalls concluded his comments on this township with a description of the new town of Phoenix, indicating that ancient irrigation had been practiced along the Salt. He added that recent settlers were reinstituting this aid to farming – apparently with no concern for the river's potential navigability:

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[31] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N Range 3 E of the Gila and Salt River Meridian in the Territory of Arizona," March 27, 1868, p. 172, U.S. Bureau of Land Management, Phoenix, Arizona.

[32] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N Range 3 E of the Gila and Salt River Meridian in the Territory of Arizona," March 27, 1868, pp. 212-213, U.S. Bureau of Land Management, Phoenix, Arizona.

> A settlement called Phoenix was formed in the NE part of the Township during the winter of 1867 & 1868. It now contains about 50 persons who have displayed great energy in the construction of their "irrigation ditches" and the clearing of their lands and will this year bring under cultivation a large extent of [? – illegible in original]. The settlement though young bears every evidence of thrift and prosperity. The land in this Tp. north of Salt River bears every evidence of having been under cultivation at some former time. The old esca [*sic* – acequia] running through secs 1, 2 & 12 which evidently used to irrigate these lands is still in a good state of preservation.[33]

6. 1868 Interior Survey of Township 1 North, Range 3 East (Plat)

The plat of township 1 north, range 3 east, which was filed with the surveyor general on December 2, 1870 (see below), illustrated the Salt River flowing in a westerly direction through the middle of the township in two channels and several sloughs.

[33] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N Range 3 E of the Gila and Salt River Meridian in the Territory of Arizona," March 27, 1868, pp. 212-213, U.S. Bureau of Land Management, Phoenix, Arizona.

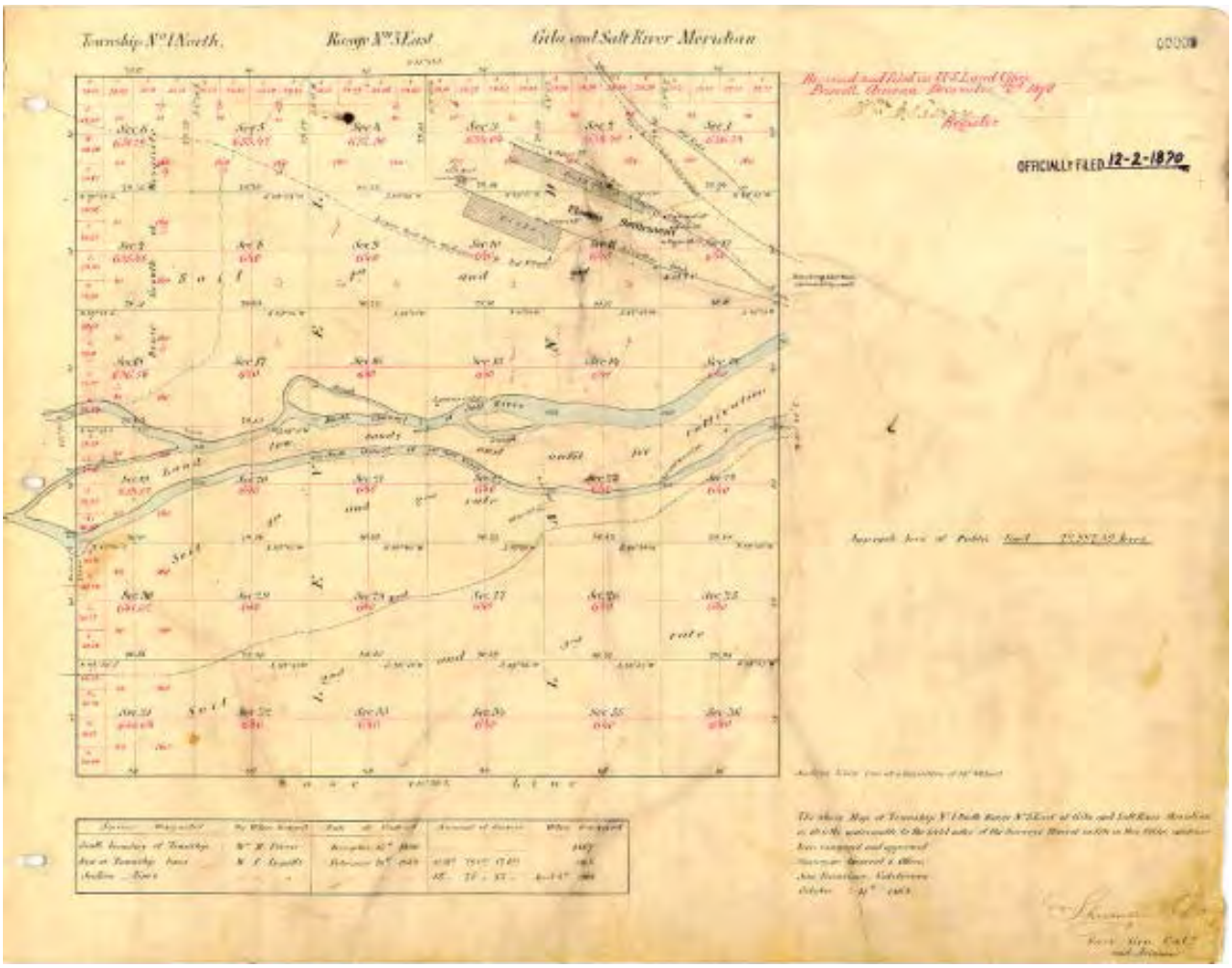

Figure 3: U.S. General Land Office Survey Plat of Township 1 North, Range 3 East, Gila and Salt River Meridian, Dec. 2, 1870, U.S. Bureau of Land Management, Phoenix, Arizona.

No meander lines are shown on the plat, and no meander data appear in the margins. Further suggesting that the Salt was not considered navigable are irrigation canals described in the field notes. Water diverted from the river to serve farmlands, of course, could deplete supplies necessary to maintain navigability, but other historical documentary evidence to be discussed later in this report indicates that no objections were made to such diversions. With regard to the roads, one runs south of the river roughly paralleling it, while another is on the

north side, again also roughly paralleling the river. The location and direction of these roads strongly indicates that the river itself was not used to carry commerce or people.[34]

7. 1868 Interior Survey of Township 1 North, Range 4 East (Field Notes)

Wilfred Ingalls surveyed the interior lines of township 1 north, range 4, east between April 8 and 16, 1868. According to Ingalls's field notes and the related plat for this township (which today includes Tempe, Arizona), the Salt River was divided into two channels for part of its distance through this township, and in all instances where Ingalls encountered either channel or the combined river, he recorded that crossing in a manner consistent with the directions in the 1851 and 1855 manuals as well as the 1864 Instructions for non-navigable bodies of water. No meander corner posts were set; only witness posts. In addition, no meander lines were run.[35]

Ingalls then discussed the general characteristics of the township. As had been the case in the township downstream, he observed that settlers were taking water from the river to irrigate their lands and planned to expand this practice – apparently with no objections from navigation interests:

> There are two esecas [*sic* – acequias] taking water from Salt River in sec 7 and runs thence westward into Tp. 1 N R 8 E and which is used by the farmers for irrigating their lands. The settlers propose constructing another eseca taking the water from the river in sec 15 leading westerly to their adjoining Township.[36]

[34] U.S. General Land Office Survey Plat of Township 1 North, Range 3 East, Gila and Salt River Meridian, Dec. 2, 1870, U.S. Bureau of Land Management, Phoenix, Arizona.

[35] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N Range 4 E of the Gila and Salt River Meridian in the Territory of Arizona," April 8, 1868, pp. 174-175, 221, 232, 243, 255, 264, 271-272, 276, U.S. Bureau of Land Management, Phoenix, Arizona.

[36] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N Range 4 E of the Gila and Salt River Meridian in the Territory of Arizona," April 8, 1868, p. 283, U.S. Bureau of Land Management, Phoenix, Arizona.

8. 1868 Interior Survey of Township 1 North, Range 4 East (Plat)

The plat for township 1 north, range 4 east (see below), was approved by the surveyor-general on October 21, 1868, and it continued to demonstrate that Ingalls consistently had treated the Salt River as non-navigable.

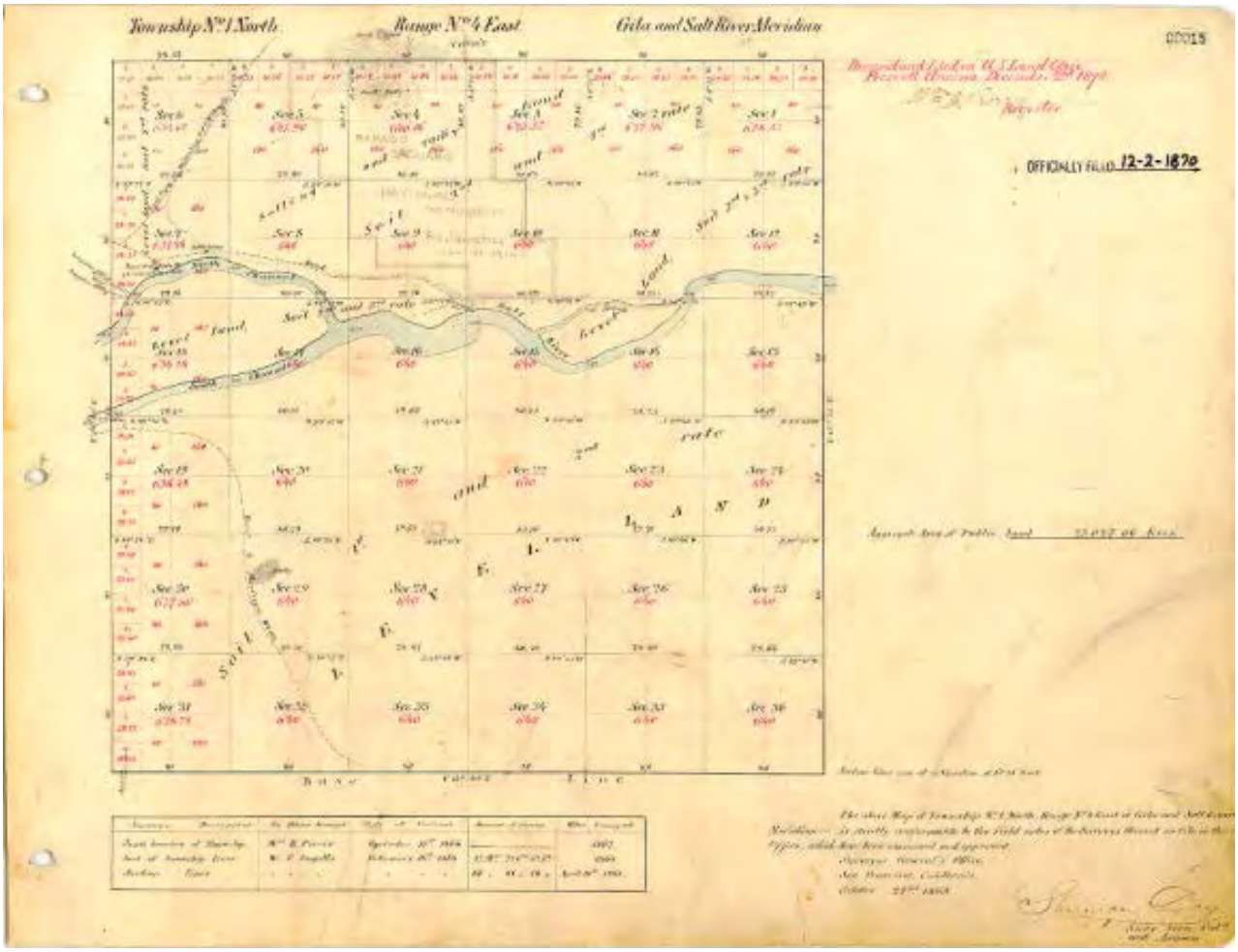

Figure 4: U.S. General Land Office Survey Plat of Township 1 North, Range 4 East, Gila and Salt River Meridian, Oct. 21, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

The plat had no meander lines or meander data in the margins. Moreover, the irrigation ditches mentioned in the field notes' general description of the township were clearly present on the north side of the river. In addition, the plat indicates several things demonstrating that

Surveyor Ingalls did not consider the Salt River to be navigable. First, suggesting that the river was not used for transportation is the fact that, like further downstream, several roads appear on the map. One of them directly paralleled the main stem of the North Channel, passing in an east-west direction by a settler's cabin and continuing to the irrigation ditch in section 16. Veering north from this road was another going northeast through sections 7, 6, and 5. This road ran from Wickenburg to Fort McDowell. Another road extended from the North Channel of the river between the two irrigation ditches that headed in section 7. This road crossed into township 1 north, range 3 east. Finally, a road paralleling the South Channel of the Salt River in section 19 turned southeast and ran through sections 20, 29, 32, and 33. This road was described as the road to Maricopa Wells. Since these roads roughly paralleled the Salt River or in some cases linked to areas connected to the Salt (such as Fort McDowell on the Verde River), their presence strongly suggests that contemporaneous observers did not consider the Salt River to be navigable.

Finally, also suggesting that the Salt River was not navigable is the fact that the figure in the margin of the plat for aggregate area of public lands – 23,027.06 acres – is the cumulative total of all the sections on the plat. In other words, no acreage was subtracted for the bed and banks of the river due to the future possible sovereignty of the State of Arizona.[37]

9. 1868 Interior Survey of Township 1 North, Range 5 East (Field Notes)

Moving upstream, Wilfred Ingalls surveyed the interior lines to township 1 north, range 5 east, between April 20 and 29, 1868. The Salt River flowed through the northwest corner of this township (which today is part of the Salt River Indian Reservation), entering from the north in two channels and merging just before flowing across the western boundary. As had been the

[37] U.S. General Land Office Survey Plat of Township 1 North, Range 4 East, Gila and Salt River Meridian, Oct. 21, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

case downstream, at each point where Ingalls crossed the channels of the Salt, he recorded that encounter in a manner consistent with federal instructions for non-navigable bodies of water. Witness posts were set on both banks, and triangulation was used to measure across on line. No meander corner posts were established anywhere in the township at any crossing of the Salt.[38]

As he had done for other townships along the river, Ingalls added at the end of his notes a description of this township. Once again, he observed the potential for expanding irrigated agriculture in the area, but he made no mention of possible conflicts with navigation concerns. Moreover, at the very end of his general description, he offered a depiction of the stream that indicated that regular navigation on the river was unlikely:

> The bottom lands can be easily irrigated with water from the Salt River and will doubtless produce grain or vegetables adapted to the climate. This land resembles that which the Maricopa and Pima Indians have under cultivation near the Gila River at what is called the Maricopa and Pima villages, upon which land they raise barley, wheat, corn, etc., etc., to a considerable extent. The mesa can be irrigated but only with much more expense that would be the case with the bottom lands as it lies about 25 or 30 ft. above the bottoms. . . . *The North and South channels of Salt River are now of about equal size – but as they run through sandy soil are constantly changing position and size.* [Emphasis added.][39]

10. 1868 Interior Survey of Township 1 North, Range 5 East (Plat)

The plat of township 1 north, range 5 east (see below), reflected Ingalls's notes and his estimation that the Salt River was not navigable.

[38] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N Range 5 E of the Gila and Salt River Meridian in the Territory of Arizona," April 29, 1868, pp. 319-320, 329-332, 346-349, U.S. Bureau of Land Management, Phoenix, Arizona.

[39] Wilfred F. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 1 N Range 5 E of the Gila and Salt River Meridian in the Territory of Arizona," April 29, 1868, pp. 353-355, U.S. Bureau of Land Management, Phoenix, Arizona.

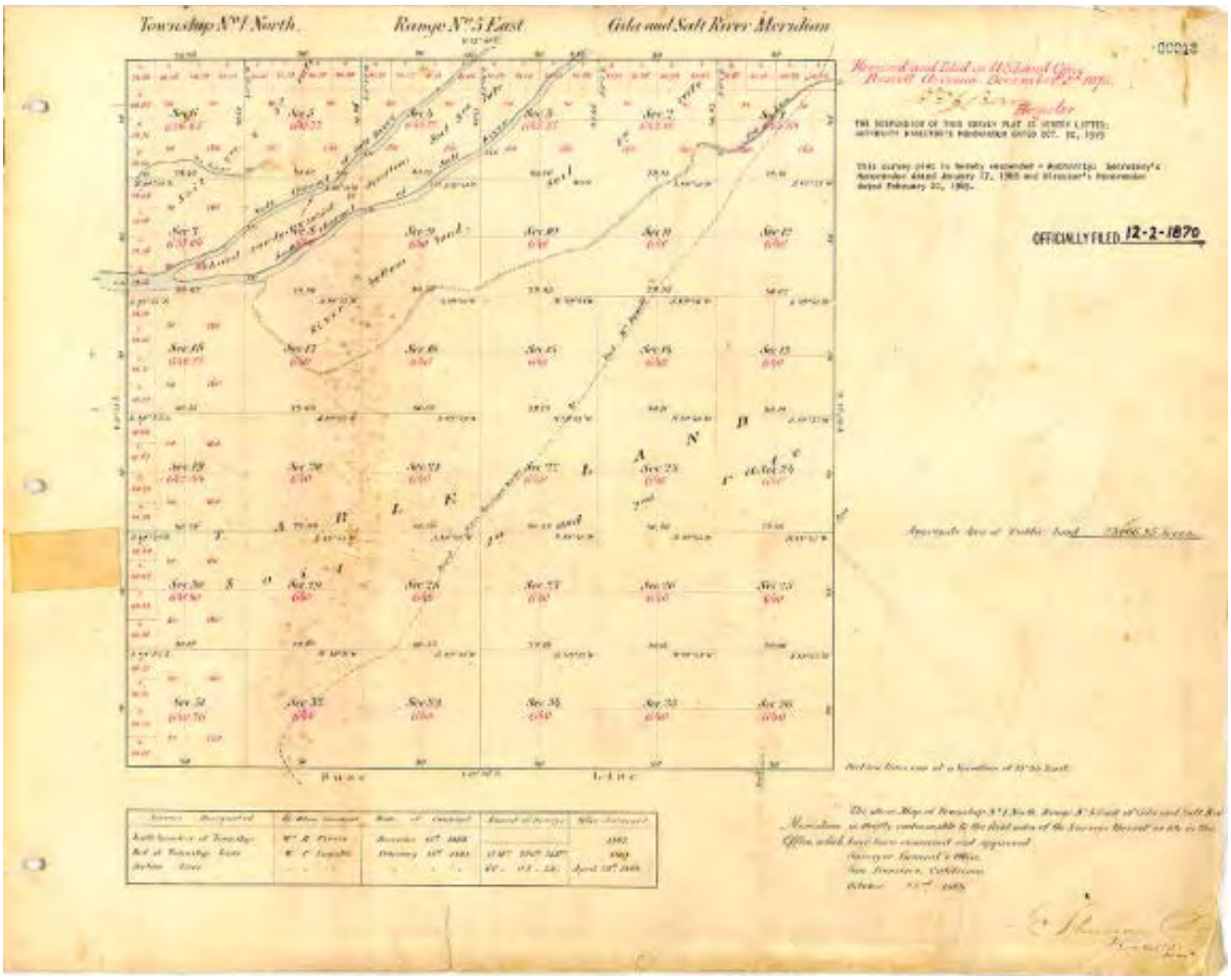

Figure 5: U.S. General Land Office Survey Plat of Township 1 North, Range 5 East, Gila and Salt River Meridian, Oct. 22, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

Approved by the surveyor general on October 22, 1868, the plat suggested that the river was not navigable by indicating that the land between the two channels of the Salt River was "sandy & subject to overflow, soil 3rd rate." The presence of roads roughly paralleling the Salt, the lack of meander lines or marginal meander notes, and the cumulative total of aggregate public lands listed on the map all supported the field notes' assessment that the Salt River was deemed not navigable by Ingalls.[40]

[40] U.S. General Land Office Survey Plat of Township 1 North, Range 5 East, Gila and Salt River Base and Meridian, Oct. 22, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

11. 1868 Interior Survey of Township 2 North, Range 5 East (Field Notes)

Much as Wilfred F. Ingalls had treated the Salt River as non-navigable in his surveys of township 1 north, ranges 1 through 5 east, his brother, George P. Ingalls, reached the same conclusion for township 2 north, ranges 5 and 6 east. In May 1868, George Ingalls surveyed the interior section lines to township 2 north, range 5 east. The Salt River entered this township in one channel in the southeastern part of the township, split into two channels, and exited the township on the southern border. Crossing the Salt's channels several times as he ran survey lines, George Ingalls consistently set no meander corners, despite the requirements spelled out in the 1851 and 1855 manuals as well as the 1864 *Instructions* that meander corner posts were necessary where interior lines crossed navigable streams. No meander lines were run either. Instead, George Ingalls – like his brother Wilfred – treated the channels of the Salt as non-navigable at each encounter, and he established witness posts to triangulate the distance across in each locale. Also adding to a picture of a non-navigable stream, George Ingalls noted that the water in the Salt's channels had a "rapid current."[41]

In the general description of this township, Ingalls added the further observation regarding the Salt River implying that the stream was not navigable:

> Its banks are generally low and sandy *and it often shifts its bed* during a very high stage of the waters. It affords many facilities for irrigating the surrounding country. [Emphasis added.][42]

[41] George P. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 2 N Range 5 E of the Gila and Salt River Meridian in the Territory of Arizona," May 25, 1868, pp. 428-429, 438-439, 440-443, 453-454, U.S. Bureau of Land Management, Phoenix, Arizona.

[42] George P. Ingalls, "Field Notes of the Survey of the Subdivision Lines of Township 2 N Range 5 E of the Gila and Salt River Meridian in the Territory of Arizona," May 25, 1868, p. 494, U.S. Bureau of Land Management, Phoenix, Arizona.

12. 1868 Interior Survey of Township 2 North, Range 5 East (Plat)

The plat drawn from George Ingalls's field notes for township 2 north, range 5 east (see below), was approved by the surveyor general on December 31, 1868.

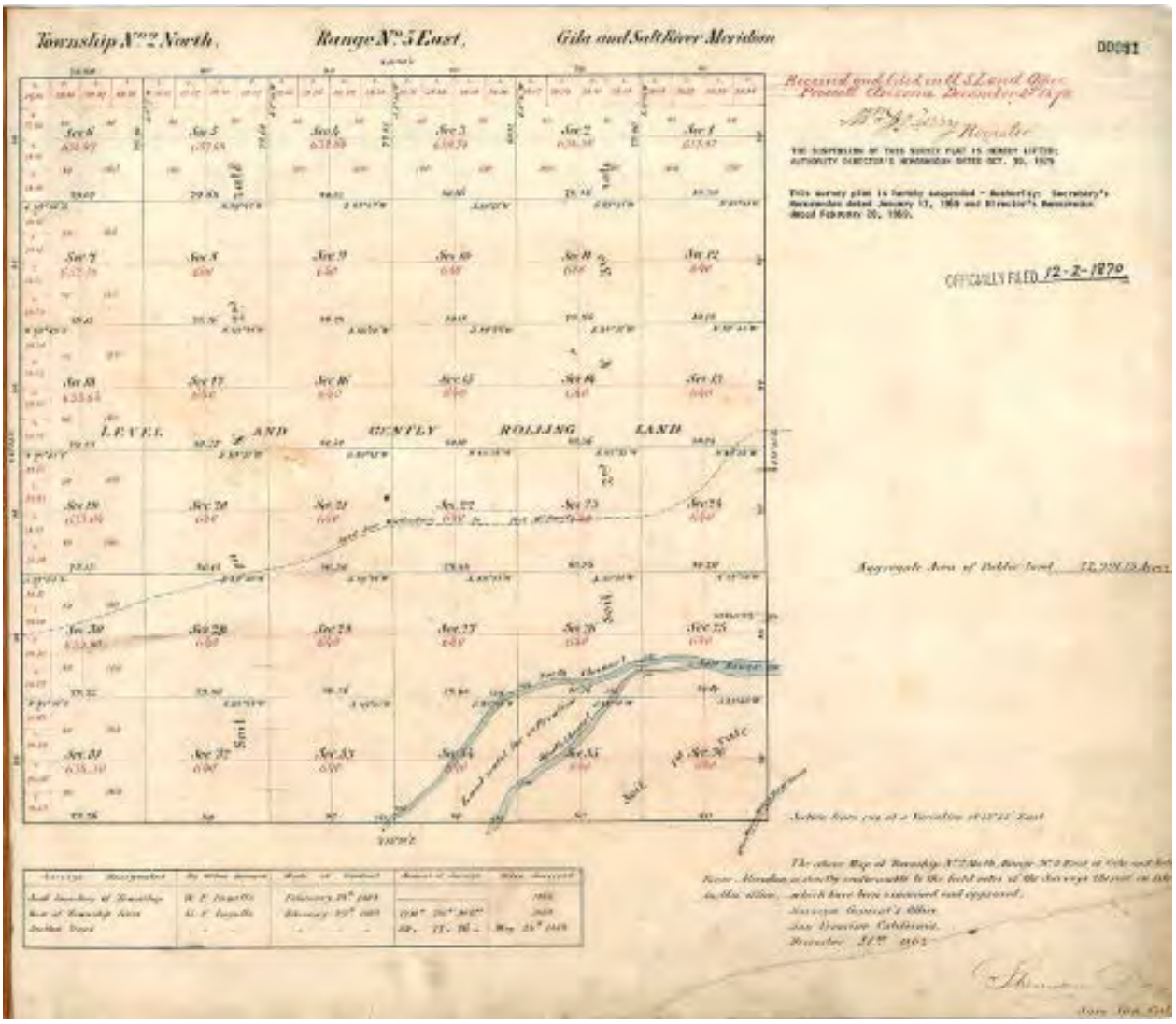

Figure 6: U.S. General Land Office Survey Plat of Township 2 North, Range 5 east, Gila and Salt River Meridian Dec. 31, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

The plat, like the notes, demonstrated in at least two ways that George Ingalls did not considered the Salt River to be navigable. First, the margin of the map indicated there were a total of 22,991.13 acres of public land in the township, which conformed with the total acreage

assigned to each section on the plat. Therefore, no acreage had been withheld as not being public lands due to the presence of the two channels of the Salt River. In addition, a road was drawn running roughly parallel to the Salt channels. The plat identified this road as running from Wickenburg to Fort McDowell, and its presence paralleling the river suggests that the stream was not used for transporting people or goods.[43]

13. 1868 Interior Survey of Township 2 North, Range 6 East (Field Notes)

The last township to be surveyed in 1868 below the present-day location of Granite Reef Dam was township 2 north, range 6 east. George Ingalls completed surveying the interior lines of this section on June 11, 1868. The survey was a "fractional" survey – meaning it did not cover the entire township. Only the southern part was surveyed (through which the Salt River flowed) because Ingalls deemed most of the northern half of the township too rough and uneven for farming.

In every instance where Ingalls encountered the Salt River in surveying the interior lines of this fractional township, he consistently treated the river as being non-navigable. He set no meander corner posts, and he did no meander measurements. Instead, he established witness posts and measured across the stream by triangulation. Moreover, in denoting his measurements at one crossing, Ingalls wrote in his field notes that the "water not too deep to prevent measuring across it on line."[44]

Indicating the fluctuating levels of the Salt River's flows, Ingalls wrote in the general description of the township:

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[43] U.S. General Land Office Survey Plat of Township 2 North, Range 5 east, Gila and Salt River Meridian Dec. 31, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

[44] George P. Ingalls, "Field Notes of the Survey of the Subdivision of Fractional Township 2 N Range 6 E, of the Gila and Salt River Meridian in the Territory of Arizona," June 11, 1868, pp. 565, 570-571, 576, 578, 595-596, U.S. Bureau of Land Management, Phoenix, Arizona. The quotation is at 595-596.

The bottom lands are good 1st & 2nd rates and is [*sic* – are] situated on both sides of Salt River, a fine stream of pure water running in a westerly direction through the middle of the township. It is fordable during six or seven months of the year in sec 29 at the crossing of the Fort McDowell & Maricopa Wells Road.[45]

14. 1868 Interior Survey of Township 2 North, Range 6 East (Plat)

The plat based on Ingalls's field notes for the survey of township 2 north, range 6 east (see below), was approved by the surveyor general on December 31, 1868.

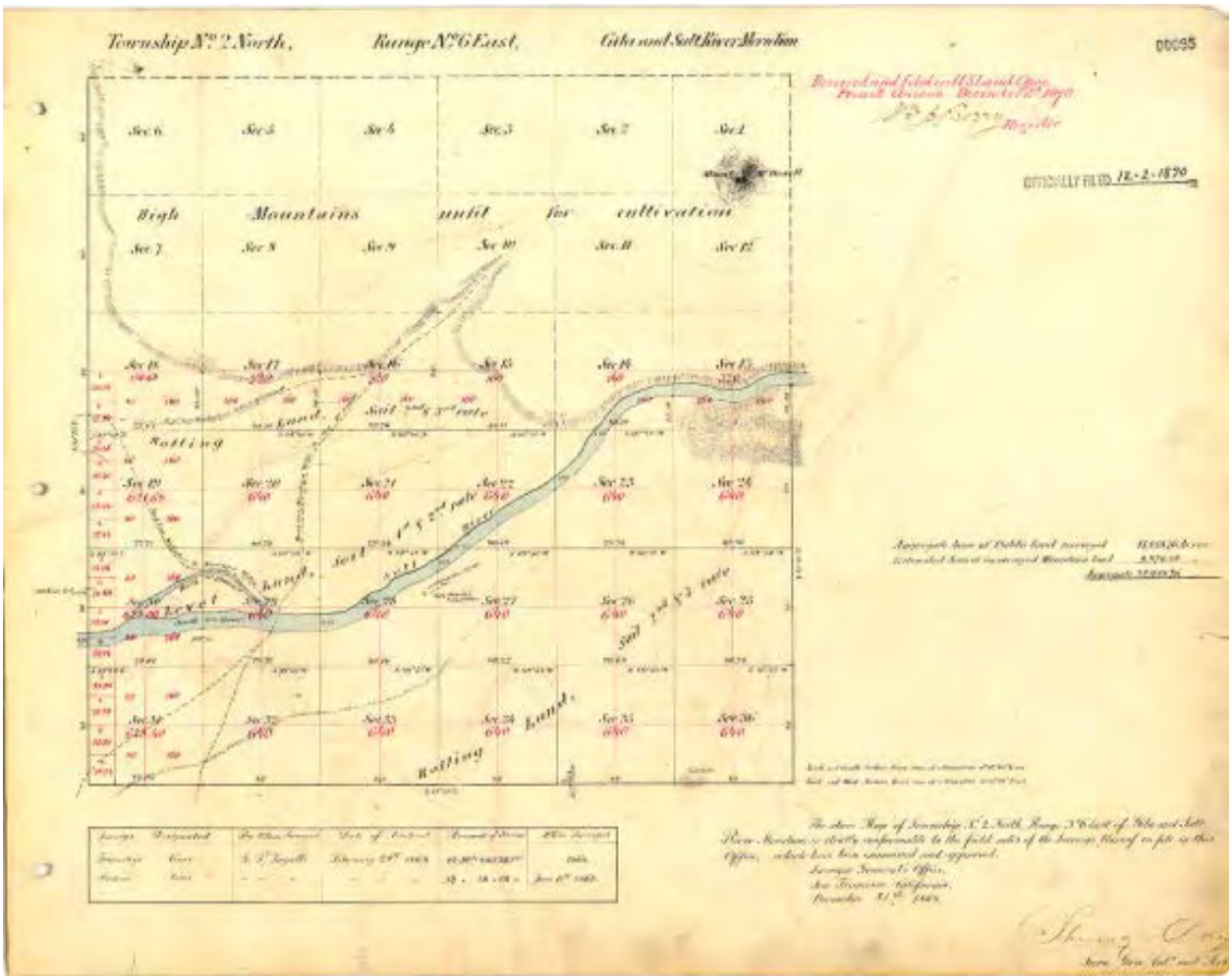

Figure 7: U.S. General Land Office Survey Plat of Township 2 North, Range 6 East, Gila and Salt River Meridian, Dec. 31, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

[45] George P. Ingalls, "Field Notes of the Survey of the Subdivision of Fractional Township 2 N Range 6 E, of the Gila and Salt River Meridian in the Territory of Arizona," June 11, 1868, p. 605, U.S. Bureau of Land Management, Phoenix, Arizona.

The plat did not show any meander lines nor were there meander bearings listed in the margin of the plat. Further indicating a lack of navigability, the plat illustrated in two places the location of the old channel of the stream. While channel changes suggest difficulty for navigation, the presence of roads connecting to Fort McDowell underscore this conclusion by implying the Salt was not used to carry goods or people.[46]

C. Re-surveys Along the Salt River

While the entire study area through which the Salt River flowed was surveyed in 1868, parts of those townships were resurveyed in 1888 by L.D. Chillson, in 1899 by Herbert R. Patrick, and in 1910-1911 just before Arizona statehood by Robert A. Farmer.[47] These surveys were all done to define the boundaries and interior lines of either the Salt River Indian Reservation or the Gila River Indian Reservation. While parts of the surveys involved meanders of portions of the Salt River, those meanders were to define the reservations' borders, not to identify a navigable stream. However, the descriptions offered in the field notes and the details on the plats continued to paint a picture of the Salt River as a non-navigable body of water. For clarity reasons, the two Salt River Indian Reservation boundary surveys (1888 and 1910-1911) will be discussed first followed by the survey of the Gila River Indian Reservation border (1899).

1. 1888 Resurvey of part of Township 1 North, Range 5 East (Field Notes)

In March 1888, L.D. Chillson resurveyed the northwest corner of township 1 north, range 5 east, to establish the boundaries of the Salt River Indian Reservation. His survey, done under

[46] U.S. General Land Office Survey Plat of Township 2 North, Range 6 East, Gila and Salt River Meridian, Dec. 31, 1868, U.S. Bureau of Land Management, Phoenix, Arizona.

[47] There were also a few resurveys of areas along the Salt after Arizona's statehood, but since those surveys did not deal with the river prior to 1912, they are not discussed here. Nevertheless, the results of those surveys do not contradict the indications of non-navigability found in the notes and plats of the pre-1912 surveys. See, for example, U.S. General Land Office, "Dependent Resurvey of a Portion, Township No. 1 North, Range No. 1 East, Gila and Salt River Meridian, Arizona – Gila River Indian Reservation," Sept. 2, 1920, U.S. Bureau of Land Management, Phoenix, Arizona.

instructions in the 1881 surveyors' manual, included parts of sections 3, 4, 5, 6, 7, and 8. The southern boundary of the survey was the right (north) bank of the Salt River. Because the center of the river was defined as the southern border of the reservation, Chillson meandered the right bank, and his field notes record setting meander posts at each point where a section line or quarter section line reached the edge of the Salt River. His notes clearly indicated that these were meander posts, and he recorded that he had marked each post with "M.C." (meander corner). Aside from the survey lines and meander posts, Chillson observed that most of the area was cultivated by Indians, and he recorded crossing or passing irrigation ditches, fences, and Indian huts at many points. Finally, Chillson wrote that the "Arizona Canal runs through the northern portion of the [Salt River Indian] Reservation, their dam being about 3 miles south of where the Verde River empties into Salt River."[48] Chillson gave no indication that the Arizona Dam interfered with any navigation on the Salt River.

2. 1888 Resurvey of Part of Township 1 North, Range 5 East (Plat)

The plat for Chillson's resurvey (see below) was approved by the surveyor general on July 11, 1888.

[48] L.D. Chillson, "Field Notes of Resurvey of Fractional Township 1 North, Range 5 East," March 28, 1888, pp. 1-61 (with quotation at p. 61), U.S. Bureau of Land Management, Phoenix, Arizona.

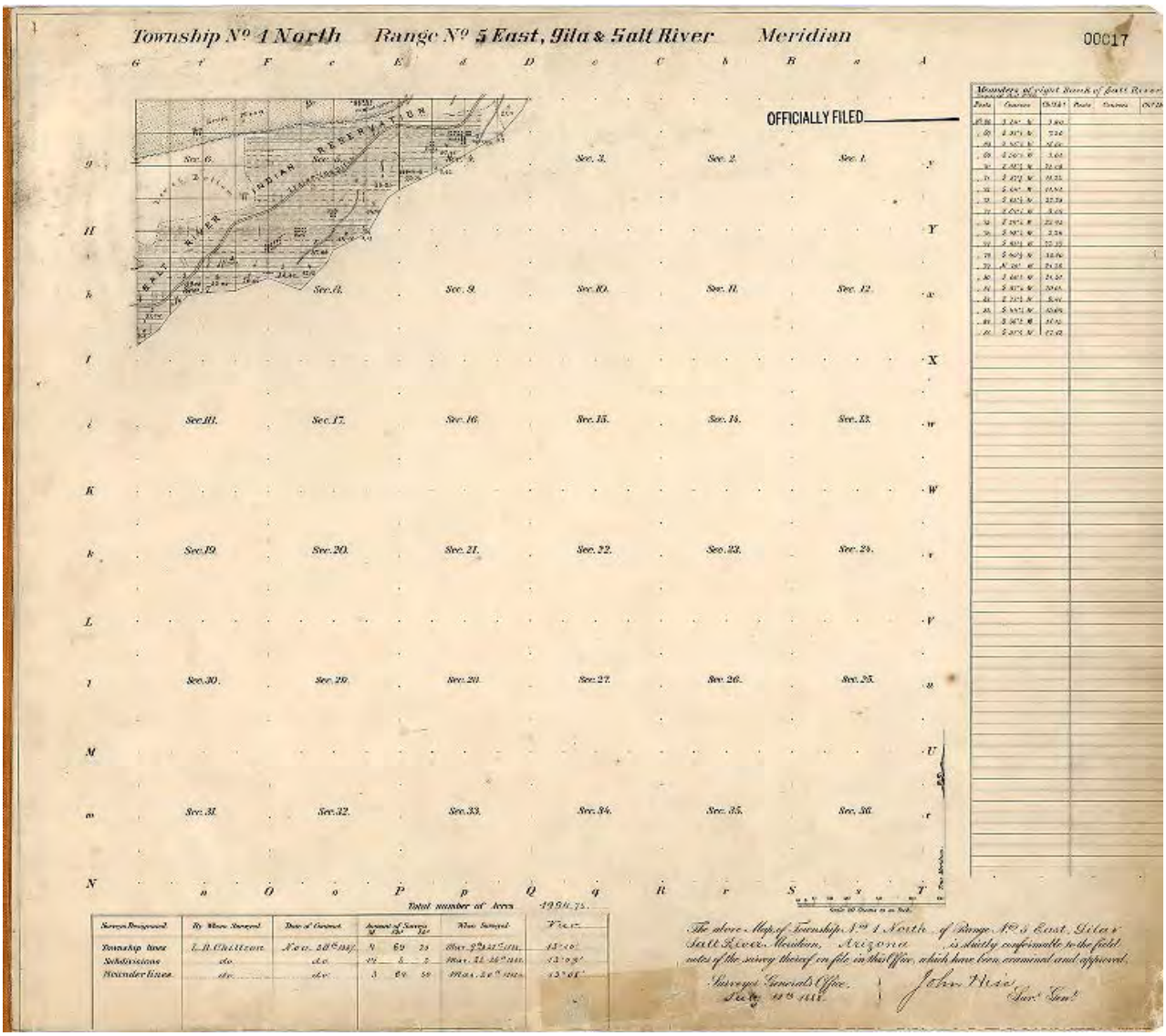

Figure 8: U.S. General Land Office Interior Resurvey of the Northwest Corner of Township 1 North, Range 5 East, March 28, 1888, Gila and Salt River Meridian, U.S. Bureau of Land Management, Phoenix, Arizona.

In the right margin, Chillson listed his "Meanders of the Right Bank of Salt River," and those meanders were drawn on the plat itself showing where the north bank of the river was located. There were no meanders either drawn or listed for the south bank of the Salt River. In addition, Chillson noted that much of the land involved in his resurvey was bottom land, and shading on the

plat indicated that most of it was irrigated farmlands. He also drew and identified a major irrigation ditch, at least two other smaller ditches, several huts, and an old trading post.[49]

3. 1910-1911 Resurvey of Salt River Indian Reservation Border (Field Notes)

In late 1910 and early 1911, Robert A. Farmer was directed to resurvey segments of the boundary of the Salt River Indian Reservation lying in townships 1 and 2 north, ranges 4 to 6 east. Part of the southern portion of this boundary (which had also been resurveyed by Chillson in 1899) was the middle of the Salt River, and to locate that line more accurately, Farmer meandered the north bank of the stream as Chillson had done earlier.[50]

Farmer also noted the characteristics of the Salt River, particularly in township 2 north, range 5 east. Two channels of the Salt River existed in this township, a north and south channel, but in several places, there were sloughs connecting the channels. There were a variety of places where interior lines crossed the Salt River's channels, and in each place, Farmer established meander corners to mark the edge of the river, which in turn would help establish where the middle of the river (the reservation boundary) lay. There were also useful descriptions of parts of the channels. Heading south between sections 34 and 35, for example, Farmer noted at 45.60 chains a "wagon ford across channel, brs. N. and W." In section 34 itself, as he ran east through the middle of that section, Farmer observed that the water in the North Branch was eight inches deep, while the South Branch was completely dry. When running the line through the middle of the south half of section

[49] U.S. General Land Office Resurvey Plat of Part of Township 1 North, Range 5 East, July 11, 1888, U.S. Bureau of Land Management, Phoenix, Arizona.

[50] Robert A. Farmer, "Field Notes of the Survey of the Subdivision of T. 1 N., R. 4 E., Sections 1 and 12, of the Gila and Salt River Principal Meridian in the State of Arizona," Dec. 1910, pp. 12, 17-20, U.S. Bureau of Land Management, Phoenix, Arizona; U.S. General Land Office Resurvey Plat of Township No. 1 North, Range No. 4, East of the Gila and Salt River Meridian, Arizona, March 29, 1913, U.S. Bureau of Land Management, Phoenix, Arizona; Farmer, "Field Notes of the Survey of the Subdivision of T. 1 N., R. 5 E., Salt River Indian Reservation," Dec. 12, 1910, U.S. Bureau of Land Management, Phoenix, Arizona; Resurvey Plat of Fractional Township 1 North, Range 5 East of the Gila and Salt River Meridian, March 29, 1913, U.S. Bureau of Land Management, Phoenix, Arizona; Farmer, "Field Notes of the Survey of the Subdivision and Meander Lines of Township No. 2 North, Range No. 6 East, of the Gila and Salt River Principal Meridian," Jan. 20, 1911, U.S. Bureau of Land Management, Phoenix, Arizona.

26, Farmer found the river to be four feet deep. Nevertheless, in another channel of the river in the same section, Farmer wrote: "3.80 [chains] Middle of channel of Salt River, course SW. (No water)."[51]

On the line between sections 25 and 26, Farmer established meander corners, but indicating that the river was not navigable, he wrote that he crossed the river in its bed, adding that this channel of the Salt was 200 chains wide but only one foot deep. He repeated this assertion when running the line south through the middle of section 25, yet when he resurveyed the line a few days later, the channel now had two to three feet of water running in it. At the second channel of the Salt on this line, Farmer again set meander corners, but attesting to the stream's lack of navigability, he also observed that while the channel was 200 chains wide, a road crossed it in the bed itself.[52] Other similar descriptions are scattered throughout the field notes of this township, indicating a river that varied widely in terms of depths and widths, even in just relatively short distances. The roads crossing the river and the mention of several channels and islands all contribute to a description of a river where reliable navigation would have been difficult at best.

4. 1899 Survey of North Border of Gila River Indian Reservation (Field Notes)

On June 6, 1899, the commissioner of the General Land Office approved Herbert R. Patrick's contract to survey lands related to the boundary of the Gila River Indian Reservation, the northern part of which lay in the middle of the Salt River. Patrick's contract provided that he was to survey:

> all that portion of the boundary of the Gila River Indian Reservation extending from a point four miles east from the confluence of the Gila and Salt Rivers, at the

[51] Robert A. Farmer, "Field Notes of the Re-Survey of the Subdivision and Meander Lines of Township No. 2 North, Range No. 5 East of the Gila and Salt River Principal Meridian, Dec. 6, 1910, pp. 59, 72, 75, 108, 111, U.S. Bureau of Land Management, Phoenix, Arizona.

[52] Robert A. Farmer, "Field Notes of the Re-Survey of the Subdivision and Meander Lines of Township No. 2 North, Range No. 5 East of the Gila and Salt River Principal Meridian," Dec. 6, 1910, pp. 20-21, 24, 27, U.S. Bureau of Land Management, Phoenix, Arizona.

> intersection of the meridional line with the center of low water channel of Salt River, southeasterly to the northwest corner of the old Gila Reservation; & also all the lines necessary for closing the Township & section lines in T1N, R1E, & Tns. 1 S, Rs 1 & 2 E, G. & S.R.B. & Mer, upon that portion of the boundary line of the Gila River Indian Reservation, extending from the Initial Monument in middle of Salt River, southeasterly to a point on line between Tps. 1 & 2 S; R 2 E., Arizona.

He was to undertake this survey in conformity with "the printed Manual of Surveying Instructions as revised and approved June 30, 1894" and any other special instructions issued by the surveyor general. Patrick was to receive nine dollars per mile for surveying base, standard, meridian, and meander lines, seven dollars for township lines, and five dollars for section and connecting lines. Yet despite this financial incentive to run meander lines where necessary, Patrick did none as part of his survey.[53]

Patrick began his work on October 17, 1899, and he noted that his instructions from the surveyor general were for the

> [i]nitial Monument of this Reservation Boundary line to be established at the center of the low water channel of Salt River at a point due north of a point on the Base line distant 320 chains east of the Initial Monument of the Public Survey.

Patrick's encounters with the Salt River as he ran the line along the southern boundary of township 1 north, range 1 east, consistently indicated a shifting channel with many sand and gravel bars.[54] In addition, his general description of the region indicated a river that would have been difficult at best to use for navigation:

> The portions of Ts. 1 N & 1 S. R 1 E traversed by lines of this survey are 1st River bottom broken by channels, Islands; Sand and gravel bars, the islands so-called, being surrounded by water only at hi [*sic*] water, the permanent flow of

[53] Contract and Bond No. 51, Herbert R. Patrick, June 6, 1899, Surveyors' Contracts, Record Group 49, Records of the U.S. General Land Office, U.S. National Archives, Washington, D.C.

[54] H.R. Patrick, "Field Notes of the Survey of the Lines of Public Survey Closing on the North East Boundary Line of the Gila River Indian Reservation in Township 1 North, Range 1 East, Township 1 South, Ranges 1 & 2 East," Oct. 17, 1899, p. 6, 16, 29, 31, and 70 (with quotation at 6), U.S. Bureau of Land Management, Phoenix, Arizona.

water being small, estimate it to be 2000 miners inches at this time when not affected by rain in the mountains.[55]

D. Summary and Conclusions to Chapter 1

Federal government surveyors were specifically charged with the task of identifying navigable streams as part of their surveying duties, and the manuals and instructions under which they carried out their work were very precise about how navigable bodies of water were to be distinguished from non-navigable ones. As part of the U.S. Government's surveying efforts, the area along the Salt River was surveyed and resurveyed many times. Significantly, while those surveys were done in varying seasons, in different years, and by several individuals, all of the descriptions and plats that resulted from this work consistently portrayed the Salt River as a non-navigable stream.

[55] H.R. Patrick, "Field Notes of the Survey of the Lines of Public Survey Closing on the North East Boundary Line of the Gila River Indian Reservation in Township 1 North, Range 1 East, Township 1 South, Ranges 1 & 2 East," Oct. 17, 1899, quote at p. 51, U.S. Bureau of Land Management, Phoenix, Arizona.

CHAPTER 2: LAND PATENTS AND STATE GRANTS

In the mid-to-late nineteenth century, the U.S. Congress passed a variety of homestead statutes designed to facilitate settlement of the American West. The laws resulted in thousands of federal patents being issued to eager setters determined to establish homes and farms in the West's unfamiliar landscape and climate. The blizzard of paperwork relating to the applications for these patents and the actual patents themselves shed considerable light on the question of the Salt River's navigability. Yet before discussing the significance of federal land patents in relation to the Salt River, a few words need to be said about the stream's location as portrayed on historical maps because there are well over two hundred federal patents adjacent to or extending into the Salt River's bed between Granite Reef Dam and the confluence of the Salt and Gila rivers.

A. Historical U.S.G.S. Topographic Maps of the Salt River Region

The U.S. Geological Survey began mapping the area surrounding the lower Salt River prior Arizona's admission to the Union in 1912. These were not the first U.S. Government maps of the region, however. As noted in Chapter 1, the U.S. General Land Office had conducted original surveys in the Salt Valley in 1868 to facilitate homesteading and to create accurate legal descriptions of property. Subsequent mapping, however, by the Geological Survey of the lower Salt River valley took place between 1904 and 1913 and resulted in four historical topographic maps. (A fifth, the 1957 Tolleson topographic map, which covers the confluence of the Salt and Gila rivers, apparently either was the original survey or has no available historical predecessors. Because of the Tolleson map's late date, it is not discussed in this report.) The four historical topographic maps are (going upstream from the confluence of the Salt and Gila rivers): 1) "Phoenix, Arizona," (1912), 2) "Mesa, Arizona," (1913), 3) "Desert Well, Arizona" (1906), and

4) “Fort McDowell, Arizona,” (1906). By comparing the General Land Office maps to the Geological Survey’s later topographic maps, it is possible to determine if the Salt River’s channel changed during the intervening years. Such changes in the Salt’s location, in turn, would shed light on the topic of navigability. The four historical U.S. Geological Survey historical topographic maps that cover the region through which the Salt River flows appear below.

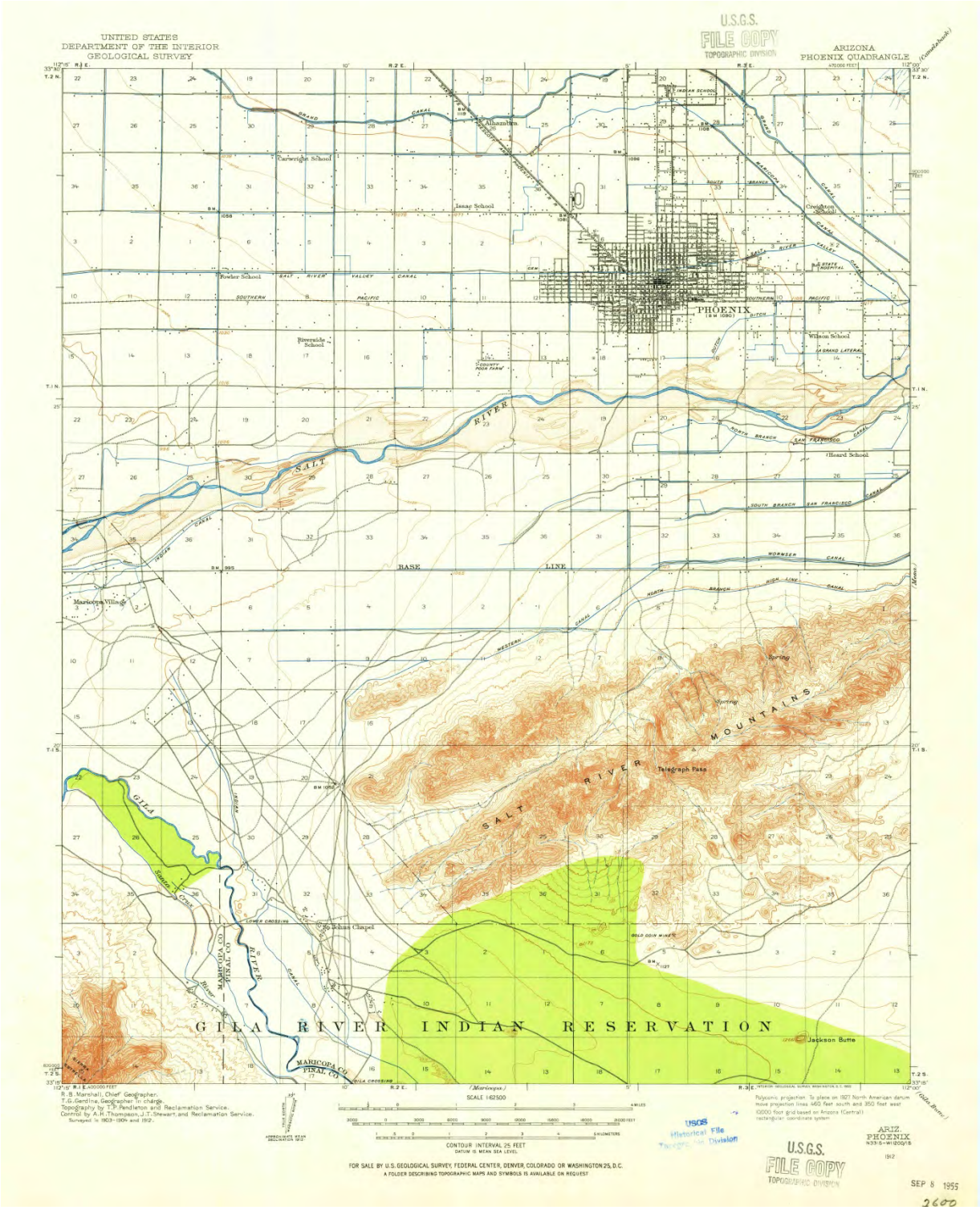

Figure 9: U.S. Geological Survey "Phoenix, Arizona" Topographical Map, 1912. Source: U.S. Geological Survey Online Historical Map Collection.

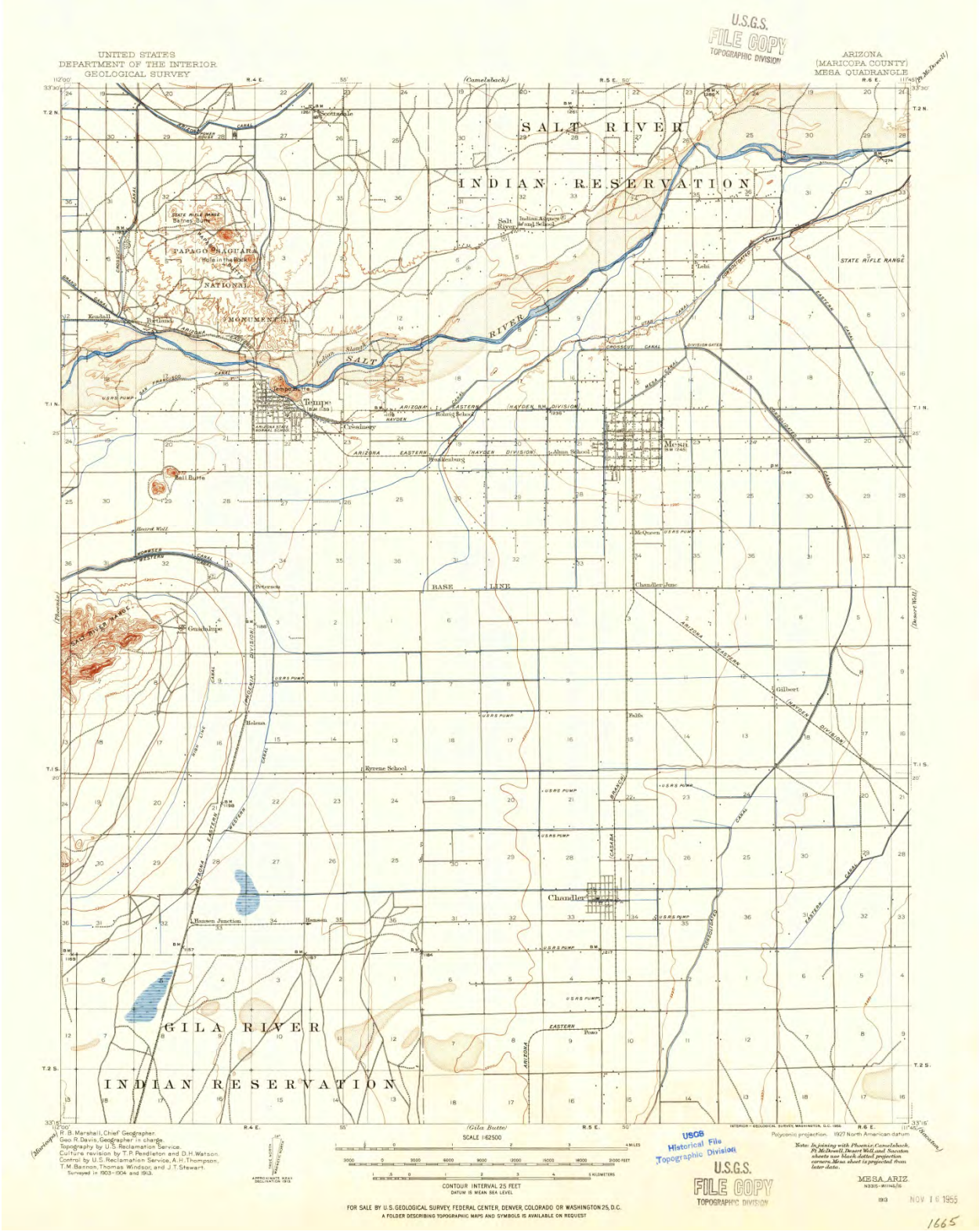

Figure 10: U.S. Geological Survey "Mesa, Arizona" Topographical Map, 1913. Source: U.S. Geological Survey Online Historical Map Collection.

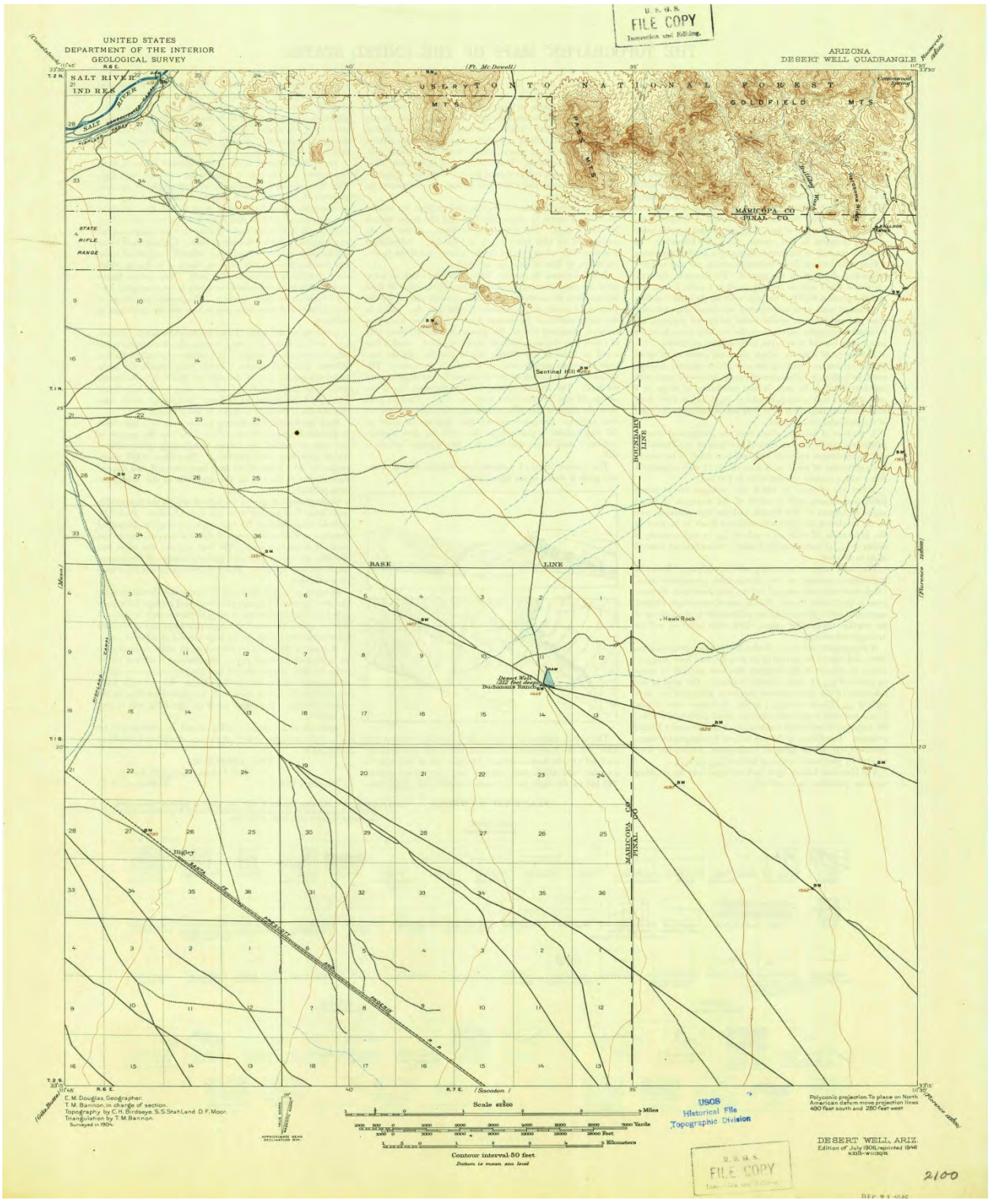

Figure 11: U.S. Geological Survey "Desert Well, Arizona" Topographic Map, 1906. Source: U.S. Geological Survey Online Historical Map Collection.

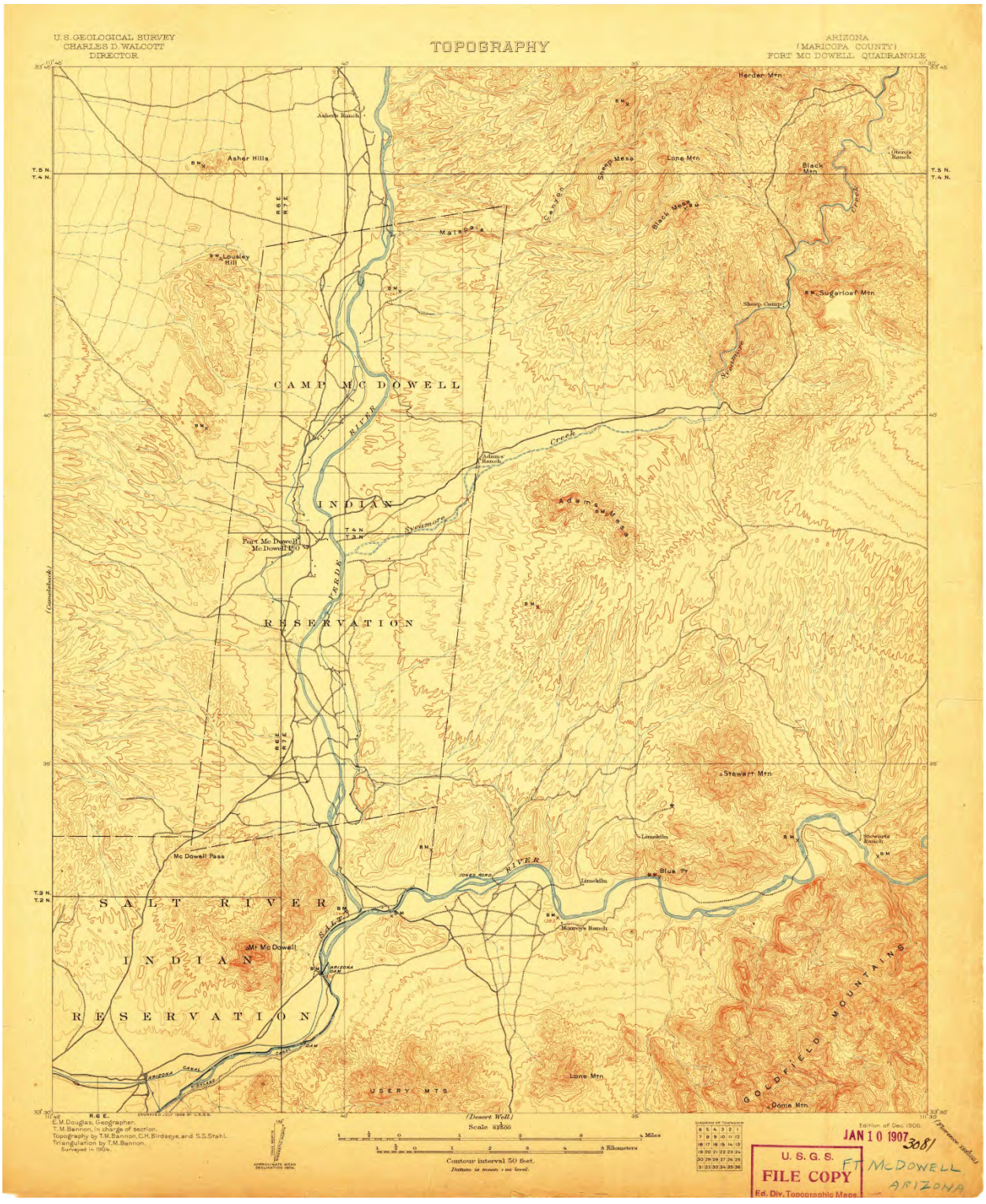

Figure 12: U.S. Geological Survey "Fort McDowell, Arizona" Topographical Map, 1906. Source: U.S. Geological Survey Online Historical Map Collection.

Comparing these four historical topographic maps to the earlier U.S. General Land Office maps from the 1860s clearly demonstrates that the Salt River underwent significant channel changes during the intervening years – indeed, the two sets of maps suggest that the Salt River may have changed channel several times. For example, the U.S. Geological Survey's original 1912 "Phoenix, Arizona" topographic map shows the Salt River running in a course south of where the river is on the 1868 U.S. General Land Office survey plats. In addition, the historical 1904-1913 topographic maps also show the river having fewer channels in some locations than on the plats in the late 1860s. Therefore, comparing homesteading information in relation to both sets of maps will shed the most light possible on the location of the Salt River's channel during the roughly four decades in between. This, in turn, will make information from federal patents and their supporting files more useful in assessing the Salt River's navigability.

B. Background Information on Federal Land Patents

With the U.S. General Land Office surveys in the late 1860s having provided an orderly system for the federal government to dispose of the public domain in the Territory of Arizona, settlers began to acquire parcels throughout the remainder of the nineteenth century and into the early years of the twentieth century.[56] There were a number of federal homestead laws under which a settler could obtain land, but although requirements varied under different statutes, generally the laws required a claimant to file an application at the local federal land office and make a small payment for a specific unoccupied tract and then live on that land for several years before "proving up" – demonstrating that certain improvements had been made. It is the

[56] The most important of these laws was *An Act of Secure Homesteads to Actual Settlers on the Public Domain,* 12 Stat. 392 (1862).

paperwork relating to these applications that sheds vital information about the tracts adjacent to the Salt River's bed.

The homestead application would describe the desired land by township, range, and section, and within each six-hundred-forty-acre section by a fractional identification. For example, a typical one-hundred-sixty-acre parcel might be described as the northeast quarter of section 7, township 1 north, range 5 east, Gila and Salt River Meridian. A forty-acre parcel might be the northwest quarter of the southeast quarter, or a twenty-acre parcel might be the west half of the southwest quarter of the southwest quarter, and so forth. With this precise description of the parcel, it is possible to locate it in relation to the Salt River's bed.

When the necessary time had elapsed to establish residence on the land, the homesteader would return to the land office with witnesses to file affidavits and complete other paperwork stating that the settler had complied with the homesteading requirements. The affidavits and documents created a patent file that contains a great deal of evidence about the homesteader and the land he or she wanted to acquire – sometimes including information about the Salt River. Typically, the affidavits describe the parcel in question, the number of acres, the crops farmed, the improvements made (such as the settler's home, fences, barns, irrigation ditches, etc.). Depending on the parcel, the homestead law involved, and whether there was any controversy over the parcel (such as dual claimants), the patent file might also contain other material such as court documents.

If the land office approved the affidavits and other documents, the settler would pay an additional small fee, and he or she would obtain the patent (legal title) to the parcel. Even if the homesteader never fulfilled the requirements to obtain title to the land, however, a patent file

would still have been created describing the land sought, although the patent would be carried on federal government books as having been relinquished or canceled.

C. Mapping Patents along the Salt River

In relation to the Salt River below Granite Reef Dam, there are over 225 patent applications that were filed in sections overlapping the stream between the western boundary of township 1 north, range 1 east (the Salt River's confluence with the Gila River) and the eastern edge of township 2 north, range 6 east (near the location of Granite Reef Dam). To illustrate locations of these patents for this report, we searched the U.S. Bureau of Land Management's Master Title Plats and Historical Indices (which illustrate the disposition of federal public domain lands) to obtain patent numbers and locations in the region through which the Salt River flowed according to either the General Land Office survey plats from the 1860s or the U.S. Geological Survey's historical topographic maps from the early 1900s. Then, Salt River Project Cartographics used a GIS computer system to overlay the patents' boundaries on base maps showing the Salt River's historical location according to the Land Office survey plats or the Geological Survey's topographic maps. This work resulted in eight detailed maps – two sets of four maps each with one set showing patents in relation to the General Land Office plats from the late 1860s and the second set illustrating patents in relation to the U.S. Geological Survey's historical topographic maps. These eight maps, in turn, were used to obtain the patent files from the National Archives in Washington, D.C., for all patents adjacent to the historical Salt River below Granite Reef Dam. The eight maps illustrating the location of federal land patents in relation to the Salt River are shown below. The first set of four maps illustrates patents in relation to the Salt River in the 1860s and the second set shows the same patents in relation to the U.S. Geological Survey's historical topographic maps from the early 1900s. (The same process

was used to illustrate the locations of state patents, but because there were far fewer state patents than federal patents along the Salt, only one base map was necessary. The state patents will be discussed later in this chapter.)

The eight federal land patent maps relating to the historical location of the Salt River are shown below arranged in an upstream order, with the earlier set of four first followed by the later set of four. Following the maps is a discussion of some of the patent files and what those files illustrate about the historical Salt River's potential navigability or non-navigability. In this report's digital form, the maps may be enlarged to locate individual parcels being discussed.

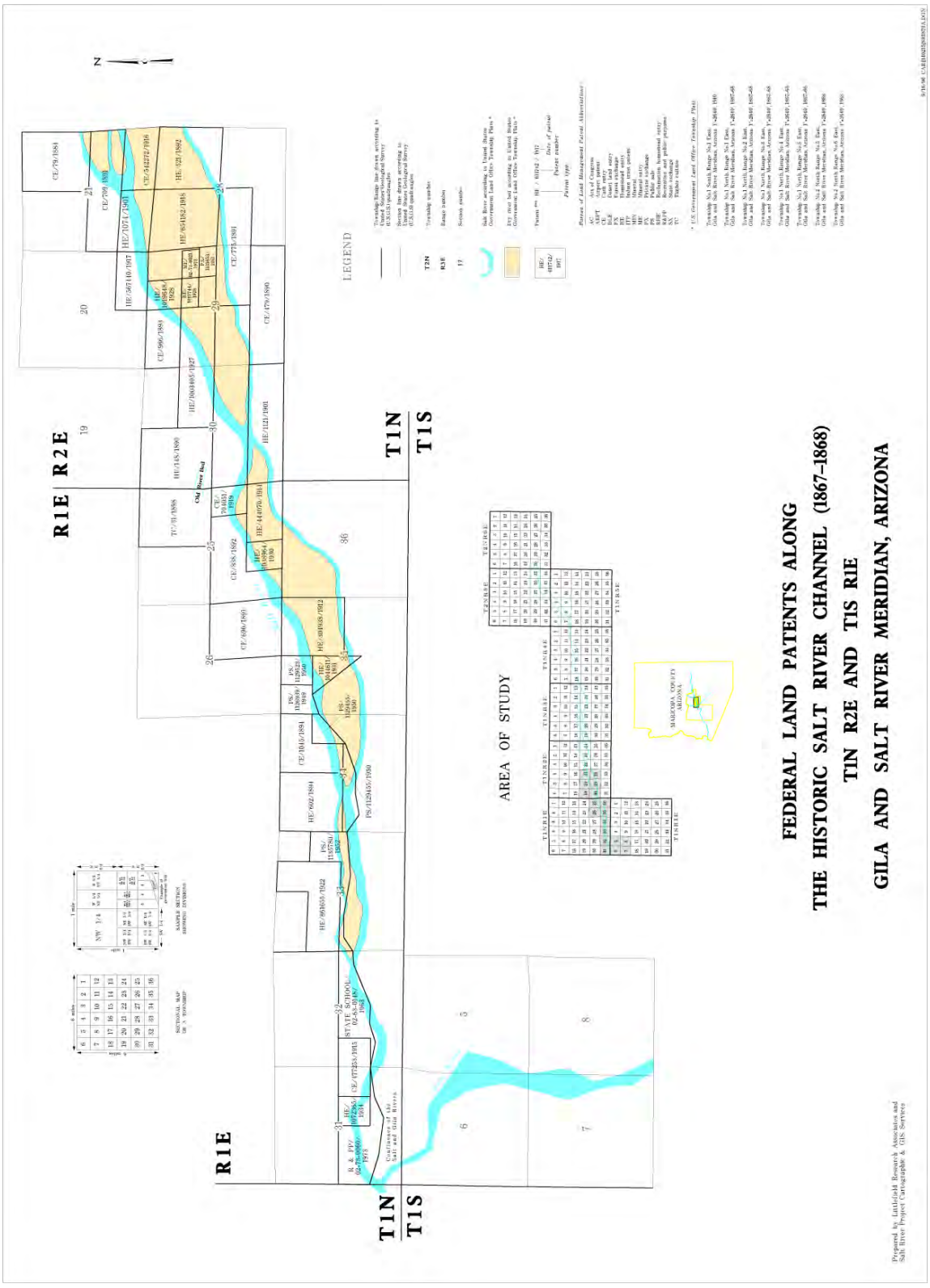

Figure 13: Federal Land Patents along the Salt River Channel (1867-1868), T1N, R2E, and T1S, R1E. Source: Salt River Project Cartographics and Littlefield Historical Research.

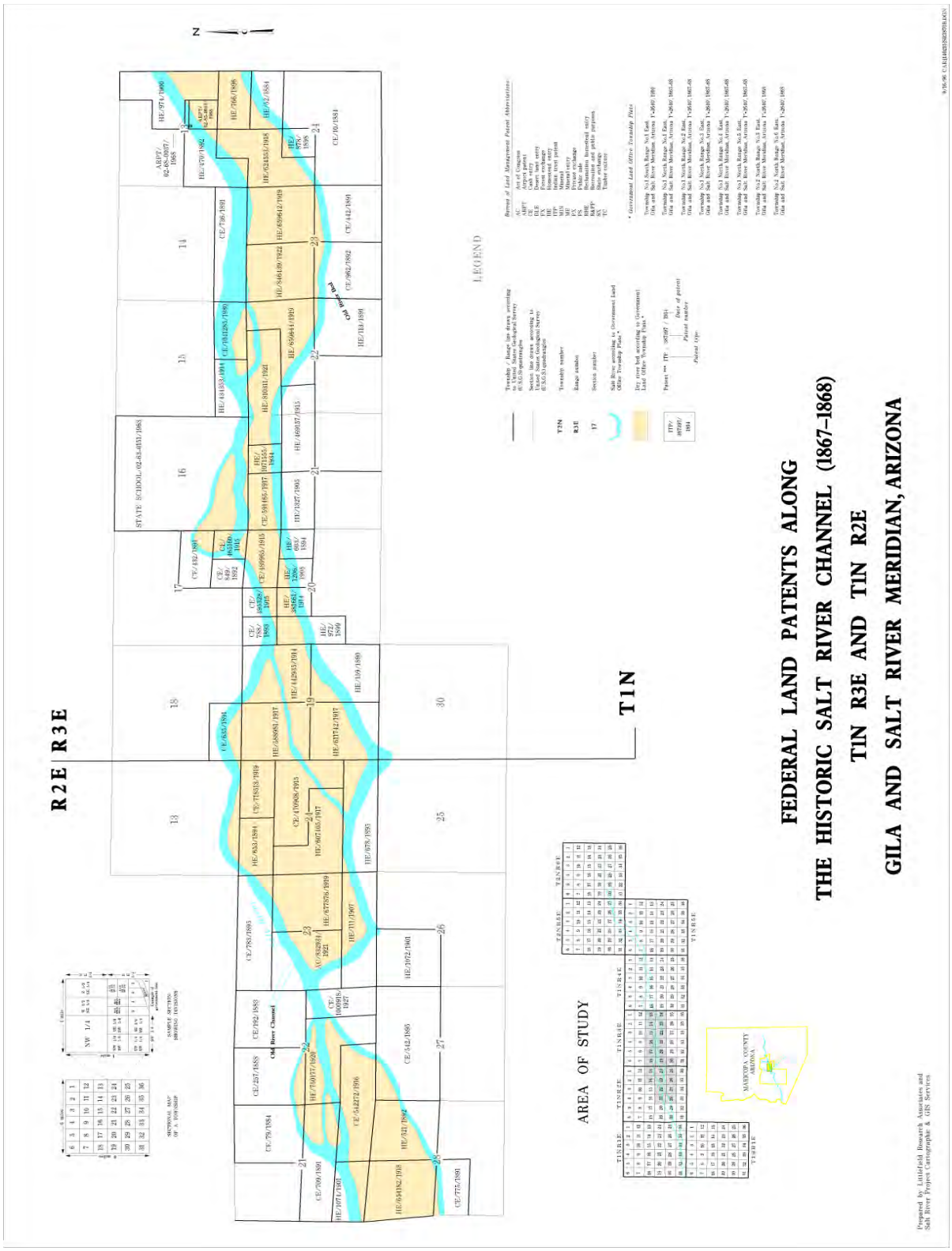

Figure 14: Federal Land Patents along the Historic Salt River Channel (1867-1868), T1N, R3E, and T1N, R2E. Source: Salt River Project Cartographics and Littlefield Historical Research.

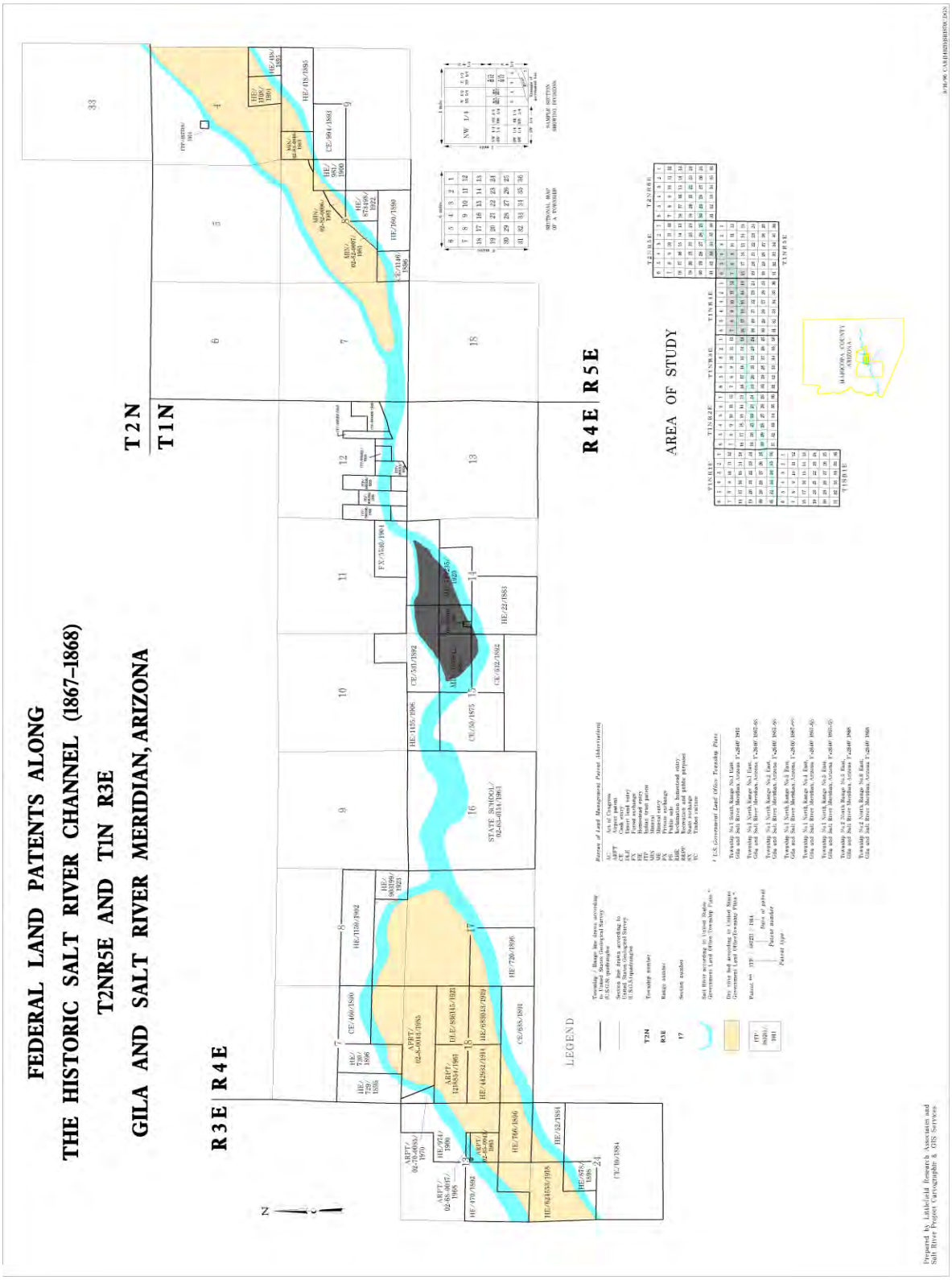

Figure 15: Federal Land Patents along the Historic Salt River Channel (1867-1868), T2N, R5E, and T1N, R3E. Source: Salt River Project Cartographics and Littlefield Historical Research.

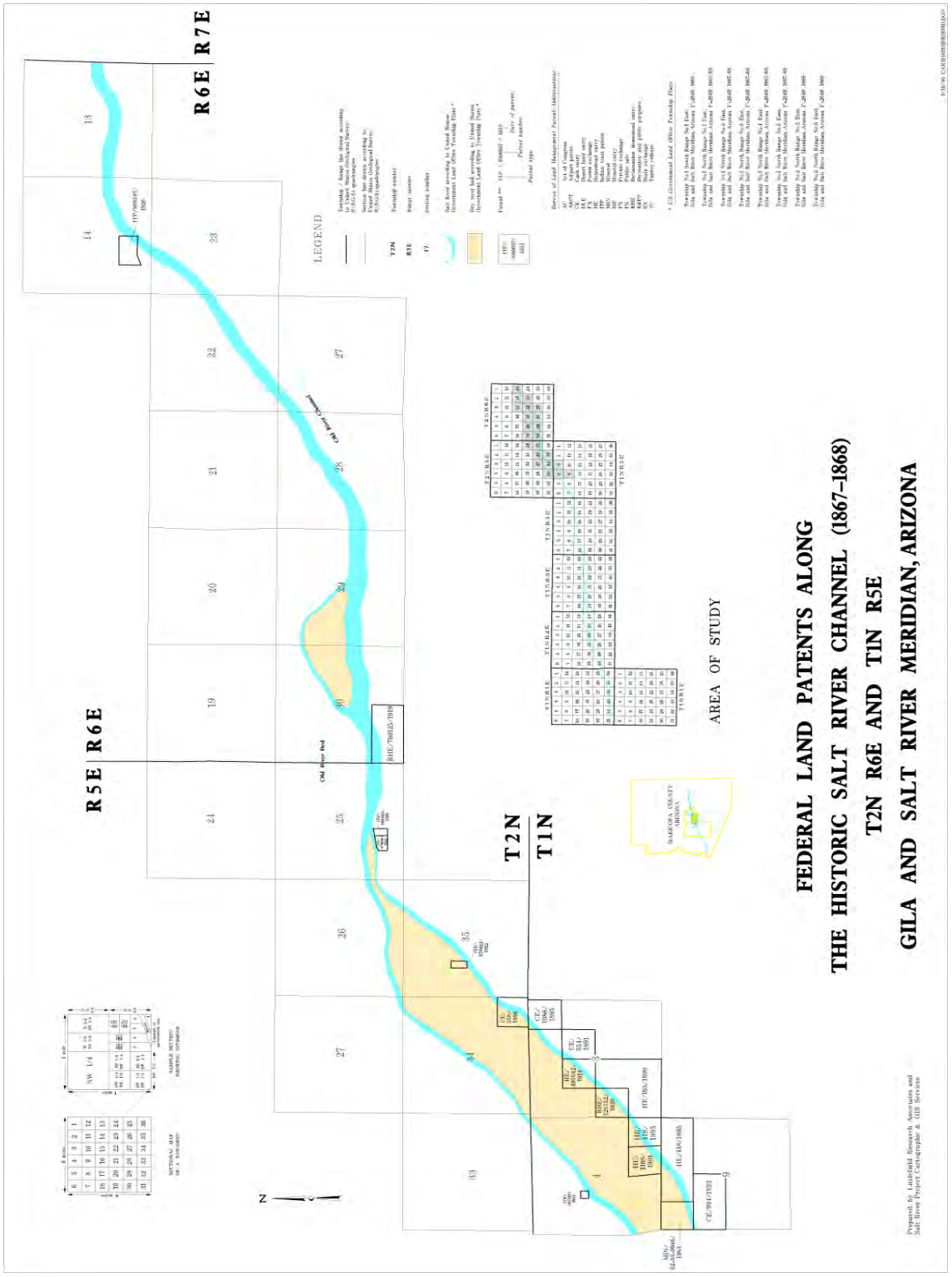

Figure 16: Federal Land Patents along the Historic Salt River Channel (1867-1868), T2N, R6E, and T1N, R5E. Source: Salt River Project Cartographics and Littlefield Historical Research.

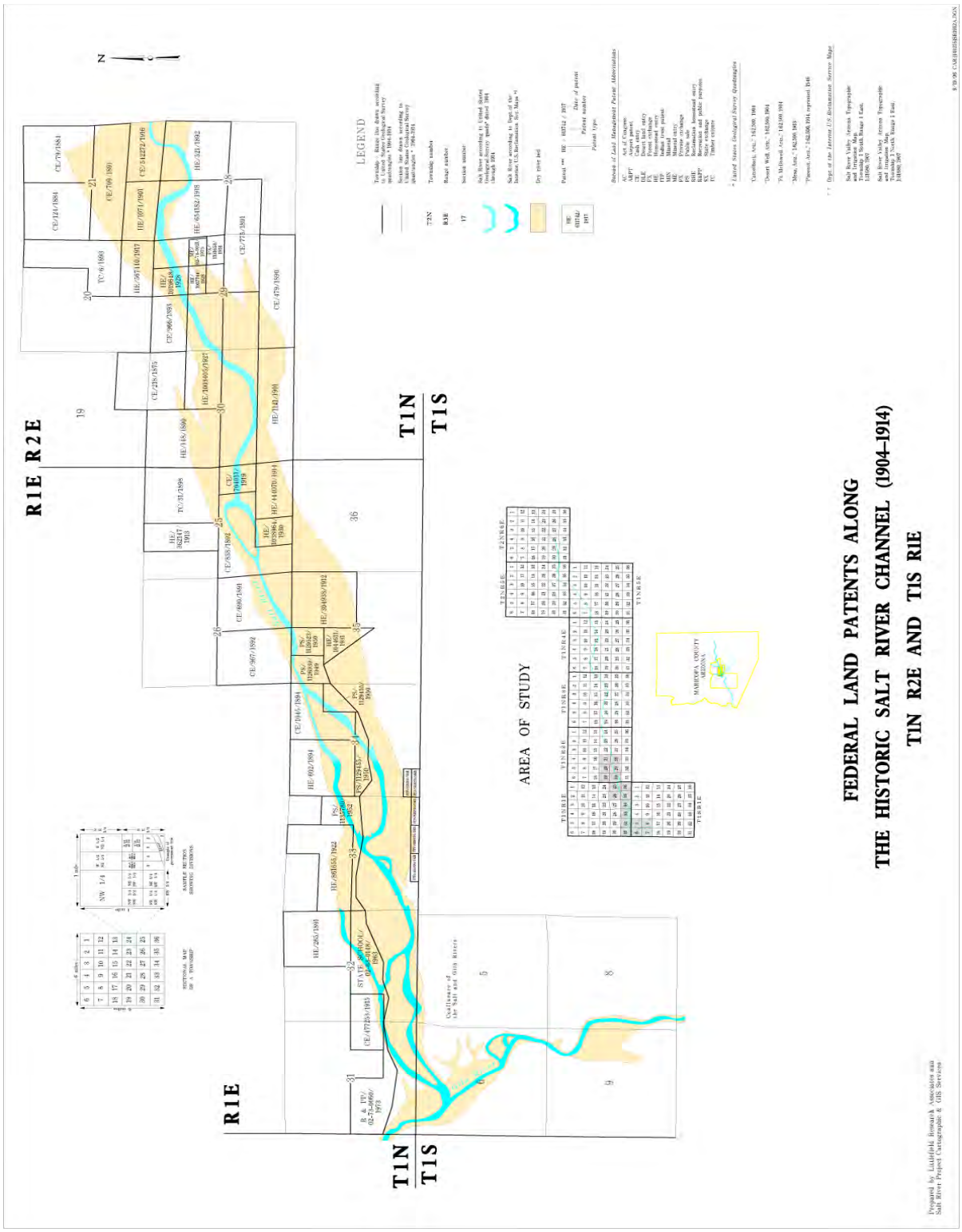

Figure 17: Federal Land Patents along the Historic Salt River Channel (Early 1900s), T1N, R2E, and T1S, R1E. Source: Salt River Project Cartographics and Littlefield Historical Research.

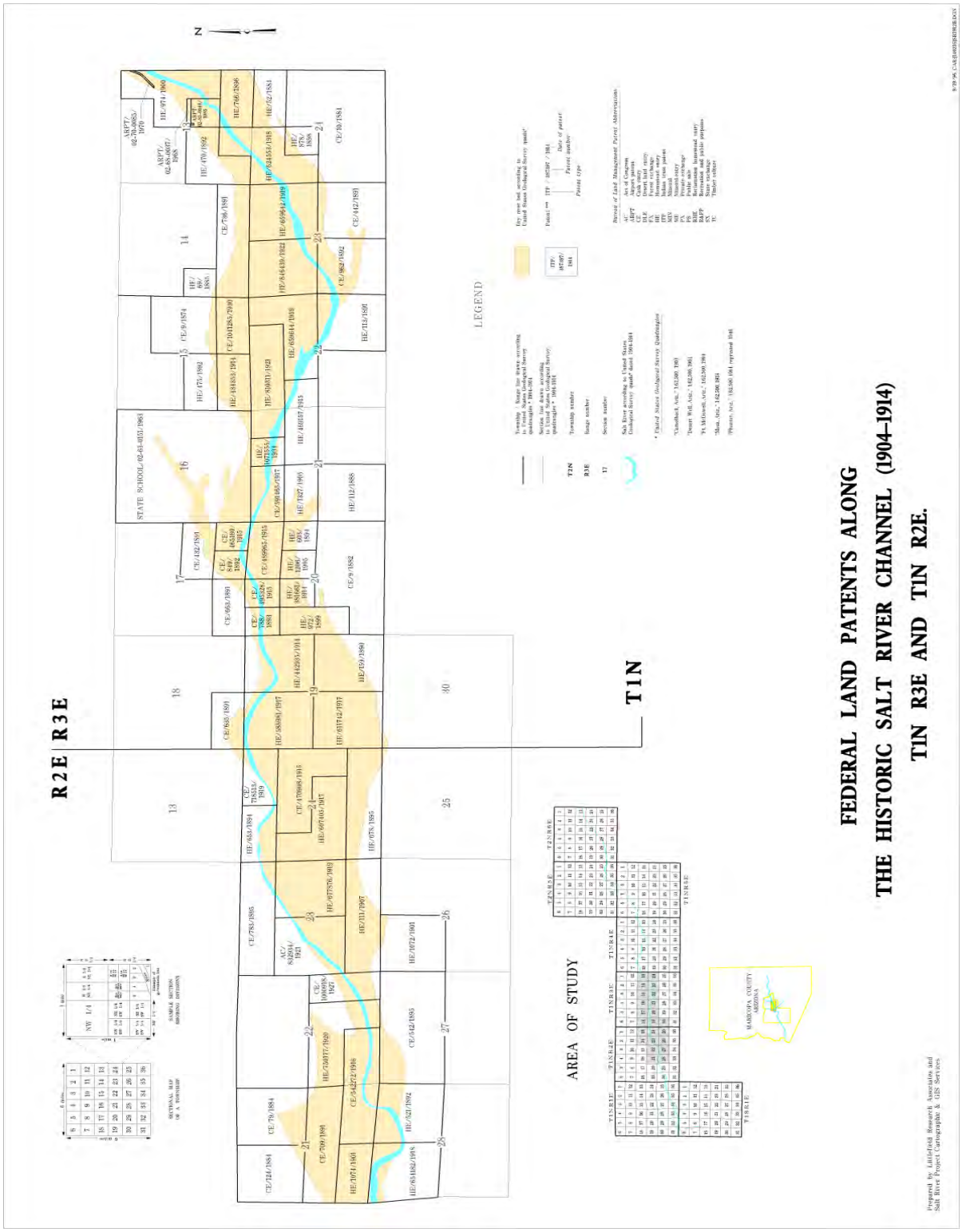

Figure 18: Federal Land Patents along the Historic Salt River Channel (Early 1900s), T1N, R3E, and T1S, R2E. Source: Salt River Project Cartographics and Littlefield Historical Research.

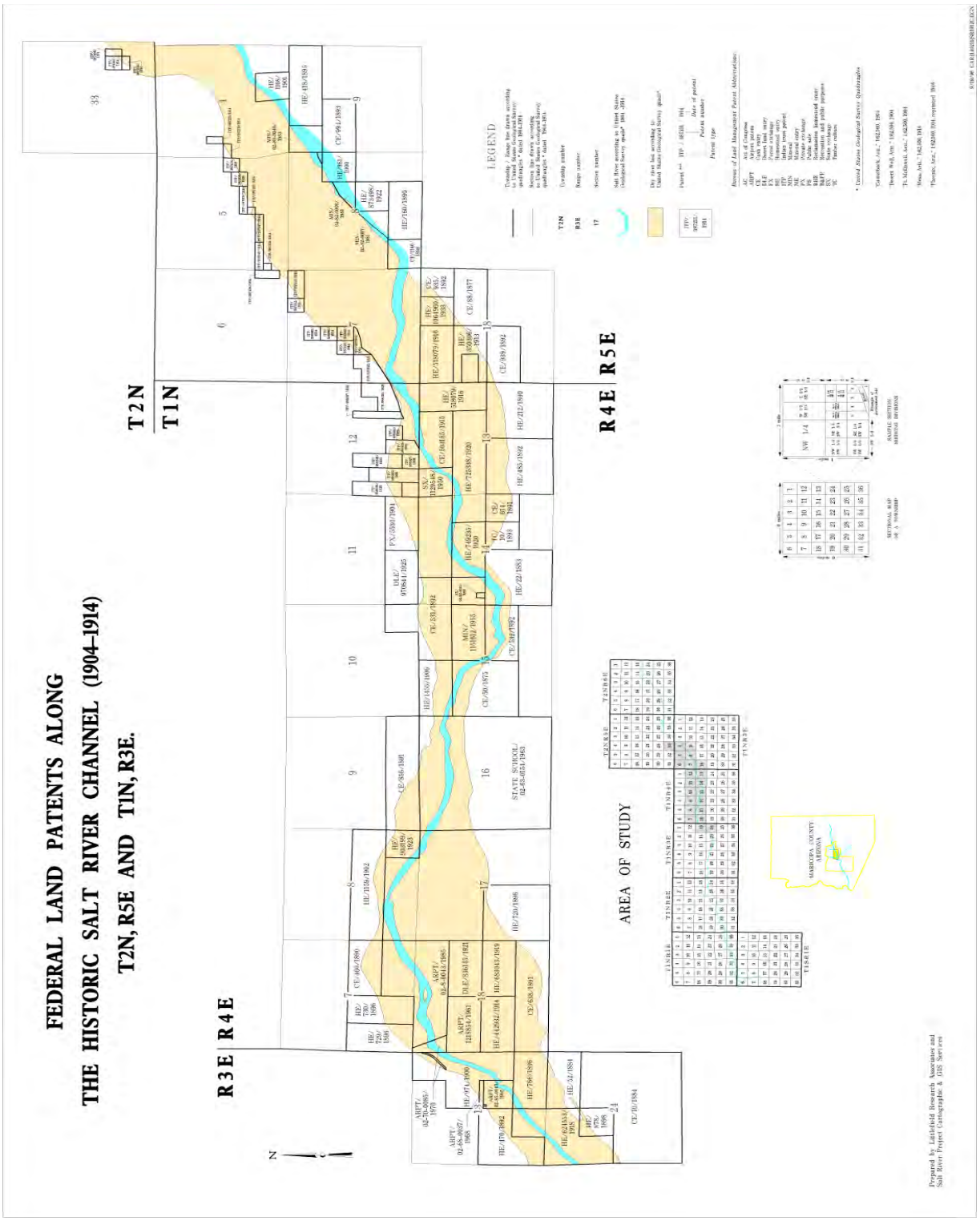

Figure 19: Federal Land Patents along the Historic Salt River Channel (Early 1900s), T2N, R5E, and T1S, R3E. Source: Salt River Project Cartographics and Littlefield Historical Research.

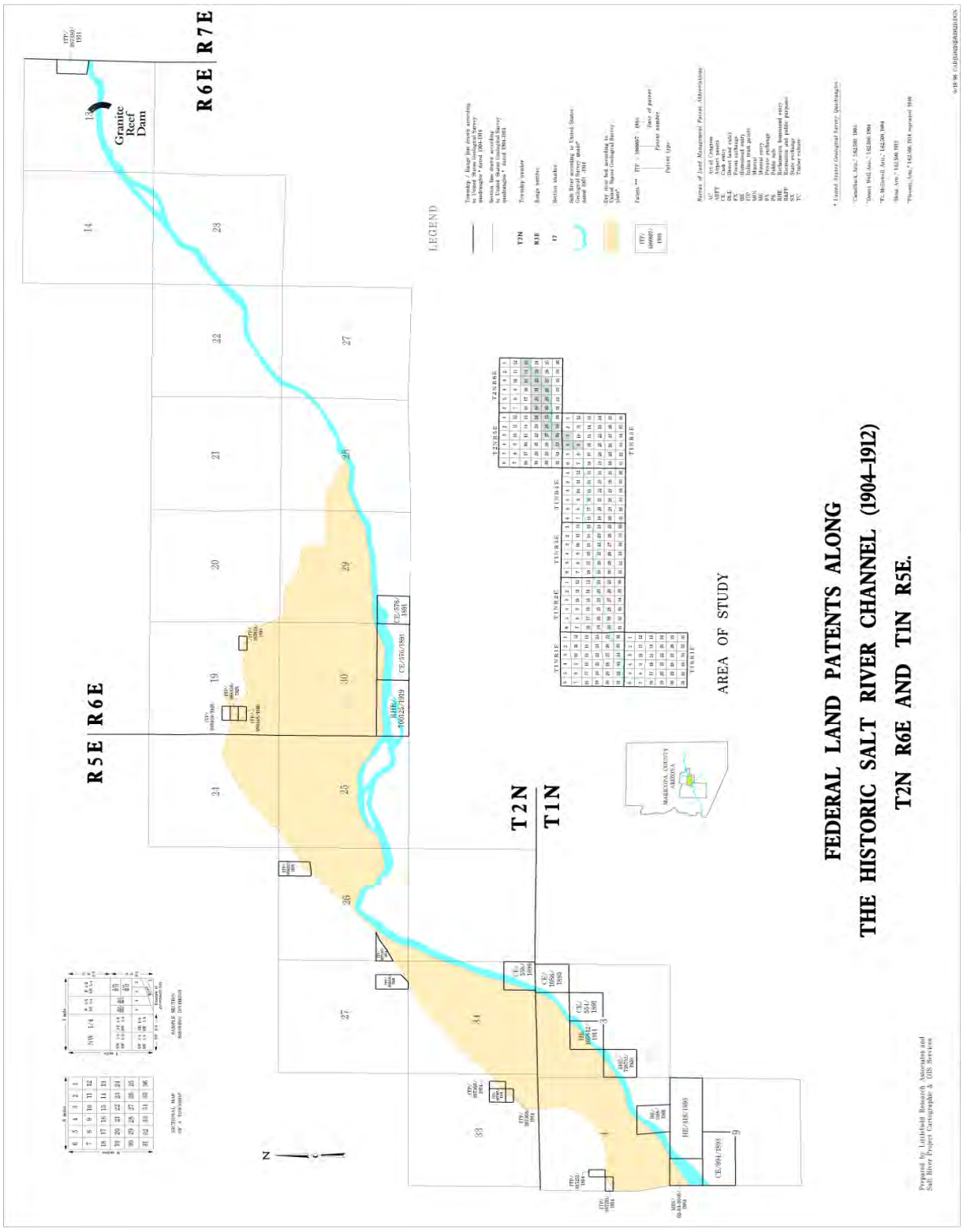

Figure 20: Federal Land Patents along the Historic Salt River Channel (Early 1900s), T2N, R6E, and T1S, R5E. Source: Salt River Project Cartographics and Littlefield Historical Research.

D. Federal Patents and the Salt River's Potential Navigability

Federal patents to private parties and the supporting files (federal grants made to the state of Arizona will be discussed later) are important for several reasons in ascertaining the potential navigability of the Salt River in the nineteenth century. First, each patent indicates the total amount of land awarded by the United States. If the Salt River flowed through the parcel and was navigable, federal officials would not have granted the title to the bed of the stream because the state of Arizona would own it due to the state's sovereignty. As a result, a patent to a quarter section of 160 acres (the typical size for homestead patent) would have been recorded as somewhat less than that amount, depending on how much acreage was occupied by the bed of the Salt River. Moreover, if the river had been considered navigable, an irregularly-shaped parcel next to the river would have been identified as a "government lot" instead of as an even division of a six-hundred-forty-acre section. In other words, a patent to a small parcel of land lying next to a navigable body of water would have a reference to, hypothetically, "government lot 3, consisting of 127.4 acres."[57]

Importantly, none of the federal patents that overlay the Salt River contain any provisions for reserving the bed of the river to the state of Arizona. There is also no evidence that Arizona, upon statehood, chose lands "in lieu" of those patented upon the river bed – which it would have been entitled to do had the river been navigable. (In-lieu, or indemnity, selections are public domain lands chosen by a state to compensate for overlapping claims to state ownership elsewhere.) Similarly, there are no government lots listed in patents adjacent to the Salt River,

[57] For details on how federal surveyors were to handle creating government lots next to navigable bodies of water, see *Instructions to the Surveyor General of Oregon; Being a Manual for Field Operations* (Washington, D.C.: Gideon and Co., 1851), reprinted in C. Albert White, *A History of the Rectangular Survey System* (Washington, D.C.: U.S. Department of the Interior, 1983), pp. 434, 436-437. See also for examples of how government lots were established, *Instructions to Deputy Surveyors of the United States for the District of Illinois and Missouri* (St. Louis: N.p., 1856), reprinted in ibid., pp. 425, 430.

except for parcels lying on the north or west boundaries of individual townships (where acreage was adjusted to account for the curvature of the earth) or for parcels lying adjacent to the bed of the river near the Salt and Gila River Indian reservations.

Another reason why patents are important to help determine whether the Salt River was navigable at the time of statehood relates to their supporting application files. Since a prospective settler had to sign an affidavit regarding improvements and similar documents had to be secured from eyewitnesses, a patent file not only reiterates the amount of acreage in the patent, but the patent file also can convey details such as whether the farmer had built an irrigation ditch from the Salt River or whether he or she had used the river for other purposes. Again, nothing in the hundreds of supporting files suggests that the Salt River was navigable.

E. Federal Patents to Private Individuals in the Study Area

This report first will discuss examples that are typical of all federal patents granted to private individuals along the Salt River from section 31 of township 1 north, range 1 east (where the Salt River joins the Gila River), upstream to section 13 of township 2 north, range 6 east. In some cases, the patent files also contain revealing information about the Salt River's navigability, and in those instances, the patent files will also be discussed. In addition, copies of a few documents from patent files have been included in this report for illustrations. In all cases, patents will be reviewed going upstream. A later section of this chapter will deal with federal grants to the state of Arizona.

1. Federal Patents on the Salt River in Township 1 North, Range 1 East

Lying close to the confluence with the Gila River in section 32 of township 1 north, range 1 east, is the land encompassed in homestead patent 265. (For map reference to all patents discussed in this township see the appropriate patent map earlier in this chapter. To find

individual patents, use this report in digital form and then enlarge the maps on a computer.) Deeded to William F. Fickas on November 9, 1891, the federal government sold the northeast quarter of this section (one-hundred-sixty acres) in its entirety. According to the historical 1904-1913 U.S. Geological Survey topographic maps as well as the 1868 U.S. General Land Office plats, the river and its bed lie in the southeastern area of this parcel. Yet the government granted title to this complete quarter section; no lands were withheld from Fickas because of the river bed's location in his patent.[58]

Slightly upstream from Fickas's land and just north of the Gila River Indian Reservation in section 34 lies land patented to Eliza C. Ambrose in 1894. Her parcel contained the land in the northwest quarter of this section, and the federal government deeded the full one-hundred-sixty acres to her in homestead patent 602. According to the 1904-1913 U.S. Geological survey quadrangles as well as the 1868 U.S. General Land Office survey plats, the Salt River ran directly through this parcel of land, with its bed covering over half the patented portion. Yet the U.S. government made no attempts to withdraw any of this land for Arizona.[59]

2. Ira Jasper Richards's Patent – An Example with Illustrations

Moving upstream in township 1 north, range 1 east, the northeast quarter of the southeast quarter of section 25 was purchased in 1919 as homestead patent 704051 by Ira Jasper Richards. This particular patent provides good illustrations of many of the patents and patent files discussed in this chapter. According to the U.S. General Land Office survey plats from the 1860s as well as the historical U.S. Geological Survey topographic maps from the early 1900s,

[58] Homestead Patent No. 265, Nov. 9, 1891, Records of the U.S. Bureau of Land Management, Phoenix, Arizona.

[59] Homestead Patent No. 602, March 15, 1894, Records of the U.S. Bureau of Land Management, Phoenix, Arizona.

the river runs directly through this land, as can be seen on the close-up views of the patent maps from earlier in this chapter:

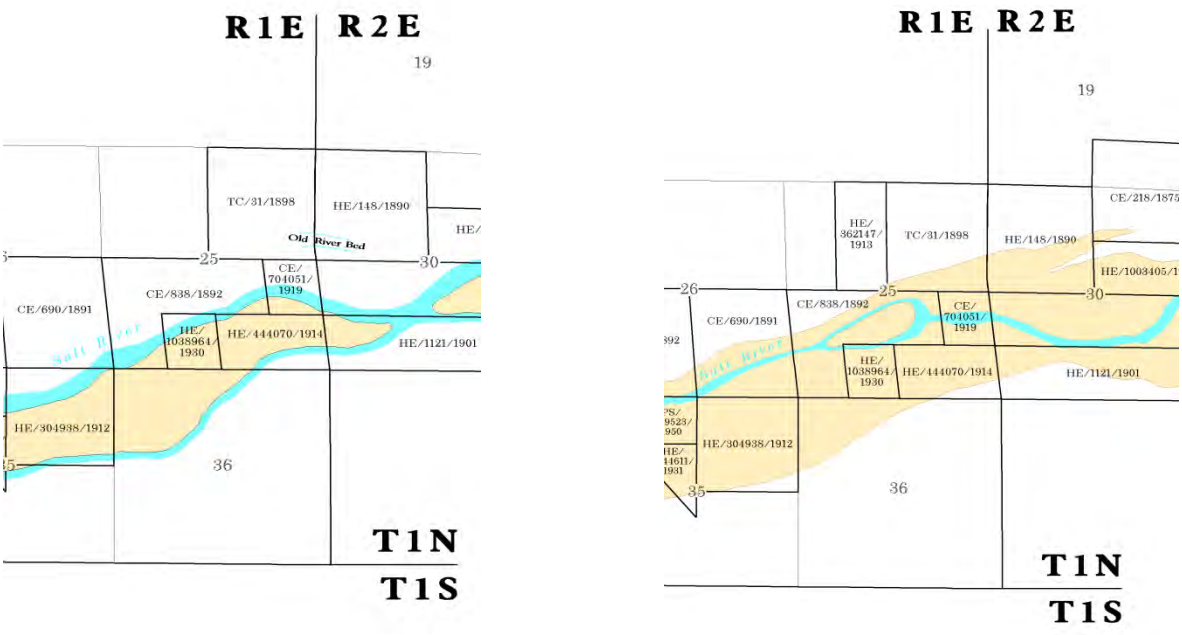

Figure 21: Close-up views of the location of Ira Jasper Richards's patent 704051 (small square near middle of both maps) in relation to the U.S. General Land Office's 1868 survey (left) and the U.S. Geological Survey topographic maps from the early 1900s (right). Note that the Salt River flows directly through this parcel on both maps, although the channel had changed in the intervening years. (Skewing of lines is due to GIS rectification.)

Inasmuch as Arizona had attained statehood in 1912 – seven years before Richards's patent was issued – it is significant that the state made no objections to Richards's patent based on a claim of navigability of the Salt River.

While the patent itself is revealing about the nature of the Salt River, so too is Richards's patent file. The tract of land Richards wanted consisted of forty acres. For his "Testimony of Claimant" for final proof, Richards listed "about 25" for the area of the patent that was capable of being cultivated, and he then noted that the remainder was "bottom land, river bed." A copy of this page of Richards' "Testimony" can be seen below, where he clearly indicates that the land he is claiming lies directly in the Salt River's bed.

QUESTION 11. Describe the land embraced in above entry by legal subdivisions, showing fully the character of same, and kind and amount of timber, if any.

ANSWER.

Subdivision.	Acres cultivable.	Acres timbered.	Feet timber.
	about 25		
Balance bottom land, river bed.			

QUESTION 12. State the number of acres cultivated, kind of crop planted, and amount harvested, each year.

ANSWER. 1918, 2 A. corn, beans and garden truck, maize, cane; har-
19..., vested about 1500 lbs. milo maize, about 600 lbs. corn; about
19..., 500 lbs. sweet potatoes. All good crops.
1919, About 3 A. in barley, not harvested yet; is in good condition.
19..., About 1 A. in corn, beans, potatoes.
19..., ~~about~~ 10 fruit trees, 100 grape vines, about 30 cottonwood trees
19..., planted.

QUESTION 13. Describe fully and in detail the amount and kind of improvements and number of acres under cultivation on each subdivision. State total value of improvements on the claim.

ANSWER.

Subdivision.	Character of improvements.
3 A. in cultivation now.	sheet iron house 10 x 12; frame house 12 x 12 with screen porch; ~~xxxxxx xxxxxx~~ ~~1/2~~ mile four strand barbed wire fencing; 3/4 three strand barbed wire fencing, about; about ~~6~~ or ~~2 1/2~~ A. cleared Also have apiary, 7 stands bees.
	Total value of improvements, about $700.00

QUESTION 14. Is your present claim within the limits of an incorporated town or selected site of a city or town, or used in any way for trade or business?

ANSWER. No.

QUESTION 15. Are there any indications of coal, salines, or minerals of any kind on the land? If so, describe what they are.

ANSWER. No.

QUESTION 16. Have you sold, conveyed, or agreed to sell or convey any portion of the land? If so, to whom and for what purpose?

ANSWER. No

QUESTION 17. Have you optioned, mortgaged, or agreed to option or mortgage, or convey this land, or any part thereof? If so, when, to whom, and for what purpose and in what amount?

ANSWER. No

Figure 22: Second page of Ira Jasper Richards's "Testimony of Claimant," 1919. Note that Richards states under Question 11 (at top) that 25 acres of his claim are capable of cultivation but that the balance are "bottom land, river bed." Source: Patent Files, Records of the U.S. General Land Office, U.S. National Archives, Washington, D.C.

Richards also obtained affidavits from two witnesses to complete his final proof, and these affidavits also are in Richards's patent file. Nathaniel Waldo Haggard's affidavit stated that only fifteen acres of this tract was cultivable, observing that the remaining land lay "in river bed." John H. Ivy's affidavit contained information about the riverbed that was similar to Richards's and Haggard's. Thus, it is clear from the documents in Richards's patent file that the parcel contained land in the bed of the Salt River. Yet the patent file contains nothing to suggest that the United States denied any portion of Richards's claim due to the Salt River being navigable or due to any claim by Arizona that the state owned the riverbed. The United States granted to Richards the full forty acres.[60]

Patent 444070, issued to Manuel V. Gonzales in 1914, contains land in the south half of the southeast quarter of section twenty-five, directly south of Richards's land. According to the 1904-1913 U.S. Geological Survey topographic maps as well as the 1868 U.S. General Land Office survey plats, the river and its bed lay directly on this parcel of land. Additionally, affidavits provided by Gonzales's witnesses record the river's presence on the land. For example, Arturo Zuniga wrote that "about eighty acres can be cultivated, *balance in river*." (Emphasis added.) A further indication of the federal government's knowledge of the river's presence was the parcel's initial withdrawal from settlement for use by the Salt River Project. The land was restored to the public domain on November 7, 1912, almost nine months after statehood. If the land had been Arizona's due to the navigability of the Salt River, the state made no such claim then or when Gonzales patented it. Instead, the federal government issued the patent to Gonzales in November 1914 for the full eighty acres. There is no indication in the

[60] Homestead Patent No. 704051, Aug. 29, 1919, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Homestead Patent file for Entry 704051, Aug. 29, 1919, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

patent itself or in its supporting file that any exception was made for withholding the bed of the Salt River due to a possible claim of ownership by the State of Arizona.[61]

3. Federal Patents on the Salt River in Township 1 North, Range 2 East

Moving upriver into township 1 north, range 2 east (all patents for this section can be found on the appropriate patent map earlier in this chapter), Robert E. Jameson applied in 1951 for the south half of the southeast quarter of the northeast quarter of section twenty-nine. He was granted twenty acres through private exchange patent 1131653. In this type of transaction, the U.S. Bureau of Land Management was required to file a Land Classification Report. A copy of the report, completed by a field examiner, was included in the patent file and described the topography of the parcel as "[f]lat on side channel of Salt River." The examiner also noted that the land was "[f]looded by Salt River" when he recorded the type and extent of erosion. In recording his findings and recommendations, the examiner also made the point that

> [t]he Bureau of Reclamation wants the offered lands so that their lands will join and not have a 1/4 mile gap between, and so that channelizing the river for flood protection can be done without acquiring right-of-way.

Under the same section, it was also noted that the Bureau of Reclamation had been using gravel from the area for construction purposes. Though the land clearly lay in the bed of the river according to the historical U.S. Geological Survey topographic maps, the original U.S. General Land Office survey plats, and documentation in the patent file, there was no indication in either the patent or its supporting file that the federal government withheld any lands in this parcel due to Arizona's sovereign rights to the bed and banks of any navigable body of water.[62]

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[61] Homestead Patent No. 444070, Nov. 21, 1914, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 444070, Nov. 21, 1914, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

[62] Private Exchange Patent No. 1131653, April 13, 1951, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Private Exchange Entry 1131653, April 13, 1951, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

Just north of Jameson's land and still in the bed of the Salt River lies the parcel of land patented by John E. Clem, who filed for the south half of the southeast quarter of section twenty in township 1 north, range 2 east. He was granted title to the full eighty acres in 1917. According to the historical 1904-1913 U.S. Geological Survey's topographic maps and the original 1868 U.S. General Land Office survey plats, Clem's land lay directly in the Salt River's bed. Furthermore, the presence of the river itself is documented by the patent file. In the file, three separate proofs described the land Clem was applying to purchase. In Clem's own proof, he described the subdivision as:

> [o]rdinary river bottom land. All can be cultivated *except 20 acres which is cut by ditches and river*. [Emphasis added.]

Horace A. Mitchell, a witness for Clem, noted similar characteristics about the land, and he was even more specific:

> It is river bottom land, and half of it can be cultivated. *The river runs through one side of it*. No timber except scrub timber along river. [Emphasis added.]

Another witness, Albert E. Manley, simply stated that the tract of land was "[r]iver bottom land, about 50 acres tillable." When describing the improvements the applicant had made, Manley also stated that the "land is fenced 3 sides, river & canal on other side."[63]

Despite these numerous and obvious descriptions of the land actually lying in the river bed, the federal government nonetheless chose to patent the entire tract to the applicant instead of removing a certain portion of the acreage (at least twenty acres according to the most conservative estimate) based on the state's sovereign ownership of the bed and the banks of any navigable river. There is no indication in either the patent or its file that the federal government attempted to remove any acreage.

[63] Homestead Patent No. 567440, Feb. 14, 1917, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 567440, Feb. 14, 1917, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

Continuing upstream, Charles Edwin Kirkpatrick filed an application for land located in section twenty-four of this same township. The land, according to the historical U.S. Geological Survey topographic maps and the original U.S. General Land Office survey plats, lay directly in the bed of the Salt River. Underscoring the presence of the river is the documentation found in the patent file created during the homesteading process. A question on the final proof Kirkpatrick filed inquired whether he had left the land for any length of time since first establishing residence. Kirkpatrick noted that his entire family was on their "[r]egular 5 month leave of absence," from October 1, 1915, to May 1, 1916, but that "[o]n account of high water it was impossible to go back at the expiration of that time." Two of the three witnesses filing testimony on behalf of Kirkpatrick (Oscar F. Alexander and Delbert H. Thornton) also noted that the family left the land during winter due to high water. The Kirkpatrick family's extended absences forced Kirkpatrick to apply for an exception to the homestead law's requirement for permanent residence on the land. On his "Application for Leave of Absence," Kirkpatrick explained the reason for his request (original spellings have been retained):

> The said *claim consists of a part of two Islands in Salt River* and high water has caused the road to the homestead to be in very bad condition and on this acct. and on acct. of the Roosevelt Reservoir being full of water makes it very unsafe for a family consisting of a wife and 4 small children to be left alone *on the island* in Feb, March & April with the reservoir full & running over *it is possibly [sic] for the water to cover the island* in case of heavy rains in the mountains, *as the water covered a part of 1 island* during the flood about Jan. 15-16 of this year destroying 2 or more acres of my barley[.] I have to work in Phoenix to make a living for family so can only be at home nights and Sundays. [Emphases added.][64]

It is clear from Kirkpatrick's description that this particular tract lay directly in the river bed. Other documents in the file indicated likewise. However, despite this knowledge, the U.S.

[64] Homestead Patent No. 607405, Nov. 12, 1917, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 607405, Nov. 12, 1917, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

General Land Office patented the land to Kirkpatrick as homestead entry 607405 without removing any acreage due to navigability.

4. Federal Patents on the Salt River in Township 1 North, Range 3 East

Going upstream to the next example, James Littleton filed for homestead entry 588981 in township 1 north, range 3 east, in November 1913. Littleton's application was for the northwest quarter of section nineteen (just west of present-day Phoenix). According to the historical U.S. Geological Survey topographic maps as well as the original U.S. General Land Office survey plats, the river and its bed encompass the entire parcel. Yet there is no indication in either the patent or its corresponding file that the federal government withheld any acreage for the bed and the banks of the river due to sovereign ownership by the State of Arizona.

Littleton's thick patent file provides many indications that the land he wanted was located in the bed of the Salt River. On his own final proof, the form required him to list any absences from the land. Littleton wrote that there was "[o]ne absence from the 17th January to 8th of April last year because of the high water." George Washington Pike and Delbert H. Thornton, witnesses for Littleton, both re-iterated the absence from the land due to high water. The patent was finally issued to Littleton in 1917 for one-hundred-sixty acres. Yet when deeding out the parcel, no land was withheld due to Arizona's sovereign right to the bed and the banks of navigable streams.[65]

5. George W. Pike's Patent – Another Example with Illustrations

Directly to the east of Littleton's land lay the northeast quarter of section nineteen. This parcel was patented to George W. Pike as homestead entry 442935. Like Littleton's land, Pike's

[65] Homestead Patent No. 588981, June 22, 1917, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 588981, June 22, 1917, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

entire parcel lay directly in the river's bed according to the U.S. General Land Office surveys of the late 1860s as well as the U.S. Geological Survey's historical topographic maps of the early 1900s (see the close-up views of the maps from earlier in this chapter below):

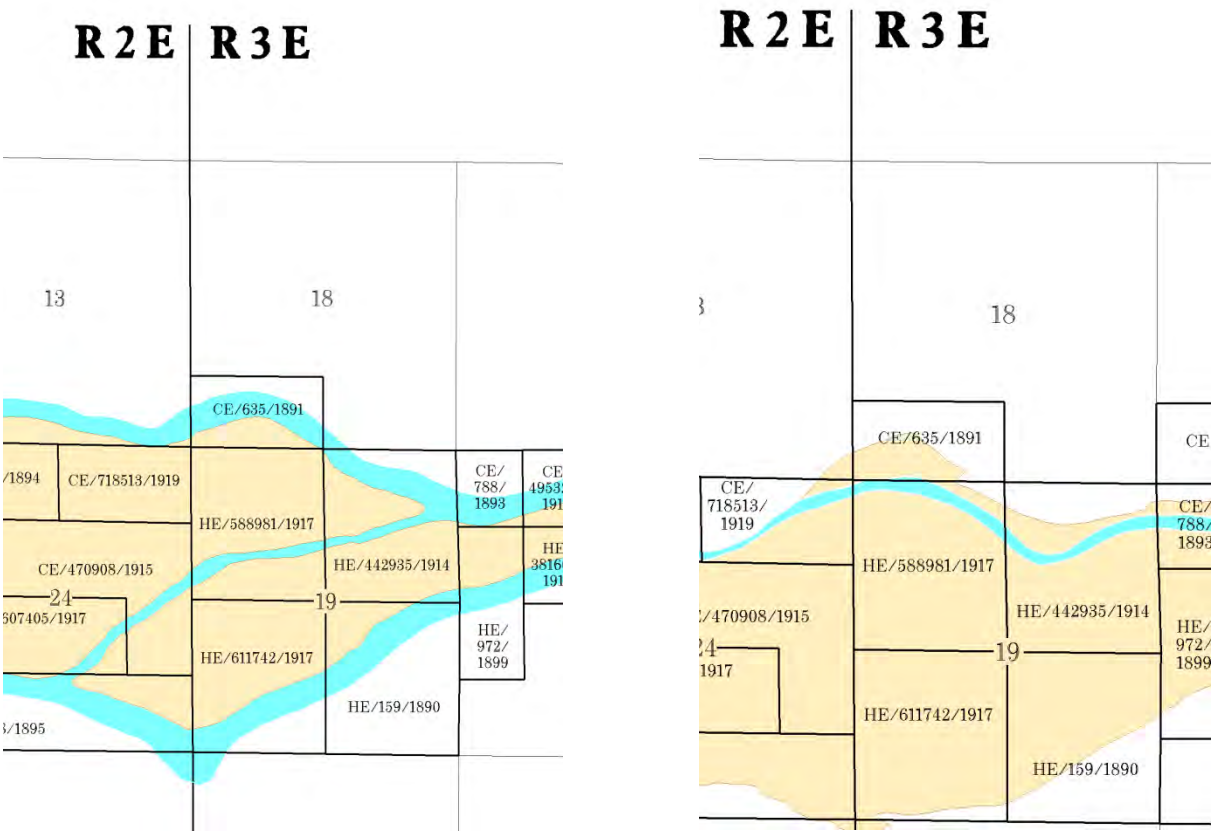

Figure 23: Close-up views of the location of George W. Pike's patent 442935 (in lower right portion of both maps) in relation to the U.S. General Land Office's 1868 survey (left) and the U.S. Geological Survey topographic maps from the early 1900s (right). Note that the Salt River flows directly through this parcel on both maps, although the channel had changed in the intervening years. (Skewing of lines is due to GIS rectifications.)

In the patent file for this tract of land, there were many proof documents filed by the applicant and his witnesses describing the land and the improvements made upon it. These documents support the conclusion that the Salt River ran directly through the land. One witness, Thomas Rain, wrote that in 1910 Pike had "cleared on south side of the river about 20 acres."

Rain also recorded that Pike had spent time "filling up deep slues [sic]." More telling, however, was Pike's own description of the land:

> *The claim is located partly in the river bed of the Salt River*. The portion not cultivable is covered with brush and small trees. The small trees can be cut for fire wood and for fence posts. [Emphasis added.]

In response to the question of whether Pike had joined the Salt River Valley Water Users' Association, Pike wrote that he had not done so because "my land is located in the river."[66]

Below are two pages of Pike's "Testimony of Claimant" illustrating the above quotations.

[66] Homestead Patent No. 442935, Nov. 16, 1914, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Homestead Patent file for Entry 442935, Nov. 16, 1914, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

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QUESTION 6. Describe the land embraced in above entry by legal subdivisions, showing fully the character of same, and kind and amount of timber, if any.

ANSWER.

Subdivision.	Acres cultivable.	Acres timbered.	Feet timber.
NE¼, Sec.19,T.1 N.,R.3 E.	80	None.	

About 50 acres on the south and 30 on the north side cultivable. The claim is located partly in the river bed of the Salt River. The portion not cultivable is covered with brush and small trees. The small trees can be cut for fire wood and for fence posts. There are no trees large enough from which lumber could be obtained. The trees are mostly cottonwood.

QUESTION 7. State by subdivisions the number of acres cultivated, kind of crop planted, and amount harvested, each year. How many acres of the claim are now cleared, or broken, and under cultivation? If used for grazing only, state number and kind of stock grazed each year and by whom owned.

ANSWER. NE forty I have 12½ acres under cultivation. SE forty I cleared 10 acres. 1½ acres cultivated. NE and NW forty I trimmed up the brush and trees and transplanted some trees on about 15 acres. I plnated 600 eculyptus trees, but the cold weather killed them. I planted 100 peach trees, and 80 plum trees,and 400 grape vines,300 black berry vines, 400 strwberry vines, 8 fig trees; 1910. I cleared 10 acres and trimmed up about 10 acres. I raised garden truck,1½ acres. I planted 30 peach trees and 20 plum trees. 1911,-I cleared about 10 acres and trimmed up the trees on the SE forty. NE forty I garden truck,3 acres. 1912,-3 acres garden and sorghum. The sorghum I fed to my stock. 1913-I have been retrimming trees and leveling the land. I have 1½ acres potatoes.12½ acres under cultivation with garden truck. 1910-cleared land. 1911,-10 acres recleared and 3 acres in garden truck; 1912-3 acres in garden and sorghum. I fed the sorghum to stock. 1913-about 12½ acres cultivated. 3/4 mile of fencing. No stock grazed.

QUESTION 8. Describe fully and in detail the amount and kind of improvements on each subdivision. State total value of improvements on the claim.

ANSWER.

Subdivision.	Character of improvements.
NE¼, Sec.19,T.1 N.,R.3 E.	Tent house,12x12,now torn down. Adobe house,18x22,1 room,to which has been added a leanto of 1 room. Floored,metal roof,5 doors,6 windows. The adobe is on the SE forty. On the NE forty I built a 4 room frame. 1 small chicken house on each place. 1 well on each place,1 pump on north and buckets used on south. My boy has lived on the southside,and I have lived on the north side. Improvements valued at $1500.

QUESTION 9. Is your present claim within the limits of an incorporated town or selected site of a city or town, or used in any way for trade or business?

ANSWER. No

QUESTION 10. Are there any indications of coal, salines, or minerals of any kind on the land? If so, describe what they are.

ANSWER. No

QUESTION 11. Have you ever made any other homestead entry? If so, describe the same.

ANSWER. I made a homestead in Colorado in 1896. Affidavit as to this entry was made with original entry papers.

c 6—1924

Figure 24: Second page of George W. Pike's "Testimony of Claimant." Note that under question 6 (at top), Pike states that "the claim is located partly in the river bed of the Salt River." Source: Homestead Patent Files, Records of the U.S. General Land Office, U.S. National Archives, Washington, D.C.

QUESTION 12. Have you sold, conveyed, or agreed to sell or convey any portion of the land; if so, to whom and for what purpose?

ANSWER. No

QUESTION 13. Have you optioned, mortgaged, or agreed to option or mortgage, or convey this land, or any part thereof; if so, when, to whom, and for what purpose and in what amount?

ANSWER. No

QUESTION 14. Have you any personal property of any kind elsewhere than on this claim? If no, describe the same, and state where the same is kept.

ANSWER. No

QUESTION 15. Describe by legal subdivisions, or by number, kind of entry, and office where made, any other entry or filing (not mineral) made by you since August 30, 1890.

ANSWER. See statement filed with original application.

Have you signed up with the Water Users Association and are all assessments paid to date.

I have not signed up with the Water Users Association because my land is located in the river, and I think it is to the interest of myself and the government not to do so, because I can get water from the river. I am willing to sign up up it is necessary to do so.

George W. Pike
(Sign plainly, with full Christian name.)

☞ NOTE 1.—If applicant is alien born, he should state the fact and file evidence of citizenship in due form, either a certificate of his own naturalization in a court of competent jurisdiction, or, if claiming to be a citizen by virtue of his father's naturalization and his own minority and residence in the United States at the date thereof, or, if a married woman claiming citizenship by virtue of her husband's nativity or naturalization, then record evidence of the naturalization of the father, or husband, or an affidavit as to the nativity of the latter.

☞ NOTE 2.—The officer before whom the proof is made will see that all answers are complete and responsive to the questions.

☞ NOTE 3.—The officer before whom the deposition is taken should call the attention of the witness to section 5392 of the Revised Statutes (over), and state to him that it is the purpose of the Government, if it be ascertained that he testifies falsely, to prosecute him to the full extent of the law.

I HEREBY CERTIFY that the deponent was examined separately and apart from the other witnesses in the case; that the foregoing deposition was read to or by deponent in my presence before deponent affixed signature thereto; that deponent is to me personally known (or has been satisfactorily identified before me by _____ (Give full name and post-office address.)); that I verily believe deponent to be the identical person hereinbefore described, and that said deposition was duly subscribed and sworn to before me at my office, in Phoenix, Maricopa Co., Arizona. (Town, county, and State.), within the Phoenix, Arizona. land district, this 24 day of June 19 13.

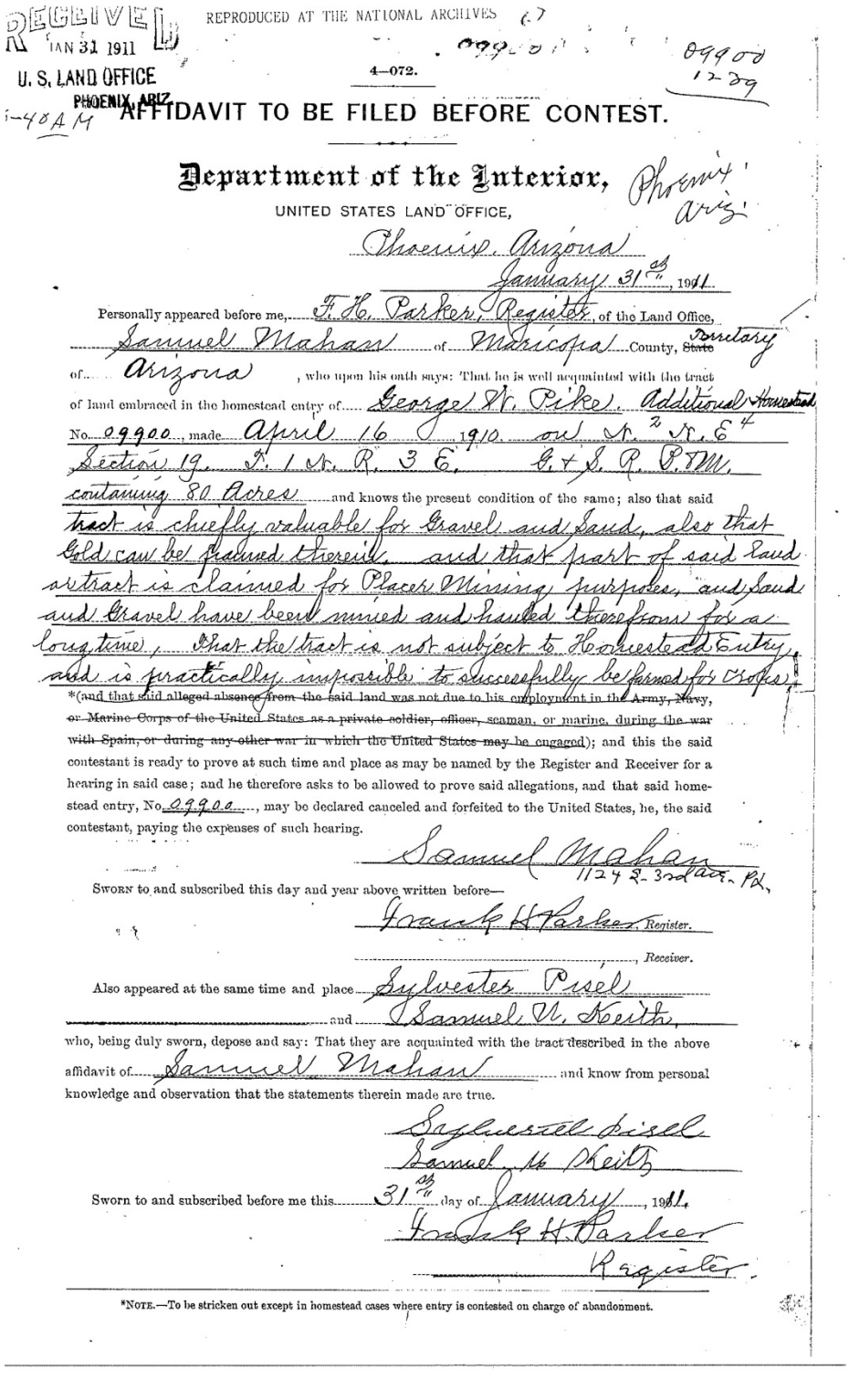
Frank H. Parker
Register.
(Official designation of officer.)

c 6—1024

Figure 25: Third page of George W. Pike's "Testimony of Claimant." Note that under question 15, Pike states that he had not yet signed up with the Salt River Water Users' Association because his claim was located in the Salt River, and he therefore believed he could obtain adequate water on his own. Source: Patent Files, Records of the U.S. General Land Office, U.S. National Archives, Washington, D.C.

Though Pike's patent was eventually granted, his case was a difficult one. The homestead laws were intended to increase settlement of the West as well as perpetuate the agriculturally-based history of the United States, and therefore, settlers under such laws were required to demonstrate use of the land for farming as opposed to mining, land speculation, etc. In Pike's case, his land was contested by fellow homesteader, Samuel Mahan, as not being suitable for cultivation as required under the 1862 *Homestead Act*. On the "Affidavit to be Filed Before Contest" (see below for a copy of Mahan's "Affidavit") Mahan swore that the:

> tract is chiefly valuable for Gravel and Sand, also that Gold can be panned therein, and that part of said land or tract is claimed for Placer Mining purposes, and Sand and Gravel have been mined and hauled there from for a long time, [t]hat the tract is not subject to Homestead Entry, and is practically impossible to successfully be farmed for crop.



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AFFIDAVIT TO BE FILED BEFORE CONTEST.

Department of the Interior,
UNITED STATES LAND OFFICE,
Phoenix, Ariz.

Phoenix, Arizona
January 31st, 1911

Personally appeared before me, F. H. Parker, Register, of the Land Office, Samuel Mahan of Maricopa County, ~~State~~ Territory of Arizona, who upon his oath says: That he is well acquainted with the tract of land embraced in the homestead entry of George W. Pike, Additional Homestead No. 09900, made April 16 1910, on N. ½ N. E. ¼ Section 19, T. 1 N. R. 3 E. G. & S. R. P. M. containing 80 Acres and knows the present condition of the same; also that said tract is chiefly valuable for Gravel and Sand, also that Gold can be gained therein, and that part of said Land as tract is claimed for Placer Mining purposes, and Sand and Gravel have been mined and hauled therefrom for a long time, That the tract is not subject to Homestead Entry, and is practically impossible to successfully be farmed for Crops.

*(and that said alleged absence from the said land was not due to his employment in the Army, Navy, or Marine Corps of the United States as a private soldier, officer, seaman, or marine, during the war with Spain, or during any other war in which the United States may be engaged); and this the said contestant is ready to prove at such time and place as may be named by the Register and Receiver for a hearing in said case; and he therefore asks to be allowed to prove said allegations, and that said homestead entry, No. 09900, may be declared canceled and forfeited to the United States, he, the said contestant, paying the expenses of such hearing.

Samuel Mahan
1124 2-3rd Ave. Pl.

Sworn to and subscribed this day and year above written before—

Frank H. Parker, Register.

....., Receiver.

Also appeared at the same time and place Sylvester Pisel and Samuel N. Keith, who, being duly sworn, depose and say: That they are acquainted with the tract described in the above affidavit of Samuel Mahan and know from personal knowledge and observation that the statements therein made are true.

Sylvester Pisel
Samuel N. Keith

Sworn to and subscribed before me this 31st day of January, 1911.

Frank H. Parker
Register.

*NOTE.—To be stricken out except in homestead cases where entry is contested on charge of abandonment.

Figure 26: Samuel Mahan's protest that George W. Pike's patent claim was not suitable for farming because the land was only valuable for sand and gravel (because it was in the Salt River's bed.) Source: Patent Files, Records of the U.S. General Land Office, U.S. National Archives, Washington, D.C.

Although Mahan's claim was rejected, it nonetheless demonstrated certain characteristics about the parcel in question, strongly suggesting it lay in the river bed. Yet despite the obvious knowledge that the land was located in the river bed, the federal government, when granting title, did not withhold any acreage for Arizona due to the stream's navigability. The full eighty acres were granted to Pike in 1914.[67]

Not far from Pike's land is the northeast quarter of the northwest quarter of section twenty, the lands contained in Samuel Mahan's own patent, number 495328. As shown by the 1904-1913 U.S. Geological Survey topographic maps as well as the 1868 U.S. General Land Office survey plats, the Salt River flowed directly through Mahan's land. Mahan, the contestant in Pike's case, applied for a cash entry to this tract, completed the necessary procedures, and was eventually granted title to the forty-acre parcel in 1915. But Mahan's case, like Pike's, was littered with difficulties – some of which shed light on the nature of the Salt River. Ironically, what Mahan had contested about Pike's land was also disputed on his own. Mahan filed his application in May 1913. On August 15, 1914, according to documentation in the patent file, a protest was lodged by the attorneys for Clinton Lauver and D.G. Beals against Mahan's application on the ground that the land was already embraced in two placer mineral filings made on sand and gravel deposits in the bed of the Salt River. Documentation of the conflict found in Mahan's patent file underscores the river's presence as well as gives excellent descriptions indicating the character of the Salt River at that location. A brief filed by Mahan's attorneys summarized testimony throughout the case:

> [i]t was also shown that about 34 acres of the said land is valuable agricultural land adapted to the raising of agricultural crops or for fruits. *The balance of said*

[67] Homestead Patent No. 442935, Nov. 16, 1914, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Homestead Patent file for Entry 442935, Nov. 16, 1914, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

> *land or some six acres is in the wash of the Salt River* and is a deposit of sand and gravel. [Emphasis added.]

Apparently Mahan had taken some of the sand and gravel, hauling it to Phoenix to make concrete. Immediately following its removal, according to Mahan "the excavations made thereby were . . . filled by silt washed down by the river and would thereafter grow agricultural products." Mahan contended that extraction of the sand and gravel was done not for commercial purposes, but to take advantage of the silt that subsequently filled the pits and made the land more suitable for agriculture. In a deposition regarding this matter, Phillip Hickey disagreed. He stated that:

> *[t]he 40 acres is traversed by the Salt River*, and when flood waters come, as they frequently do, when it rains, the pits made in taking the sand out, are filled up, the sand restored, and as this sand and gravel is only thing of value that the ground furnished . . . *it being simply River Bed Wash*. [Emphases added.]

A joint deposition signed by Clinton Lauver, D.G. Beals, P.K. Hickey, C.C. McEwen, and J.E. Rilly contained virtually the same information:

> We know the land in controversy, and *we know that it is River Bottom land*, and chiefly valuable for the Sand and Gravel upon it, it is not valuable or to any extent useful for farminfg [*sic*] purposes, its value is in the grade of sand and gravel it furnishes, and it is inexhaustible, because the River floods restore the Sand and Gravel removed. [A]nd that is a valuable commercial commodity, and worth more than anything that can be raised upon the place agriculturally. . . . *[T]he Salt River flows through the tract, and it is practically all river bed wash*, Sand and Gravel, and as Floods come down the River that at times have overflowed every foot of the ground, and to quite a depth, it is absurd to call it good agricultural land. [Emphases added.]

Further displaying the extremes of the Salt River was Lauver and Beals's "Statement of Facts," which noted that:

> *the whole of the said tract has frequently in past 32 years, to our knowledge been under water from 10 to 30 feet, in River Floods*, and from those floods the character of the ground was created and the Sand and Gravel deposited have a commercial value, and sell right along, while no other things can be successfully raised upon and sold from the said ground. [Emphasis added.]

Although the evidence pointing to the river's presence was overwhelming, Mahan maintained that the river did not pass through his land "proper." Nevertheless, all other witnesses, including those testifying on Mahan's behalf, mentioned the presence of the river in the parcel. Lawrence Nelson, for example, testified that "[y]es, there is a little channel that overflows at times," and he further stated that "[a]bout 30 or 33 acres of this claim can be put under cultivation: *The rest of it is un [sic – in] the river* and unfit for agricultural purposes." (Emphasis added.) Mahan's arguments finally succeeded and all protests were dismissed.[68]

The documents in this case illustrate two important points: 1) they confirm the presence of the river on the land and 2) they demonstrate the irregular ebb and flow of the river. Moreover, Mahan's case gives important insight to Arizona's perception of the Salt River. First, the dispute documented that a channel of the Salt River ran directly through this property. Furthermore, the conflict also substantiated that the land was valuable for its sand and gravel deposits. Despite these facts, Arizona allowed Samuel Mahan to gain title to the land without protest. There is no evidence that state officials were involved in any aspect of the controversy, which they undoubtedly would have been had there been any claim to ownership of the bed and the banks of the river. Not only does the state's absence from this matter indicate non-navigability, but the vivid descriptions of frequent floods on the Salt River suggest its historically erratic nature. At times, this land was completely dry, while at others, the land was inundated to a depth of thirty feet. In spite of the river's presence, Mahan was given title to the full forty acres of this land in 1915.

Upstream from Mahan's land was a parcel patented by John S. King, who applied to homestead the southeast quarter of the southeast quarter of section seventeen in township 1

[68] Homestead Patent No. 495328, Oct. 25, 1915, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 495328, Oct. 25, 1915, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

north, range 3 east. Cash entry patent 465160 was issued to King in March 1915 for forty acres. The file created for this patent contains information demonstrating that some of the land lay in the bed of the Salt River. George W. Artis, one of the witnesses that submitted a testimonial proof for King, described the parcel as follows:

> I should say about 15 or 20 acres of his land can be cultivated, *the rest is liable to flood from the river*. No timber except cottonwoods growing in river bed. [Emphasis added.]

James H. Deardorff augmented this information in his own statement that "[a]bout 25 acres of his land can be cultivated, the rest is liable to flood from the river when it is up."

King himself admitted that a portion of his land was subject to flooding. When asked if he had been gone from the land since settling it, he replied that he "[w]as absent over the night of Mar. 22, 1914. Left for that night account of high water, but did not move either stock or household furniture. Returned early next morning." On the next page of the proof, King described his land: "About 25 acres can be cultivated, *balance of 15 acres is liable to overflow when water is in river*. No timber except what grows along the river." (Emphasis added.) Indeed, there is no indication in either the patent or its supporting file that any acreage was withheld for Arizona's sovereign ownership. The full forty acres was granted to King in 1915 despite the clear evidence that the land lay directly in the bed of the Salt River.[69]

Within a few years, a controversy paralleling Mahan's in complexity erupted over land lying upstream to the east in what is now present-day South Phoenix. Margaret Dorn had applied for a homestead on the north half of the northwest quarter of section twenty-one. Roy E. Cook applied for the same parcel of land. According to Cook, Dorn had physically gone to the land before it was officially thrown open to entry; on the other hand, Dorn contended that Cook

[69] Cash Entry Patent No. 465160, March 27, 1915, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Cash Entry 465160, March 27, 1915, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

had arrived on the land *after* the 9:00 a.m. opening time on March 11, 1914, at which point Dorn had staked her claim. Cook claimed he did not see Dorn on the land when he arrived shortly before noon.

Included in the file for this patent was a lengthy transcript of a hearing held to settle the matter. Numerous individuals' testimony described the land and its proximity to the river. The historical U.S. Geological Survey topographic maps and the original U.S. General Land Office survey plats show the river's presence in this parcel of land, and testimony at the hearing provides yet another source of evidence that the river flowed directly through this tract. Roy Cook answered the following questions during the hearing:

> Q: With reference to this tract, how does it lay with regard to the river?
>
> A: *The river cuts through it; the river cuts through the tract approximately two hundred feet east of the Northwest corner of this tract, and then continues through, almost due east, slightly towards the south, and the river is about five hundred feet south of the Northeast corner of the tract, and at that point the river is one hundred and twenty-five feet wide. That is at the east corner*. [Emphasis added.]
>
> Q: With reference to the number of acres, how many acres are there north of the river?
>
> A: There are about eleven acres north of the river.
>
> Q: And about how many acres south of the river?
>
> A: There are about forty-two acres south of the river of tillable ground.
>
> Q: About forty-two acres of tillable ground?
>
> A: Yes, sir.
>
> Q: About how much wash?
>
> A: There are about twenty acres of wash south of the river.

Answering yet more questions, Cook described the river further in the following exchange:

Q: How wide is the river at your place?

A: The river is about a hundred feet wide, I think, at that time. There is a lagoon on this side.

Q: It may be five hundred feet?

A: The river?

Q: Yes.

A: No, it is impossible for the river to be more than one hundred and fifty feet at the most. You are talking about that lagoon on this side. The lagoon is not the river. The lagoon is possibly one hundred and twenty-five feet long and there is a sand bar in between the lagoon and the river proper. There may be five hundred feet in all, but that is including the river proper, the lagoon and the sand bar.

Witnesses other than Cook gave additional insights as to the nature of the river on March 11, 1914. Guy Allen, who had accompanied Cook to the land, testified that he "walked out north into the river bed there quite a ways." That Allen was able to walk into the river bed that day indicated that the river probably had little, if any, water in it. Samuel Mahan also testified on behalf of Cook, stating on cross-examination that he had walked "probably one hundred yards north [on the day of settlement], on the edge of the bank, where the old river-bed used to run. . . . Mr. Allen there went out and we also went down into the old river-bed." Henry Larson, also a witness for Cook, testified that "we paced off the west boundary of the claim, and waded the river on the west boundary and walked north to the east boundary and measured off the distance from the corner to the river." Larson's description corroborated Allen's testimony, showing that the depth and flow of the river was slight on the day of settlement.

Other witnesses gave a similar impression of the river. Francisco Rubio was asked how he happened to see the activity on the land on March 11, 1914. Rubio testified that:

A: I was working on that day. I came up and was going to town.

Q: And you came to town by that road?

A: Yes, sir; went by there.

Q: And crossed the river?

A: Yes, sir.

Q: Wasn't the river too high to ford at that time?

A: No, sir.

In addition to the testimony illustrating the presence of the river on the land, other documents in the patent file provide insight on the characteristics of the river at that locale. On Margaret Dorn's final proofs, she and her two witnesses, Fred Smith and Burk Pinkerton, all noted that Dorn had been off of the land multiple times "on account of the water being up around the place." At one point, one of the witnesses even had to take Dorn off "in a boat, she was marooned by the floods."

It is clear from this patent and its file that the land in question contained the bed and banks of the Salt River. No land was withheld due to Arizona's sovereignty.[70]

This conclusion is bolstered by yet another representative sample of federal patenting along the Salt River. Feliciano Gutierez applied for homestead entry 469157 on land lying in sections twenty-one and twenty-two in township 1 north, range 3 east. Gutierez's application was approved and the land patented to him in April 1915. Yet according to the topographic maps created by the U.S. Geological Survey between 1904 and 1913 as well as the original survey plats created by the U.S. General Land Office in 1868, the Salt River flowed directly through the northeast corner of this land.

Although there are no comments in the final proofs submitted by Gutierez or his witnesses regarding this land lying in the river, it is clear that the U.S. Department of the Interior

[70] Homestead Patent No. 591465, July 9, 1917, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 591465, July 9, 1917, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

was aware of its presence. In a "Favorable Report" issued by the General Land Office in November 1914, a copy of which is in the patent file, it was noted that:

> the entry is within the limits of the Salt River Project; but it lies along the Salt River and portions at times are subject to overflow. The Reclamation Service has not designated any portion of this entry as lands to which water will ever be supplied.

Obviously, the federal government knew that the river flowed through this land, yet there is no indication in the patent itself or in its file that any portion of the lands was withheld for the state of Arizona. Instead, the patent was granted in the full 120 acres.[71]

Also in township 1 north, range 3 east, Rawghlie Stanford filed an application to homestead eighty acres lying in the south half of the southwest quarter of section fifteen. According to the historical mapping sources noted above, much of the land encompassed by this patent clearly lay in the Salt River bed. The final proof filed in 1914 by Frank Harris, a witness for Stanford, stated that "[a]bout 60 acres of this claim can be put under cultivation: *the rest of the claim is in the river bed* and is totally unfit for cultivation." (Emphasis added.) Testimony by William Blucks, another witness, supported Harris's statement: "All of this entry can be put under cultivation but 20 acres; *which is in the river bed* and unfit for cultivation." (Emphasis added.) No documentation exists, however, suggesting the federal government withheld acreage due to ownership by Arizona.[72]

[71] Homestead Patent No. 469157, April 20, 1915, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 469157, April 20, 1915, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

[72] Homestead Patent No. 434353, Oct. 8, 1914, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 434353, Oct. 8, 1914, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

6. Federal Patents on the Salt River in Township 1 North, Range 4 East

Going upstream to the next township, George J. Awrey filed an application for a homestead for land in section eighteen, township 1 north, range 4 east.[73] The application was for 78.63 acres (half of a quarter section adjusted for the curvature of the earth), all of which was granted. In section eight of this same township, homestead patent 903199 was issued in 1923 to Edward B. Rives, the assignee of Antonio C. Alvarado.[74] Similarly, Dennis Thornesberry's patent on land in section thirteen was issued in 1915.[75] Though the river ran directly through all three parcels of land according to historical U.S. Geological Survey topographic maps as well as original U.S. General Land Office survey plats, no acreage was removed to account for the state's sovereign ownership of the bed and banks of navigable bodies of water. Instead, the government granted full title to each applicant, suggesting that neither Arizona nor the federal government considered the Salt River navigable.

Likewise, all one-hundred-sixty acres of Thomas J. Parry's land, overlying sections thirteen and fourteen of township 1 north, range 4 east, was patented to him in 1920. According to the same historical mapping sources, the river ran directly through this parcel of land, located east of present-day Tempe. Supporting this fact was documentation found in the Parry's patent file. In a "Favorable Report" issued by the U.S. General Land Office in 1914, the government agent who wrote the report described the "character of land" in this application as "Semi-arid. Adjoining banks of Salt River." Parry, on his own final proof submitted for the land, admitted that "[m]ost of the claim is river bottom." Parry did not state that "part" of the claim was river

[73] Patent file for Homestead Entry 442932, Nov. 16, 1914, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington D.C.

[74] Homestead Patent No. 903199, April 13, 1923, Records of the U.S. Bureau of Land Management, Phoenix, Arizona.

[75] Homestead Patent No. 503185, Dec. 11, 1915, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 503185, Dec. 11, 1915, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

bottom, or that "some" of it was river bottom, but that "most" of the claim was river bottom, suggesting that if the river was considered navigable, *most* of this claim should have been the state's. However, no documentation existed in the file to indicate that land was withheld from the patent in order to reserve title for Arizona.[76]

7. Federal Patents on the Salt River in Township 1 North, Range 5 East

At the far eastern edge of township 1 north, range 4 east, a piece of land extending into township 1 north, range 5 east, was filed for by George T. Kimbell in 1912. Overlying parts of section thirteen of township 1 north, range 4 east, and section eighteen of township 1 north, range 5 east, Kimbell's patent lay where the river bed historically crossed from one township to the next. Because of section eighteen's location on the western boundary of the township, its total acreage was adjusted during surveying to accommodate the curvature of the earth. Therefore, government lot one (part of this patent) contained less than a full forty acres, making the total acreage for Kimbell's patent 159.79 acres, just short of the full one-hundred-sixty acres.

Kimbell had substantial difficulty perfecting his patent because the land, which is just south of the Salt River Indian Reservation, had been withdrawn from entry by the Reclamation Service. A file in the records of the U.S. Secretary of the Interior contains documents which give useful insight to Kimbell's dilemma as well the Salt River's navigability at the time of Arizona statehood. A hand-written letter dated February 20, 1912, is especially telling. Composed eight days after Arizona was admitted to the Union, the letter describes the Salt River in great detail. Kimbell wrote (original spellings have been retained):

> I have looked at the land very carefully and will give you the decription of it as near as I can. . . . Years ago before Granite Reef [Dam] was put in about 22 miles

[76] Homestead Patent No. 725338, Jan. 3, 1920, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 725338, Jan. 3, 1920, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

above here, and the Roosevelt dam was put in, The water, from the Verde River and Salt River above the Roosevelt dam, would, when the rains and snow was great up there, come down the river and spread out over the valley about 4 miles above here and cut chanals thru the valley, thru these two sections I speak of, and the sections closest to the river up to about 40 miles above here. The worst damage the water done to this part of the land was when the water cut in east of Tempe and extended up the river to about 4 miles above here. *The water run over all the low places of these sections* mentioned and caused the people of Tempe and the people along this land mentioned to put rock and brush levies across the washes that was made by the water that come out of the river on the south side of river. The land that the two large levies were put on is the south side of the n. west eighty of section 18. Up to about 4 years ago the water would run over the low places in the levies caused by the brush giving away and animals working in them. *From the southwest corner of the northwest fourty of section 18 to the first slough north it is 51 steps. From the southwest corner going east it is 127 steps to the first slough. From the last slough mentioned on east to about halfway across the east fourty of land mentioned the land has river rock and gravel and some timber such as scruby willow and cottonwood***.** There is about 10 acres of sandy soil at the southeast corner of the east 40ty of land mentioned that would do to farm. It is 100 steps from the southeast corner of the east fourty acre block, belonging [?] the northwest eighty of section 18 in Township 5 east, Range one north, to the river, and *the land I speak of runs west to a point, or to where the old river washes begins*. . . . Before I go any farther with my story, I am going to tell you more about that River. We call that chanal the river, for I saw last summer the water come down there about 8 or ten feet deep. Above this land I am now talking of, about a mile above [?] land begins and goes west. *This chanal that runs thru this eighty I am talking of is the South chanal of the river and ends as far as the west side of the north east fourty of section 13 in Township 4 east, Range one north. The land is, across its widest place, about a mile wide***.** The land is in this shape [diagram] or about that shape. The upper end of it has most any kind of brush and timber on it that will grow on this river here. But not very large. *The land is made up of all kinds of river material*. . . . The South 40ty has the best land on it. There are two sloughs that runs thru the north side of the 40ty last mentioned and on down thru the three 40tys west of it. The highest part of the South part of the 40ty mentioned is about 12 feet to water. It is about two feet to water in the sloughs that I last mentioned. . . . *All this land that I have mentioned has been overrun by high water. There is a slough that joines this land on the south and goes on west about a half or 3 quarters of a mile and goes in to the sloughs north and on into the river*. . . . Last summer I waded that slough when the water was waist deep. . . . I think I have said enough about this land. I think I can make a home out of it if I can file a homestead on it. I will take chances on getting washed away. It will make a chicken ranch. . . . [Emphases added.]

A July 13, 1912, letter sent to Kimbell from the U.S. Department of the Interior informed him that the lands he wanted had, in fact, been restored to the public domain, and therefore were

available for his homestead claim. It is clear not only from Kimbell's detailed description but also from the historical U.S. Geological Survey topographic maps and the 1868 U.S. General Land Office survey plats that the land lay directly in the bed of the Salt River and had many sloughs and channels. But when the federal government restored these lands to the public domain, none were retained for Arizona due to the Salt River's navigability. Ultimately, Kimbell received title in 1916 to the entire 159.79 acres.

Aside from where the Salt River lay in relation to Kimbell's claim, his description is also revealing as to the nature of that stream. Kimbell's letter depicted a very erratic river that alternated between being totally dry to having water twelve feet deep. With the numerous channels and the changing depths of water, the Salt River would have been highly unreliable as an artery of commerce.[77]

Also in township 1 north, range 5 east, Albert B. Harper was granted a homestead patent on the southeast quarter of the northwest quarter of section three in 1914. According to the 1904-1913 U.S. Geological Survey topographic maps as well as the 1868 U.S. General Land Office survey plats, the Salt River ran directly through well over seventy-five percent of this parcel. When Harper made his final proof, one of his witnesses described the parcel as follows:

> [Albert Harper's] father cultivated at least 4 acres under cultivation for many years, and the boy worked on the land with his father up to the time he took charge of it himself. The four acres have been used in rasing [*sic*] garden truck, mostly melons and cantelopes. There has been no other cultivation of this tract, because that is all that is all that is [sic] fit for cultivation. *The balance of the claim is in part of the Salt River river bed***.** [Emphasis added.]

[77] George T. Kimbell to the Secretary of Interior, Feb. 20, 1912, and First Assistant Secretary of the Interior to George T. Kimbell, July 13, 1912, "Reclamation Bureau, Salt River Project, Withdrawals & Restorations, March 4, 1908 to March 18, 1913," Box 1648, Central Classified File, 1907-1936, 8-3, Records of the Office of the Secretary of the Interior, Record Group 48, U.S. National Archives, Washington, D.C.; Homestead Patent No. 518079, Records of the U.S. Bureau of Land Management, Phoenix, Arizona.

Harper's father (Harvey J. Harper) confirmed this description of the land: "[p]ractically all but the four acres is within the overflow from the river, and is part of the Salt River bottom." Albert Harper himself stated that "20 acres are in the Salt River." Even with a substantial part of this parcel in the Salt River bed, there is no indication in either the patent itself or the patent file that the federal government withheld any acreage due to Arizona's sovereign right to the ownership of the beds and banks of navigable bodies of water.[78]

Also in section three of township 1 north, range 5 east, was a reclamation homestead entry deeded to Orlando Merrill in January 1920. According to both the historical U.S. Geological Survey topographic maps and the original 1868 U.S. General Land Office survey plat, the Salt River passed directly through this forty-acre parcel. Merrill's patent file contains documents also indicating that the river bed was in the patented lands. In his final proof in response to the question asked regarding absences from the land, Merrill stated:

> Went away on leave of absence about August 1914 and returned in October 1914. My wife and family have not lived there with me as my wife refused to do so because *the land is in the river bed* and she was afraid of the floods. [Emphasis added.]

Testimony of witnesses for the final proof backed up this statement. Thomas Jones noted that "[Merrill's] family have [*sic*] been there at times but have not made it their permanent home on account of the floods."

As if these documents were not clear enough about the land being in the river, Merrill and his wife wrote a letter to the U.S. General Land Office in Washington, D.C., on February 12, 1919. In the letter, Lucy Merrill pleaded with the Land Office to grant title of the parcel to her husband, stating that:

[78] Homestead Patent No. 405842, May 15, 1914, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Homestead Entry 405842, May 15, 1914, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

> *[t]his forty acres is situated in the river bed***.** There are about 20 acres which could be used for farming[.] [T]his 20 acres is composed of rich river silt and is very valuable for gardening and raising small crops such as berries pea-nuts etc. [Emphasis added.]

Discussing the major improvements that her husband had made on the parcel, she noted that:

> I, his wife; however refused to live there with my family of five small children-; as *during the rainy periods the land is surrounded by water for several weeks at a time*; and did not consider it safe nor wise to take my children where I could not summon medical aid at any time for my very delicate child. [Emphasis added.]

Lucy Merrill then described the floods of 1916:

> In the winter of 1916 the Salt River rose higher than for 25 years washing away the flume which my husband had built across the Tempe canal also flooding a portion of his claim including a part of that which he had cultivated[.] [I]t also coverd [*sic*] and washed away that part of the fence which was on the lower side of his claim.

This documentation illustrates two critical things about the Salt River's characteristics. First, the settlers' fears of violent flooding indicate the unpredictable nature of this stream. Second, the historical record contains numerous statements that this parcel of land lay in the bed of the Salt River. Following the floods of 1916, Merrill himself stated that "[a]bout 17 acres were cultivable before the flood but there is virtually no cultivable land there now, *the whole being river bed***.**" (Emphasis added.) Nonetheless, the U.S. General Land Office granted the full forty acres to Merrill in 1920 without withholding any acreage for the State of Arizona. Both the unreliable nature of the river and the failure to recognize Arizona's sovereign ownership of the bed and banks are strong indications of the non-navigable nature of the Salt River.[79]

[79] Reclamation Homestead Patent No. 728752, Jan. 20, 1920, Records of the U.S. Bureau of Land Management, Phoenix, Arizona; Patent file for Reclamation Homestead Entry 728752, Jan. 20, 1920, Records of the U.S. General Land Office, Record Group 49, U.S. National Archives, Washington, D.C.

8. Federal Patents on the Salt River in Township 2 North, Range 5 East

In section thirty-four of township 2 north, range 5 east, according to both the historical U.S. Geological Survey topographic maps and the 1868 U.S. General Land Office survey plats, the river flows directly through the land in cash entry patent 558. Lovina V. Davis was granted this forty-acre parcel on August 8, 1896. Though the river passes directly through where the land lies, there is no indication that any land was withheld for the state for the purposes of granting it the bed and the banks of the river.[80]

Patent 558 is representative of many of the remaining patents for this township, most of which are Indian Trust Patents because they are within the Salt River Indian Reservation. While smaller in acreage than patents granted to non-Indians, there is nonetheless no indication that there was ever any concern about the bed and the banks of the Salt River being owned by the state when any of these patents were awarded.

9. Federal Patents on the Salt River in Township 2 North, Range 6 East

The uppermost part of the study area for this report is in township 2 north, range 6 east. Though much of this land was reserved by the federal government for the Salt River Indian Reservation, there were two patents granted to individuals in sections twenty-nine and thirty of this township that further demonstrate the U.S. Government's lack of concern that the bed and the banks of the Salt River might belong to Arizona. Cash entry patent 576 was issued to Oscar Crismon in 1891, and the Salt River's bed lay directly in this parcel. Nevertheless, the patent still contained the full one-hundred-sixty acres. There is no indication in the patent itself that

[80] Cash Entry Patent No. 588, Aug. 24, 1896, Records of the U.S. Bureau of Land Management, Phoenix, Arizona.

any exception was made for withholding the bed of the Salt River due to a possible claim of ownership by the State of Arizona.[81]

Also in section thirty, south of the Salt River Indian Reservation lay the land encompassed in reclamation homestead entry patent 700125. Because it includes a parcel of land lying on the western boundary of the township and therefore was adjusted to accommodate the curvature of the earth, the tract contains 75.94 acres rather than the full eighty acres. According to the 1904-1913 U.S. Geological Survey topographic maps and surveys done by the U.S. General Land Office in 1868, the Salt River ran directly through this land. Nonetheless, there is no indication that the federal government withheld any lands due to a possible claim of ownership by the State of Arizona. It can therefore be inferred that the federal authorities did not believe the river to be navigable.[82]

F. The *Desert Land Act* of 1877

In addition to land patented under the various homestead and reclamation laws discussed earlier in this chapter, the U.S. Congress passed the *Desert Land Act* on March 3, 1877, intending to provide settlers with further opportunities to settle western lands.[83] This law, unlike the other homestead statutes, allowed an individual to file an application for up to six-hundred-forty acres, by far the largest tract of land allowed for a single person under any of the U.S. homestead laws. The act required that the settler reclaim and cultivate a piece of desert land through irrigation before a final patent would be awarded. The law also specified that the water was to come from a non-navigable stream:

[81] Cash Entry Patent No. 576, Oct. 16, 1891, Records of the U.S. Bureau of Land Management, Phoenix, Arizona.

[82] Reclamation Homestead Patent No. 700125, July 23, 1919, Records of the U.S. Bureau of Land Management, Phoenix, Arizona.

[83] *An Act to Provide for the Sale of Desert Lands in Certain States and Territories*, 19 Stat. 377 (1877).

> *Provided however* that the right to the use of water by the person so conducting the same, on or to any tract of desert land of six hundred and forty acres shall depend upon bona fide prior appropriation: and such right shall not exceed the amount of water actually appropriated, and necessarily used for the purpose of irrigation and reclamation: and all surplus water over and above such actual appropriation and use, together with the water of all, lakes, rivers and other sources of water supply upon the public lands and *not navigable*, shall remain and be held free for the appropriation and use of the public for irrigation, mining and manufacturing purposes subject to existing rights. [Emphasis added.][84]

In short, the *Desert Land Act* stated that land patented under this statute had to be reclaimed through water obtained by prior appropriation and that the appropriation had to be from a non-navigable stream.

In the townships along the Salt River from the confluence with the Gila River to Granite Reef Dam, there were forty-one applications for patents under the *Desert Land Act*. All of the applicants intended to obtain water from the Salt River, and all forty-one applications were accepted by the U.S. General Land Office in Phoenix. The logical conclusion from these applications is that the Salt River (as the source of water for these lands) must have been considered non-navigable by the applicants as well as by the administrators of the U.S. General Land Office. Although many of the applications were subsequently canceled or relinquished due to failure to fulfill the *Desert Land Act*'s requirements, the mere fact that the applications were initially accepted indicates a contemporaneous belief that the Salt River was not navigable. There is no indication the cancellations and relinquishments were due to the navigability of the Salt River.

The history of the study area's *Desert Land Act* patents supports the conclusions gleaned from the representative homestead and cash entry patents discussed above. Similar to those patents, no mention was made in the *Desert Land Act* applications of reserving the bed and the banks of the Salt River due to the sovereign rights of the state.

[84] *An Act to Provide for the Sale of Desert Lands in Certain States and Territories*, 19 Stat. 377 (1877).

G. Federal Grants to Arizona

Arizona, like other public land states, obtained acreage by Congressional grants to support certain public interest objectives prior to and following statehood. Historically, such grants to new states had started with Ohio's admission to the Union in 1802, although over the years the types and sizes of the grants varied from state to state. Grants to Arizona covered a variety of purposes. For example, prior to statehood, Congress reserved for Arizona all sections sixteen and thirty-six for the purpose of supporting public schools. At statehood, sections two and thirty-two were added (also for schools), with all four sections totaling 8,093,156 acres. In addition to this land, 1,446,000 more acres were given to Arizona instead of the internal improvement, swamp, saline, and agricultural college grants provided to earlier states. Moreover, an additional one million acres were granted to Arizona to pay for bonds issued by certain counties.

Aside from sovereign lands (which were determined by navigability and not by an act of Congress) and lands in sections 2, 16, 32, and 36, Arizona was allowed considerable leeway in selecting the other federally granted lands. In addition, Arizona had flexibility in selecting "in-lieu" or indemnity acreage if mineral lands (which were denied to the state) or Indian reservations overlay any section 2, 16, 32, or 36. Likewise, if a navigable body of water overlay any of these four sections, the state could take lands equal in size to the total area of the bed of the body of water elsewhere. Significantly, Arizona made no in-lieu selections to compensate for the area covered by the Salt River's bed in sections 2, 16, 32, and 36 or in other federal lands granted to the state where they overlay the Salt.

1. Federal Grant to Arizona in Township 1 North, Range 2 East

Along the Salt River between township 1 north, range 1 east, and township 2 north, range 6 east, only one parcel was granted by the federal government to Arizona other than the acreage in sections 2, 16, 32, and 36. That grant overlays the Salt in section twenty-nine of township 1 north, range 2 east. Because Arizona in 1983 gave up a total of one-hundred-forty acres in another part of the state for the construction of the Central Arizona Project, state officials were therefore entitled to choose other public domain lands "in lieu" of the relinquished parcels. The indemnity lands selected by Arizona were the northeast quarter of the northeast quarter, the south half of the southwest quarter of the northeast quarter, and the north half of the southwest quarter of section twenty-nine. All of the in-lieu lands lie directly in the bed of the Salt River. Therefore, if Arizona authorities had considered the river to be navigable as of 1912, the land *already* would have been owned by the state by virtue of its sovereign rights, and Arizona would not have exercised its right to an in-lieu selection for this parcel.[85]

H. State Lands along the Salt River

In the years following statehood in 1912, Arizona's officials confronted the daunting task of disposing of millions of acres given to the state by Congress for various purposes. To do this, the Arizona State Legislature created an initial version of the Public Land Code in a special 1915 session, which laid out the manner in which the state would dispose of its public land. The basic procedure established by the code was to advertise the proposed sale of state land for at least ten successive weeks in a newspaper regularly circulated in Phoenix, send an appraiser to the land to make a report and set a minimum price, and then sell the land to the highest bidder. The purchaser would receive a certificate of purchase, indicating his or her promise to pay any

[85] School Indemnity Selection List No. 589, 1983, U.S. Bureau of Land Management, Phoenix, Arizona.

balance in addition to state taxes. Once full payment had been received, an Arizona state patent was issued.

The above discussion on state land legislation is vital to an understanding of how Arizona accepted and disposed of federal land grants and what the state's actions show about the navigability of the Salt River. Probably the best examples of state officials' perceptions of the Salt are records held by the Arizona State Land Department. These documents record how the state obtained title from the U.S. government to specific parcels in the Salt River region and how the state disposed of some of those holdings to private parties. While federal land grants to Arizona have been discussed earlier in this report, this section of the report will examine what Arizona's own records show about the state's acquisition and disposition of public lands. The discussion begins with downstream areas near the Salt's confluence with the Gila and moves upstream toward Granite Reef Dam. (For the location of state patents discussed here, see the map below and subsequent close-up views of that map.) Information about state patents is derived from the state patents themselves and related state patent files at the Arizona State Land Department.

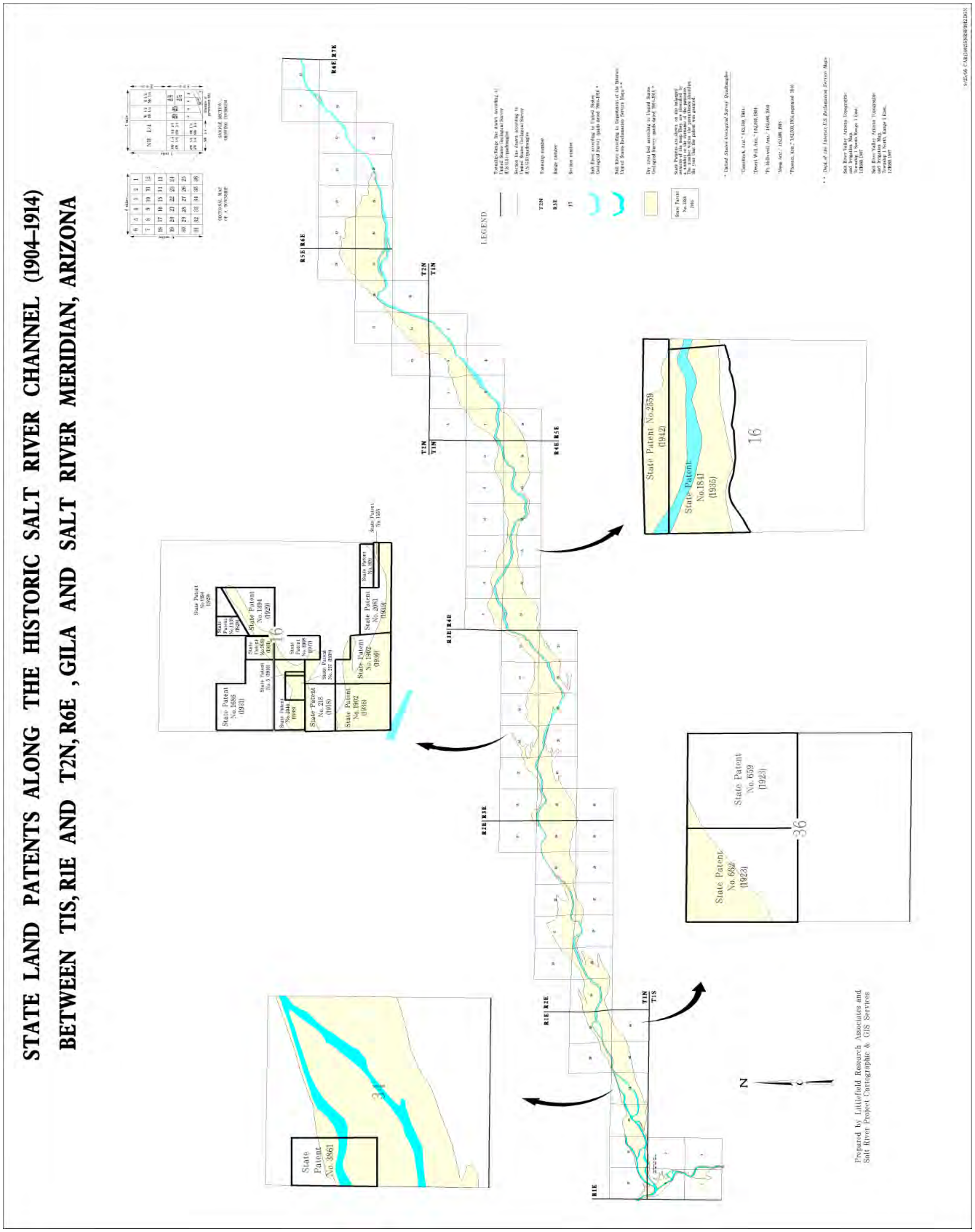

Figure 27: Arizona State Land Patents along the Historical Salt River Channel, T1N, R3E, and T1S, R2E. Source: Salt River Project Cartographics and Littlefield Historical Research.

1. State Patents in Township 1 North, Range 1 East

One parcel of land granted by the federal government to the State of Arizona lay in section thirty-six of township 1 north, range 1 east. These lands were obtained when Congress passed the 1910 *Enabling Act*, which authorized the formation of the state of Arizona. The relevant area in section thirty-six is the northwest quarter, which eventually became state patent 662. The Salt River, according to the 1868 U.S. General Land Office survey plat of this township as well as the historical U.S. Geological Survey quadrangles, flows through this parcel of land, as shown below:

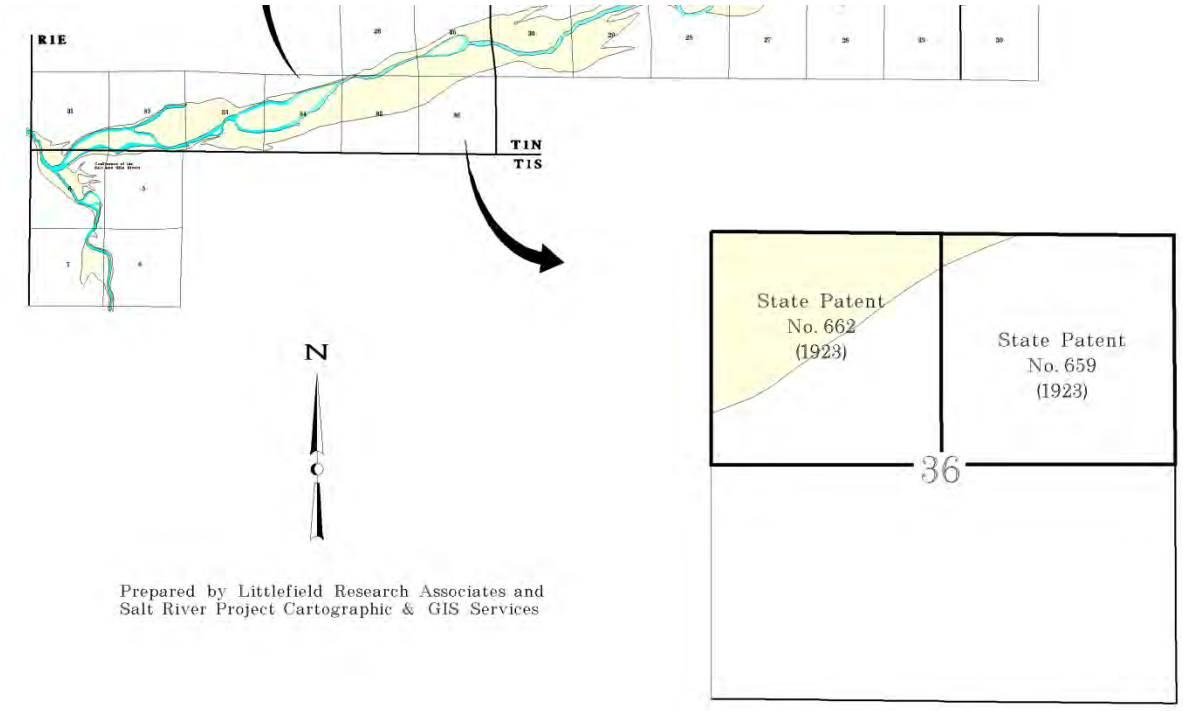

Figure 28: Close-up view of location of Arizona State Patents 662 (1923) and 659 (1923). Note: skewing of lines is due to GIS rectification.

The State of Arizona patented this parcel to Eugene D. Goldman in 1923. According to the state patent, Goldman received title to this tract containing 159.40 acres. In passing title to Goldman, Arizona made no exception to keep the bed of the Salt River, as the transfer of the full

159.40 acres demonstrates. (The reason for the missing six-tenths of an acre is unclear, but far more than this would have been removed from the parcel had the state claimed the bed and banks of the Salt River.) Not only did Arizona not claim the bed and banks, no lands were selected in lieu of the Salt River's acreage in this patent.[86]

Directly upstream and to the east of Goldman's land was a parcel lying in the northeast quarter of section thirty-six. According to the original U.S. General Land Office survey plats and the historical U.S. Geological Survey topographic maps, the Salt River and its bed are in the northwest corner of this land. Nonetheless, the State of Arizona granted state patent 659 to M.B. Harovitz for 158.79 acres in 1923. (Thirty-three feet along the eastern edge of the parcel were removed for a public road.) If Arizona had wished to make an exception for the lands covered by the Salt because state officials considered the river to be navigable, they would have removed additional acreage from the tract. Furthermore, the state would have selected lands in lieu of the acreage covered by the river (had it been deemed navigable) when granted the parcel by the federal government. This process would have been noted on the U.S. Bureau of Land Management's master title plat by a reference to "IL __," indicating the "in-lieu list" number upon which the selected lands were noted. No such list number exists here. No indemnity lands were chosen to replace lands covered in this section by the river, and the state sold its full rights to the land without making exception for the bed and the banks.[87]

2. State Patents in Township 1 North, Range 3 East

The State of Arizona also granted numerous patents to individuals for lands lying in section sixteen of township 1 north, range 3 east (see below).

[86] Arizona State Patent No. 662, March 21, 1923, Records of the Arizona State Land Department, Phoenix, Arizona.

[87] Arizona State Patent No. 659, March 21, 1923, Records of the Arizona State Land Department, Phoenix, Arizona.

Figure 29: Close-up view of locations of multiple Arizona State Patents. Note: skewing of lines is due to GIS rectification.

The land in this section sixteen been granted to Arizona for the purposes of common schools by the 1910 *Enabling Act*, and according to the 1868 U.S. General Land Office survey plats and historical U.S. Geological Survey topographic maps, the Salt River ran directly through this section. Importantly, no lands were selected in other parts of the state in lieu of the lands

covered by the river. Furthermore, more than fifteen patents covered by the Salt River were deeded out to individuals by the state.

One such parcel through which the Salt River flowed was state patent 218 (see above close-up map). Deeded to Jean Orteig in 1918, the patent contains no indication that any acreage was withheld due to the presence of the bed and the banks of the river. Orteig had applied to purchase the lands after the Arizona State Land Department advertised that it was accepting bids "in conformity with the provisions of the Public Land Code of the State of Arizona, approved June 26, 1915," which required an appraiser's report of all lands sold by the state. The resulting appraiser's report noted that "[t]hese tracts lie almost entirely in the Salt River bottom – are rough and uneven – Now used as city dumping ground." In spite of the state's acknowledgement that this land lay in close proximity to, or actually in, the bed of the river, Arizona patented out the entire parcel without removing any acreage due to state's sovereign ownership of the bed.[88]

To the north of Orteig's land is a parcel encompassed by state patent 217 (see above close-up map). Again, according to the 1868 U.S. General Land Office survey plats as well as the historical U.S. Geological Survey topographic maps, this tract lies directly in the bed of the Salt River. Documentation found in patent 217's supporting file also indicates the presence of the river. On the application by the Valley Meat Company to buy the state lands, the company drew a sketch of the piece of land in question. The map clearly shows what was labeled "Salt River" running through the land. The application also described the land in text: "A few cottonwood trees grow in edge of River. . . . [T]his is on edge of Salt River and part of it overflows in flood times." The state never chose any lands in lieu of those in section sixteen covered by the river, and as in the case of patent 217, the state did not remove any acreage due to

[88] State Patent No. 218 and corresponding file, Sept. 23, 1918, Records of the Arizona State Land Department, Phoenix, Arizona.

ownership of the bed and the banks of the river. Both are strong indications of non-navigability.[89]

South of these two patents in the southwest quarter of the southwest quarter lies state patent 1902 (see above close-up map). Patented to the Schmidt-Hitchcock Contractors in 1936, the title granted 78.22 acres of land. However, according to the original U.S. General Land Office survey plats as well as the historical U.S. Geological Survey topographic maps, this entire parcel of land lies in the river bed and the river runs directly through it. Nonetheless, there is no indication that any land was withheld from the patentee.[90]

3. State Patents in Township 1 North, Range 4 East

Section sixteen of township 1 north, range 4 east, was granted to the State of Arizona through the 1910 *Enabling Act*. According to the 1868 U.S. General Land Office original survey plats as well as the historical U.S. Geological Survey topographic maps, the north half of this section is covered by the Salt River and its bed (see close-up map below).

[89] State Patent No. 217 and its corresponding file, Sept. 23, 1918, Records of the Arizona State Land Department, Phoenix, Arizona.

[90] State Patent No. 1902, Nov. 6, 1936, Records of the Arizona State Land Department, Phoenix, Arizona.

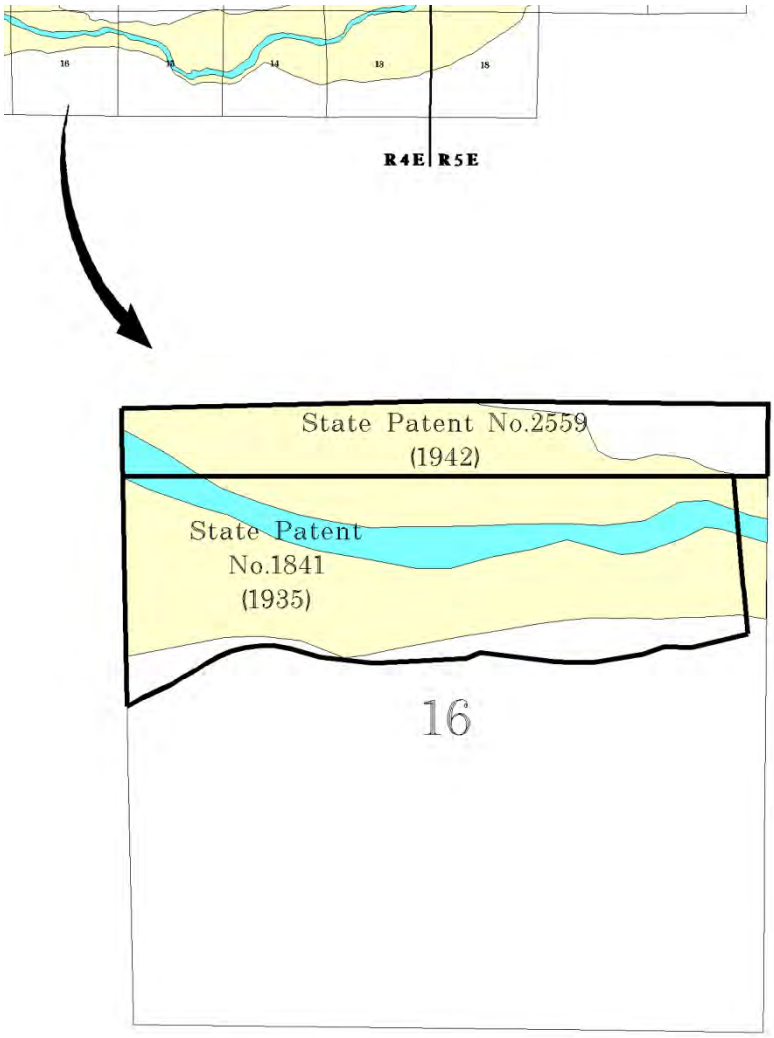

Figure 30: Close-up view of locations of Arizona State Patents 2559 (1952) and 1841 (1935). Note: skewing of lines is due to GIS rectification.

In a confusing situation for the state, the federal government withdrew certain lands for the Salt River Valley and Yuma Irrigation projects in 1902, including all of section sixteen in this township. Holding that it owned this land in spite of the federal withdrawal, the state issued patents to all of the land following statehood in 1912. State patents 1841 and 2559 lie in the north half of section sixteen (through which the river flows), and were deeded out in 1935 and 1942, respectively. Similar circumstances existed elsewhere in the state, and to clarify the

situation, Arizona State Land Commissioner Charles P. Mullen wrote to the U.S. Secretary of the Interior in 1938 asking for restoration of the school sections to the state.

Mullen's 23-page letter made note of all land to which the state wanted restored title, claiming that without restoration "great financial loss to the state and purchasers would result, and the havoc thus caused would practically bankrupt the state." The Arizona State Land Commissioner stated that "[o]n October 1, 1935, the State of Arizona issued patent to the City of Tempe for a tract of land being in the N1/2 of the N1/2 of Said Sec. 16, and this land is now used for sewerage disposal plant of the City of Tempe." The Department of Interior responded promptly by restoring and therefore clearing title to all of the lands requested. Thus, clear title to state patents 1841 and 2559 was finally confirmed. Yet despite the presence of the river, there is no indication that when seeking to clear title, the state attempted to withhold acreage for the bed and the banks due to navigability. Furthermore, Arizona never contended that the state owned any of these lands due to its sovereignty. Instead, Mullen claimed ownership on behalf of the state only by virtue of the 1910 *Enabling Act*.[91]

I. Summary and Conclusions to Chapter 2

In conclusion, the federal government granted to private individuals over two hundred twenty-five separate patents that touched or overlay the lower Salt River. In not one case did any of these patents or the supporting patent files indicate that acreage was being withheld due to possible ownership of the bed of the Salt River by the state of Arizona. In each case where patents were applied for, several parties expressed implicit opinions on the navigability of the Salt River through the request for, and award of, lands through which the river flowed. These included the patentee, his witnesses, and officials of the U.S. General Land Office. It is

[91] Charles P. Mullen to Commissioner of U.S. General Land Office, April 11, 1938, "Folder 124," Box 4, Records of the State Land Department, Record Group 59, Arizona State Archives, Phoenix, Arizona.

significant that cumulatively, literally hundreds of people made judgments concerning the Salt River's navigability in this manner – opinions spread chronologically over many years, throughout different seasons, and over a large geographic area.

Just as important, however, was how Arizona officials perceived the Salt. The in-lieu grant in the Salt River bed awarded to the State of Arizona directly did not give any indication that Arizona authorities believed the state was receiving lands it already owned due to the presence of the bed of the river. Furthermore, the patents issued by the state to private parties for land through which the river ran provided another perspective. 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. Collectively, therefore, federal patents, Congressional grants to Arizona, and state patents strongly suggest that both federal and state officials, as well as multitudes of private individuals, did not perceive the Salt River to be navigable.

CHAPTER 3: U.S. DOCUMENTS AND RELATED PHOTOS

Although U.S. Government survey records (discussed in Chapter 1) and documents relating to federal and state patents (Chapter 2) are crucial to understanding perceptions of the Salt River prior to and in 1912 – especially before too many man-made obstacles had been placed in the river – other U.S. Government records, both published and unpublished, provide a wealth of supplemental information about that stream. Two of the most important federal agencies concerned with the region were the U.S. Geological Survey and the U.S. Reclamation Service. Both these Department of the Interior agencies were heavily involved in the development of water resources in the American West in the late nineteenth and early twentieth centuries, and their records paint vivid pictures of the Salt River before and at the time of Arizona's statehood in 1912. In addition to the Geological Survey and the Reclamation Service, another federal agency whose records reveal the nature of the Salt River is the U.S. Department of Agriculture, especially that agency's Office of Experiment Stations. The Office of Experiment Stations established field offices to advance agriculture and irrigation, and in carrying out its work, the Department of Agriculture collected useful data on the Salt River.

Because of the importance of the records of the Geological Survey, the Reclamation Service, and the Department of Agriculture as farming and water-related agencies, the documents they created will be discussed in detail in this report. There were, however, other federal agencies whose responsibilities brought them into contact with the Salt River. For example, the Indian Service (today, the Bureau of Indian Affairs) administered the Gila and Salt River Indian reservations, and that agency had an interest in the Salt River because it formed part of the reservations' boundaries as well as due to the reservations' irrigation needs. Similarly, the files of the Office of the Secretary of the Interior (the "parent" to the Geological Survey,

Reclamation Service, and Indian Service) also contain descriptions of the Salt River. Although Indian Service and Office of the Secretary of the Interior records were thoroughly reviewed for this report, their characterizations of the Salt are very similar to those of the Geological Survey, the Reclamation Service, and the Department of Agriculture. Therefore, to avoid needless repetition, only the latter three agencies' records will be considered here. That discussion – together with related historical photographs – will cover representative examples of thousands of pages of documents all substantiating that the Salt River was never viewed as a reliable means of navigation.

A. Records of the U.S. Geological Survey

The U.S. Geological Survey became involved in examining water resources in the West as early as 1888, when the agency's director (and famed explorer of the Grand Canyon) John Wesley Powell, began what became known as the "Powell Irrigation Survey." Essentially a study of which arid lands in the West might be reclaimed by storing and diverting water from the region's streams, Powell's work led to increasingly frequent commentary in the Geological Survey's records regarding water resources throughout the western part of the United States. Some of those documents contain especially helpful descriptions of the Salt River.

1. U.S. Geological Survey Annual Reports

The yearly reports drafted by the Geological Survey contain detailed information on many streams in the American West, including the Salt River. For example, the *Eleventh Annual Report of the U.S. Geological Survey* (published in 1891) described the Salt River in conjunction with other rivers and streams draining the Gila Basin. Stating that all rivers in this basin were highly erratic and prone to annual destructive and dangerous floods, John Wesley Powell, who

authored the annual report, noted the characteristics of the Salt River even with multiple man-made diversion dams in place along the river:

> In this basin are found rivers most difficult and dangerous to examine and control, differing in character and habit from those of the North as widely as in geographic position. In place of the regularly recurring annual floods of spring and early summer, so strongly marked on the discharge diagrams of other basins, these rivers show conditions almost the reverse, being at that season at their very lowest stages – even dry – and rising in sudden floods at the beginning of and during the winter. These floods are of the most destructive and violent character; the rate at which the water rises and increases in amount is astonishingly rapid, although the volume is not always very great. . . . From this it will be recognized that the onset of such a flood is terrific. Coming without warning, it catches up logs and bowlders [*sic*] in the bed, undermines the banks, and, tearing out trees and cutting sand-bars, is loaded with this mass of sand, gravel, and driftwood – most formidable weapons for destruction.[92]

Powell's characterization of the Salt River is underscored by two historical photographs shown below. The first, taken in 1888 from the top of Tempe Butte and looking toward Phoenix, illustrates the Salt River in flood. The photograph that follows is another view of the Salt River taken in 1905 with the Salt River not in flood.

[92] *Eleventh Annual Report of the United States Geological Survey to the Secretary of the Interior, 1889-1890, Part II-Irrigation* (Washington D.C.: U.S. Government Printing Office, 1891), p. 58.

Figure 31: Salt River in flood, 1888, as viewed from Tempe Butte toward Phoenix. Note that the river spreads out downstream from the railroad bridge, a characteristic that contributed to the multiple and shifting channels recorded by U.S. Government surveyors on their survey plats and in their field notes in the nineteenth century. The building in the foreground is Charles T. Hayden's mill. Source: Special Collections, Arizona State University, Tempe, Arizona.

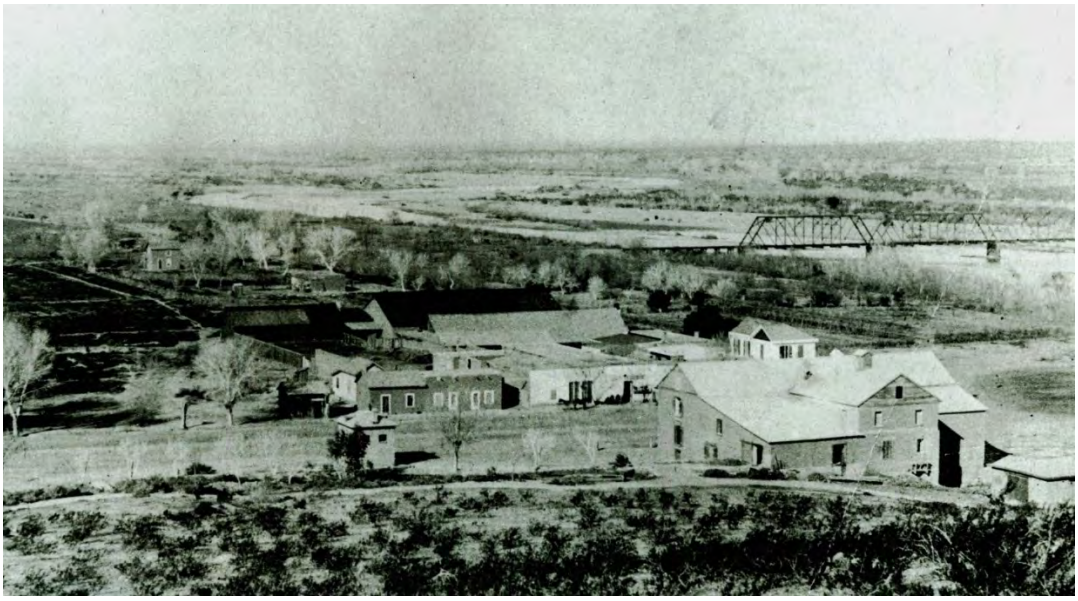

Figure 32: View from Tempe Butte toward Phoenix, 1905, with the Salt River not in flood. Note the narrow channel just below the railroad bridge followed by the streambed swinging to the right (where in the previous 1888 photo, the Salt River in flood spread out across the entire countryside). Source: Special Collections, Arizona State University, Tempe, Arizona.

The Salt River was typical of those described by John Wesley Powell, and with such violent fluctuations in flow and carrying such destructive debris, it would have been impossible to navigate on a reliable basis. In addition, the impact of the flood flows would have made maintaining a stable channel for navigation difficult, as is illustrated by two photographs above and the U.S. Government surveys and field notes discussed in Chapter 1.

The *Twelfth Annual Report of the U.S. Geological Survey*, published in 1891, contained similar descriptions of Arizona's streams, including the Salt River. Noting that many of Arizona's streams (including the tributaries of the Gila River) fluctuated greatly, the author of the *Twelfth Annual Report* wrote that those rivers "at times [are] 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." Specifically regarding the Salt River, the *Twelfth Annual Report* observed it was subject to extremely high flood flows from time to time, and while these might carry substantial quantities of water, the flows could not be depended upon for useful purposes. The *Twelfth Annual Report* noted that the Salt River was characterized by:

> short, sudden floods carrying considerable volume of water for a few hours, and at longer intervals, perhaps of three or five years, there are enormous floods, whose violence and duration is phenomenal. These latter, however, are rather to be feared than to be depended upon as beneficial.[93]

The *Twelfth Annual Report* added further details about the nature of these floods along the Salt River. The *Twelfth Annual Report*'s author stated that from interviews with local citizens, the:

> irregular character and extraordinary fluctuations of the stream are clearly brought out. The most notable feature is the great flood of February 21, 1890, when, according to Mr. [Samuel A.] Davidson's [engineer of the Arizona Canal

[93] *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), pp. 298, 312-313.

> Company] computations, the discharge increased suddenly from 1,000 second-feet to over 143,000 second-feet. This, however, is eclipsed by the flood of February 18 to 25, 1891. . . . On February 17 the mean discharge was 835 second-feet, increasing the next day to 154,000 second-feet, and on the 20th only 69,100, and on the 22nd 14,890. This was followed by a second swell greater than the first, the flood increasing until on the 24th a maximum of 300,000 second-feet was reached. This subsided almost as rapidly as it came, so that by the second day after the river was carrying less than 15,000 second-feet. . . . The Arizona Canal Company's weir across the Salt River was damaged, a portion of the canal washed out, and the channel of the stream so altered that computations of daily discharge could no longer be made without new data.[94]

These vivid descriptions of flooding and channel changes depict the Salt as a river whose flow and course were entirely unreliable for navigation.

The *Thirteenth Annual Report of the U.S. Geological Survey*, published in 1893, discussed western rivers having periodic (or regular) oscillations – changes in flow levels that could be anticipated and planned for. The only such stream in Arizona, according to the *Thirteenth Annual Report*, was the Colorado River. Regarding rivers with nonperiodic oscillations (which presumably applied to all the other rivers in Arizona) the *Thirteenth Annual Report* noted that the non-regular changes in flows from extremely high floods to almost no water at all made it difficult for farmers and engineers to plan in relation to utilizing those rivers' flows in any dependable manner:

> The nonperiodic oscillations give rise to the greatest concern on the part of the engineer and the irrigator, for while he can be reasonably certain regarding the character of the periodic variation, he must at all times be on the watch for extraordinary occurrences for which there are no analogies. The rivers and lakes may for a time increase in volume or may apparently shrink so greatly as to cause serious alarm as to their permanence.[95]

Three related views of the Salt River from 1902 are shown immediately below followed by a fourth picture of the Salt River for contrast purposes. Despite the sensational aspects of the

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[94] *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), pp. 298, 312-313.

[95] *Thirteenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1891-92, Part III-Irrigation* (Washington D.C.: U.S. Government Printing Office, 1893), p. 18.

first three pictures' subject matter (a train wreck on the railroad bridge over the Salt River near Phoenix and Tempe), the photos of the accident nonetheless clearly illustrate that while the Salt River could be exceedingly dangerous during floods, the stream also periodically was bone dry. Note in the wreck photographs that the train engine is lying in bed of the Salt River. Also observe the height of the concrete towers holding up the bridge and compare that height to the fourth picture below (taken in 1900) illustrating the Salt River again in flood. Observe in that photograph the extent of floodwaters in the Salt River as well as the debris washing up against the railroad bridge support towers in the background and the river current rushing around the tower in the foreground.

Figure 33: Train wreck on Salt River railroad bridge, 1902. Also observe the height of the concrete towers supporting the bridge and compare to how little of those towers appear during floods. Source: Special Collections, Arizona State University, Tempe, Arizona.

Figure 34: Train wreck on Salt River railroad bridge, 1902. Note that the engine and men are standing in the Salt River's bed. Source: Special Collections, Arizona State University, Tempe, Arizona.

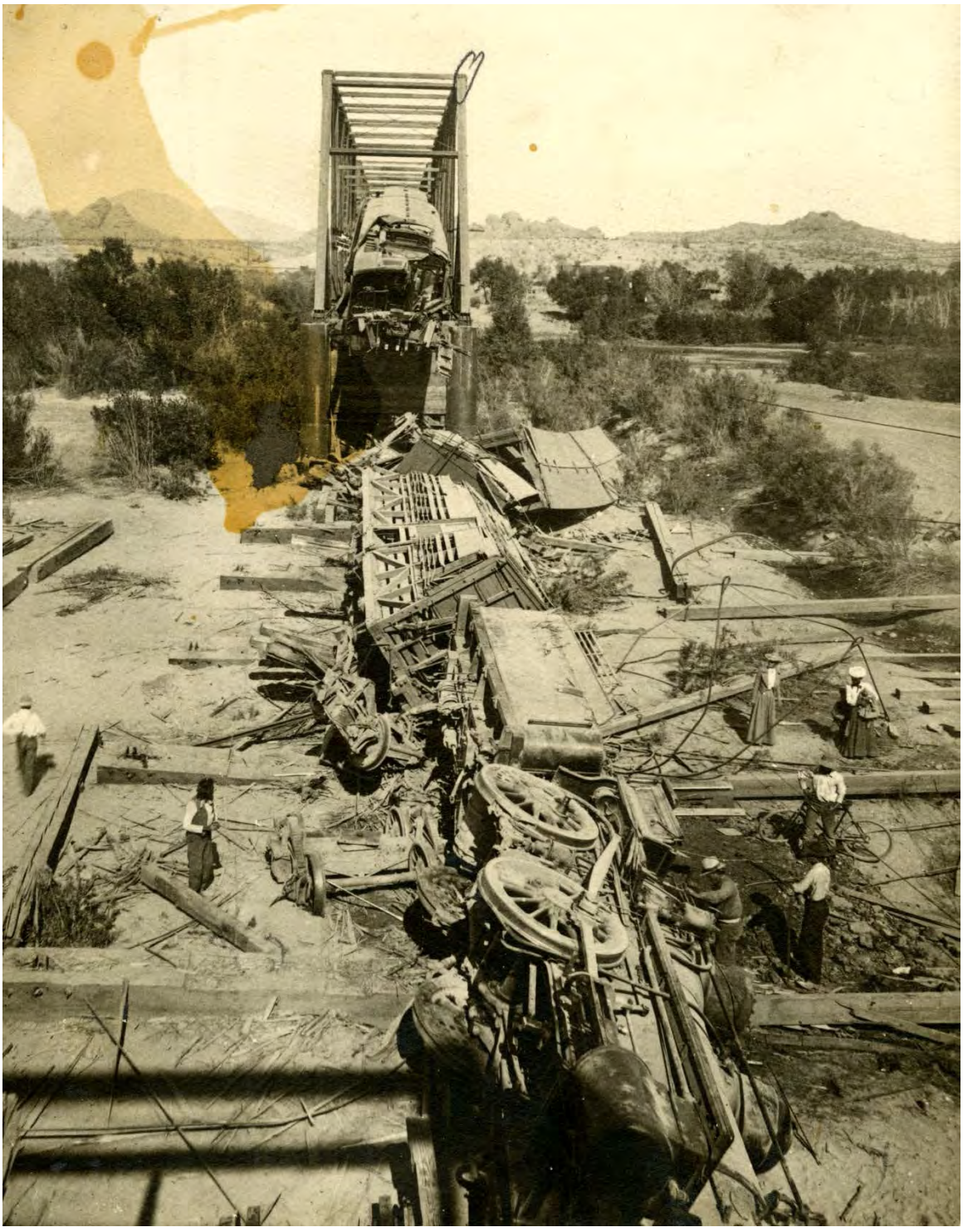

Figure 35: Train wreck on Salt River railroad bridge, 1902. View from Tempe end of bridge. Also observe the phreatophyte growth in the river bed – a characteristic of rivers that are frequently dry. (Stain is on the original source photograph.) Source: Special Collections, Arizona State University, Tempe, Arizona.

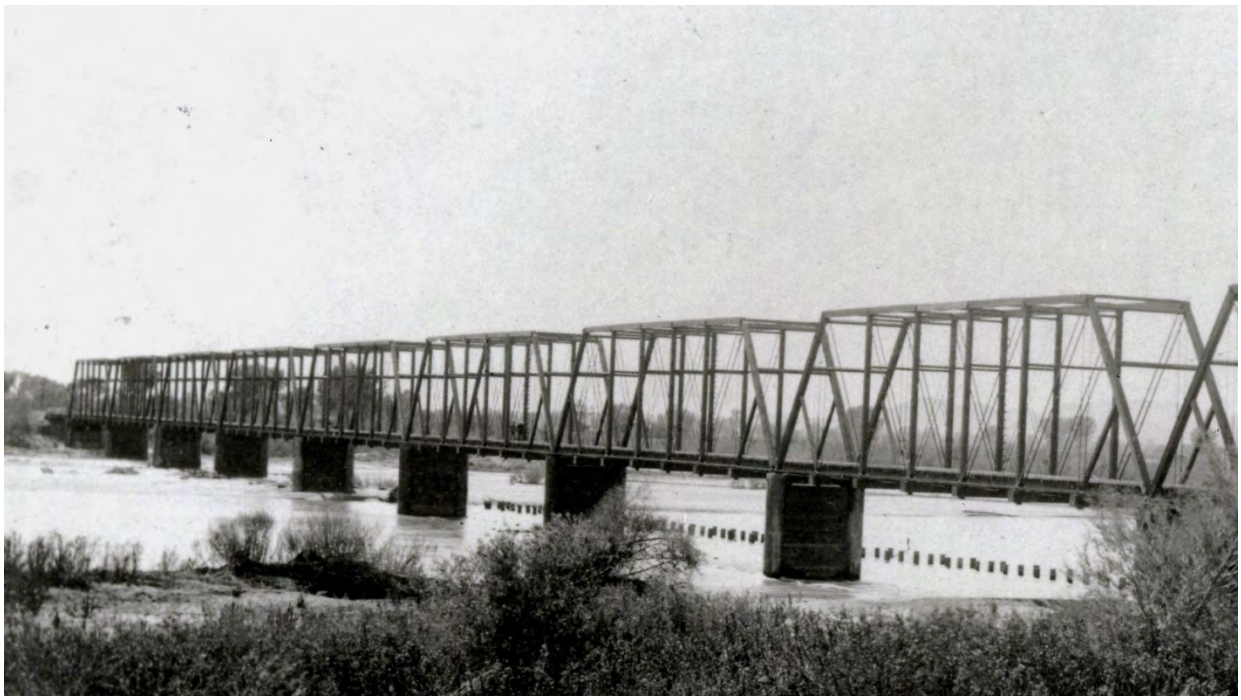

Figure 36: Salt River in flood at the railroad bridge near Phoenix and Tempe, 1900. Observe the height of the water around the towers supporting the bridge, and contrast that to the preceding photos of the train wreck on the bridge. Also note the rapid current around the tower in the foreground. Source: Special Collections, Arizona State University, Tempe, Arizona.

Confirming the nonperiodic oscillation nature of the Salt River, the *Thirteenth Annual Report of the United States Geological Survey* added that that even diverting water for irrigation was difficult due to the large vacillations in flows:

> [t]he Salt river is an extremely difficult stream from which to divert a canal, owing to the irregularity of its discharge. . . . As a consequence of this erratic discharge the river bed itself is very wide and a long and expensive diversion weir is required in order to procure stability and permanence.[96]

The "erratic discharge" was further clarified in the *Thirteenth Annual Report*:

> the river is subject to some of the greatest floods which have occurred in the west, due to cloudbursts falling over certain portions of the basin. In the early spring of

[96] *Thirteenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1891-92, Part III-Irrigation* (Washington D.C.: U.S. Government Printing Office, 1893), pp. 95-96.

> 1890 an extraordinary flood occurred in the Salt River, increasing its discharge for a short period of time to 141,000 second-feet.[97]

As the *Thirteenth Annual Report* indicated, these frequent and violent floods demonstrate the river's unreliable character and show that navigation would have been difficult at best even had there been no man-made obstacles on the river or diverted flows.

2. U.S. Geological Survey Water Supply Papers

Aside from its annual reports, the U.S. Geological Survey also published a series of research treatises known as "Water Supply Papers." While these studies dealt with specific topics and geographic areas, some examined subjects shedding light on the nature of the Salt River in the nineteenth and early twentieth centuries. For instance, Arthur P. Davis, author of Water Supply Paper No. 2, *Irrigation Near Phoenix, Arizona* (1897), characterized the "streams of this country" (Arizona) as "extremely irregular in character, fluctuating at times with great rapidity, floods coming down without warning, and disappearing in the course of a few hours." Davis added that "the gravel and bowlders [*sic*] accumulate during the lesser floods all along the course of the stream, covering the dam sites, and form long lines of barren wash." Not only were these characteristics atypical of a navigable body of water, but so too were the presence of many diversion dams along the Salt River. These dams and their related canals can be seen on the map below in relation to the present-day facilities of the Salt River Project.

[97] *Thirteenth Annual Report of the United States Geological Survey to the Secretary of the Interior, 1891-92, Part III-Irrigation* (Washington D.C.: U.S. Government Printing Office, 1893), pp. 175-176.

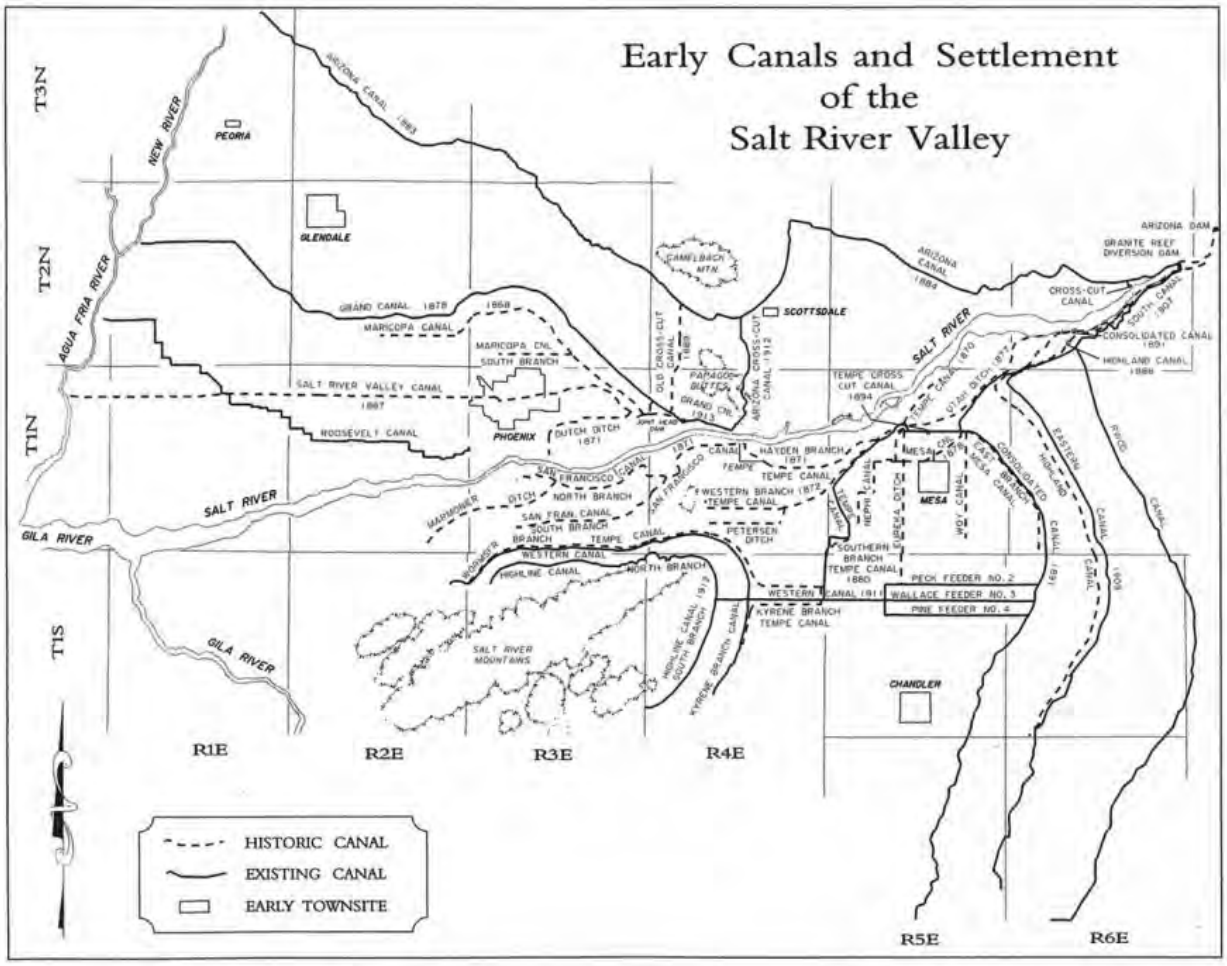

Figure 37: Early Canals and Settlement of the Salt River Valley. Source: Salt River Project, Phoenix, Arizona.

The principal diversion dam when *Irrigation Near Phoenix, Arizona* the report was written in 1897 was the Arizona Dam (at the extreme far right on the map), which Arthur Davis observed "extends diagonally across the river in a northeasterly direction from a rock projecting into the stream from the right bank to a rock on the left bank."[98] But the Arizona Dam and other similar structures on the river were not immune to the extraordinary variations in Salt River flows. As noted above in the discussion about the *Thirteenth Annual Report of the Geological*

[98] Arthur P. Davis, *Irrigation Near Phoenix, Arizona*, U.S. Geological Survey Water Supply Paper No. 2 (Washington D.C.: U.S. Government Printing Office, 1897), pp. 9, 11, 50-51.

Survey, the impacts of floods not only caused canal headings to shift, but the floods themselves repeatedly damaged or destroyed diversion dams, as shown below in two photographs of the Arizona Canal's diversion dam. The first is a photo of the wood-crib dam in 1902, and the second is the heading destroyed by an April 1905 flood.

Figure 38: Arizona Canal wood-crib diversion dam, 1902. Source: U.S. Library of Congress, Washington, D.C.

Figure 39: Remains of Arizona Dam, washed out April 13, 1905. Source: Salt River Project Archives, Phoenix, Arizona.

Six years after the Geological Survey issued *Irrigation Near Phoenix, Arizona*, the agency published Water Supply Paper No. 73, *Water Storage on Salt River, Arizona* (1903). Although focusing principally on the proposed construction of what eventually became known as Roosevelt Dam about sixty miles above the present location of Granite Reef Dam, Water Supply Paper No. 73 (also written by Arthur P. Davis) once again noted that the Salt River was "more or less torrential in character, the combined flow [of the Salt and Verde rivers] dwindling at times to about 100 cubic feet per second, and at other times reaching a volume more than one hundred times as great."[99]

[99] Arthur P. Davis, *Water Storage On Salt River, Arizona*, U.S. Geological Survey Water Supply Paper No. 73 (Washington D.C.: U.S. Government Printing Office, 1903), p. 9.

In 1905 the U.S. Geological Survey published Water Supply Paper No. 136, *Underground Waters of Salt River Valley, Arizona*. As in earlier Water Supply Papers, the report on groundwater contained numerous descriptions of the Salt River. Willis Thomas Lee, who wrote the paper, made it clear that the Salt River had changed channels on many occasions. For example, in discussing the region around present-day Mesa, Arizona, Lee noted that:

> [c]hanges in the river's course over an aggrading area are the rule rather than the exception. Old channels, therefore, which do not correspond with the present river's course are to be expected in the valley fill. . . . The old debris-filled channels may be narrow like the present channel of the Salt River near the upper end of the valley, or may be miles in width according to circumstances. . . . As the river swung from side to side of the valley, gravel and bowlder [*sic*] beds were always left in its wake; furthermore – and this is the key to the problem – wherever a bowlder [*sic*] bed was formed a bowlder [*sic*] train filling the old channel connected and probably still connects this bed with the mouth of Salt River Canyon, whence the water, together with its debris, issued then as it does now.[100]

In addition to constantly shifting channels and hazardous obstacles, the river Lee examined was not regular in flow. In his discussion of "The River and The Underflow," he stated that:

> [t]here is a permanent water supply in [the river] from the head of the valley to the Tempe canal, north of Mesa. Below the head-gates of the Tempe canal a short space occurs in which the river is practically dry for the greater part of the year. Farther downstream underground water returns to the river bed; that is, the river cuts beneath the water table and the underflow returns in part, making a surface flow of something like 35 second-feet. . . . North of Mesa the river bed is at the same elevation as the water table, while at Tempe the river bed is below the water table. This explains the return of the underflow to the surface, making a perennial stream at Tempe, while the river bed both east and west of Tempe is dry.[101]

[100] Willis T. Lee, *Underground Waters Of Salt River Valley, Arizona*, U.S. Geological Survey Water Supply Paper No. 136 (Washington D.C.: U.S. Government Printing Office, 1905), p. 119.

[101] Willis T. Lee, *Underground Waters Of Salt River Valley, Arizona*, U.S. Geological Survey Water Supply Paper No. 136 (Washington D.C.: U.S. Government Printing Office, 1905), pp. 121-123.

The author further described the river as "pass[ing] through a narrow channel between Tempe Butte and the conglomerate hills to the north"[102] – the site of the railroad bridge shown earlier in this chapter as well as the locale of later automobile bridges.

All of these descriptions point to a non-navigable stream. The shifting channels, the existence of boulder beds in the channel, the presence and then disappearance of water in the bed, and the narrowness of the channel in some locations are strong indications that the Salt River could not be relied upon for transportation purposes.

B. Records of the U.S. Reclamation Service

Following Congress's enactment of the 1902 *Reclamation Act*, many of the water resource duties formerly carried out by the hydrographic branch of the U.S. Geological Survey were transferred to the young U.S. Reclamation Service. Under the terms of the new law, the new agency also was charged with selecting reservoir locations throughout the American West and constructing dams and irrigation canals at those sites. It was under this latter mandate that the agency planned the Salt River Project, including the construction of Roosevelt Dam and Granite Reef Dam. In addition, the Reclamation Service also purchased and renovated some of the existing irrigation canals in the Phoenix area as well as built new ones (see the map above). Since much of this work took place between 1904 (when construction work began) and 1911 (when Roosevelt Dam was completed), the Reclamation Service's records are extremely useful for determining the nature of the Salt River before and around the time of Arizona's statehood.

[102] Willis T. Lee, *Underground Waters Of Salt River Valley, Arizona*, U.S. Geological Survey Water Supply Paper No. 136 (Washington D.C.: U.S. Government Printing Office, 1905), p. 130.

1. U.S. Reclamation Service Annual Reports

Like the Geological Survey, the Reclamation Service issued annual reports describing its activities, and these contain valuable descriptions of the Salt River. The *First Annual Report of the Reclamation Service* (1903) noted that irrigation in the drainage basin of the Gila and Salt rivers had already been developed to a point that there was insufficient water for the all farmlands, and the report added that "[t]he situation in this respect, while not peculiar, is most extreme as regards the entire West, the fluctuations of flow of the rivers being most marked and the effect upon the population most disastrous." Moreover, the report continued that:

> [t]he 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, lose their waters in the broad, open valleys.[103]

Because of these characteristics, the *First Annual Report of the Reclamation Service* indicated that the Reclamation Service was planning the Salt River Project to store the Salt River's irregular flows behind a giant masonry dam at the confluence of the Salt and Tonto Creek. While the report's description of the variable flows of the Salt River helped explain why storage of the stream's supplies was necessary, it gave no indication that navigation interests would be adversely affected by the Salt River Project's storage reservoir, its diversion dam, or the removal from the stream of large quantities of water for irrigation.[104]

By the time the *Third Annual Report of the Reclamation Service* (1905) was published, work on the Salt River Project was well underway, and progress was detailed in the report. In reviewing problems, the report indicated that studies were being undertaken to determine the

[103] *First Annual Report of the Reclamation Service, from June 17 to December 1, 1902* (Washington D.C.: U.S. Government Printing Office, 1903), pp. 75-76.

[104] *First Annual Report of the Reclamation Service, from June 17 to December 1, 1902* (Washington D.C.: U.S. Government Printing Office, 1903), pp. 75-76.

sources of the mineral salt in the river and to lessen the impact of that substance on irrigation. The isolated location of Roosevelt Dam had also caused difficulties in getting supplies to the construction site. In the report, Reclamation Service Supervising Engineer Louis C. Hill observed that "[f]ew reservoirs have been constructed in locations where the natural conditions are so extremely favorable and transportation facilities so meager." Hill added that the construction of a road from Phoenix to the dam site had reduced rates for hauling supplies and that "[i]ndirectly, it has opened up a country hitherto absolutely inaccessible."[105]

While issues such as salt and the difficulties of carrying supplies to the Roosevelt Dam site were thoroughly addressed in the *Third Annual Report of the Reclamation Service*, this synopsis of operations gave no indication that any problems existed due to the project's impact on the Salt River's navigability. Indeed, the building of the road (today known as the Apache Trail) from Phoenix to Roosevelt underscored the inability of the river to carry supplies or people. The construction of the road through the narrow and deep Salt River Canyon was a difficult, time-consuming, and expensive proposition, and it is extremely unlikely that the Reclamation Service would have built the road if the Salt River could have been used for transporting supplies to the remote site of Tonto Dam (later renamed Roosevelt Dam). Several photographs, all taken around the turn of the twentieth century, appear below of different locations along the Salt River Canyon illustrating that the road from Phoenix to Roosevelt was a difficult and expensive proposition and why the Reclamation Service would have used the Salt River instead for transportation, had it been navigable.

[105] *Third Annual Report of the Reclamation Service, 1903-4* (Washington D.C.: U.S. Government Printing Office, 1905), pp. 140-141.

Figure 40: Salt River Canyon, ca. 1900. Note the shallow stream and rapids. Source: Special Collections, Arizona State University, Tempe, Arizona.

Figure 41: Salt River Canyon, ca. 1900. Note the precipitous cliffs that made constructing the Reclamation Service road from Phoenix to Roosevelt very difficult. Source: Special Collections, Arizona State University, Tempe, Arizona.

Figure 42: Salt River Canyon, ca. 1900. Source: Special Collections, Arizona State University, Tempe, Arizona.

Figure 43: Salt River Canyon showing Roosevelt Dam site, January 16, 1904. Note shallow and narrow stream. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

Much like building the road to Roosevelt was necessary to carry supplies to that site, the same road was necessary to transport concrete from a plant constructed at Roosevelt downstream to Granite Reef Dam for the construction of that structure. Like transporting supplies up to Roosevelt, the Reclamation Service did not utilize the Salt River to bring concrete downstream.

Views of the beginning of construction on Roosevelt Dam and building the road to Roosevelt can be seen below.

Figure 44: Roosevelt Dam under construction, July 27, 1906. There were no objections by navigation interests to the construction of the dam found in any Reclamation Service records. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

Figure 45: Site of cut for Roosevelt Road (notch in rocks) before excavation, ca. 1906. Cut location is immediately above Roosevelt Dam site. Note man on right side of notch. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

Figure 46: Work on excavating notch on Roosevelt Road above Roosevelt Dam site, ca. 1906. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver Colorado.

Figure 47: Completed through cut on high line wagon road directly above the east wall of the Salt River dam site, 1907 (viewed from opposite side of cut from previous illustration). Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

The *Fifth Annual Report of the Reclamation Service* (1906) carried a discussion of the beginning of construction on Granite Reef Dam, noting that the "dam will ultimately divert all the water used on both sides of the river and will save the heavy maintenance charges of the six temporary structures now used." There was no suggestion that Granite Reef Dam or any of the diversion dams it would replace might cause any difficulty for navigation interests on the Salt

River.[106] The impact of Granite Reef Dam on the Salt River can be seen in the photographs below.

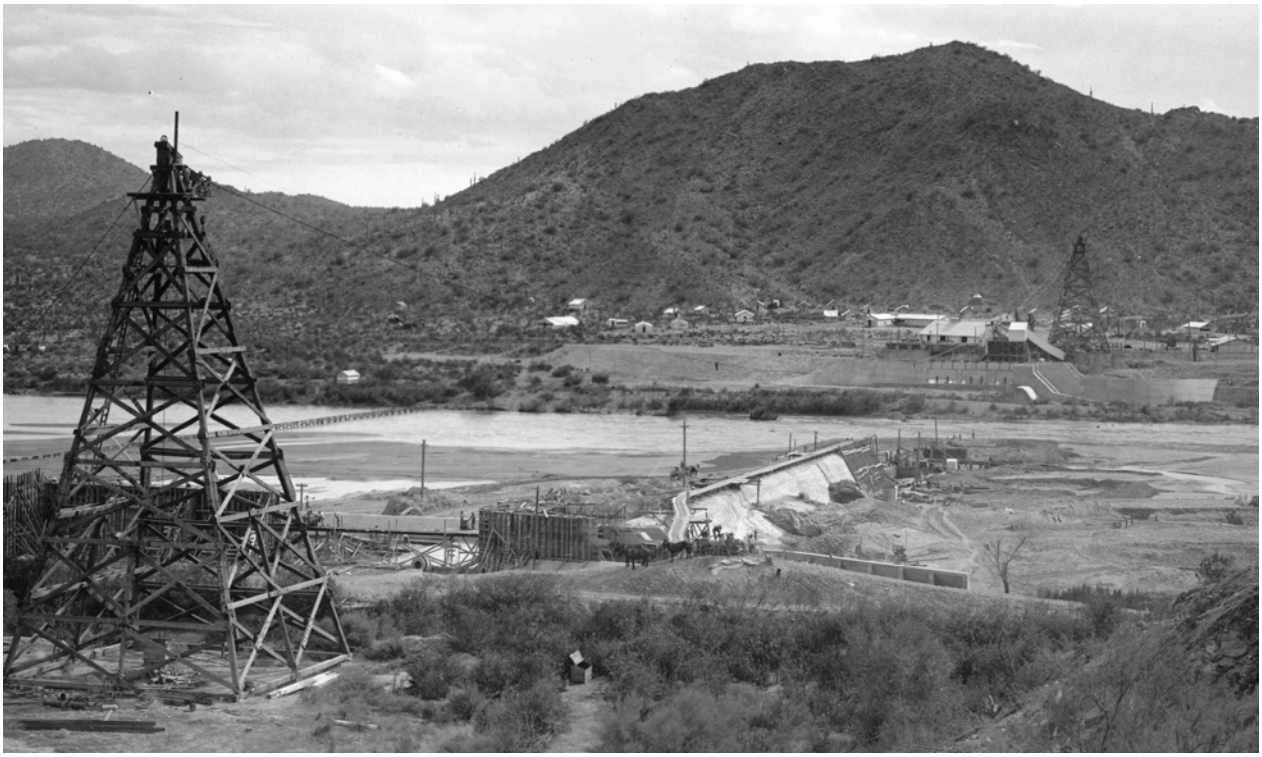

Figure 48: Granite Reef Dam under construction, October 31, 1907. Note the wooden footbridge across the shallow Salt River in the left rear of the photograph. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

[106] *Fifth Annual Report of the Reclamation Service, 1906* (Washington D.C.: U.S. Government Printing Office, 1906), p. 90.

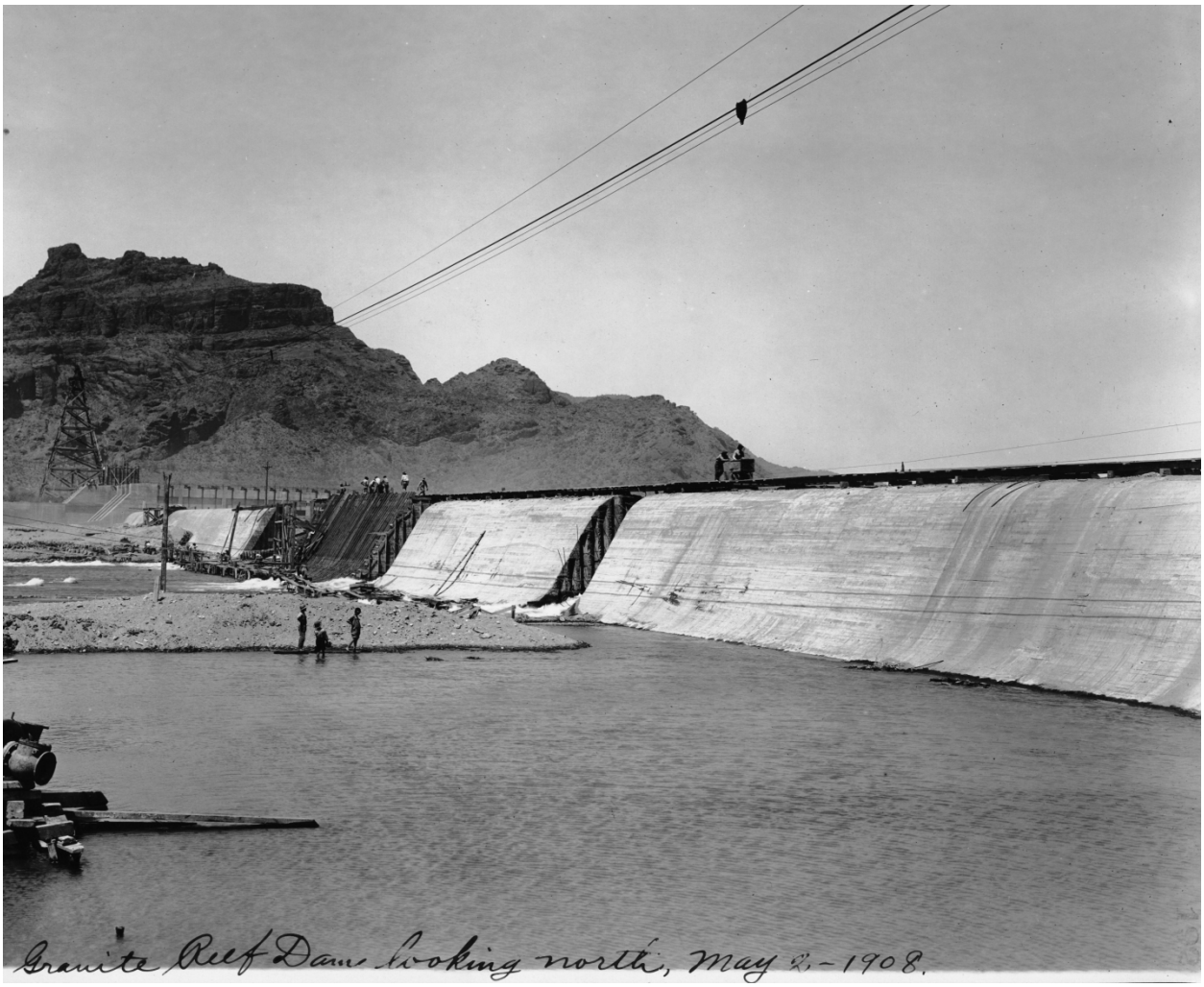

Figure 49: Granite Reef Dam, May 2, 1908. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

Figure 50: Granite Reef Dam nearing completion, May 31, 1908. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

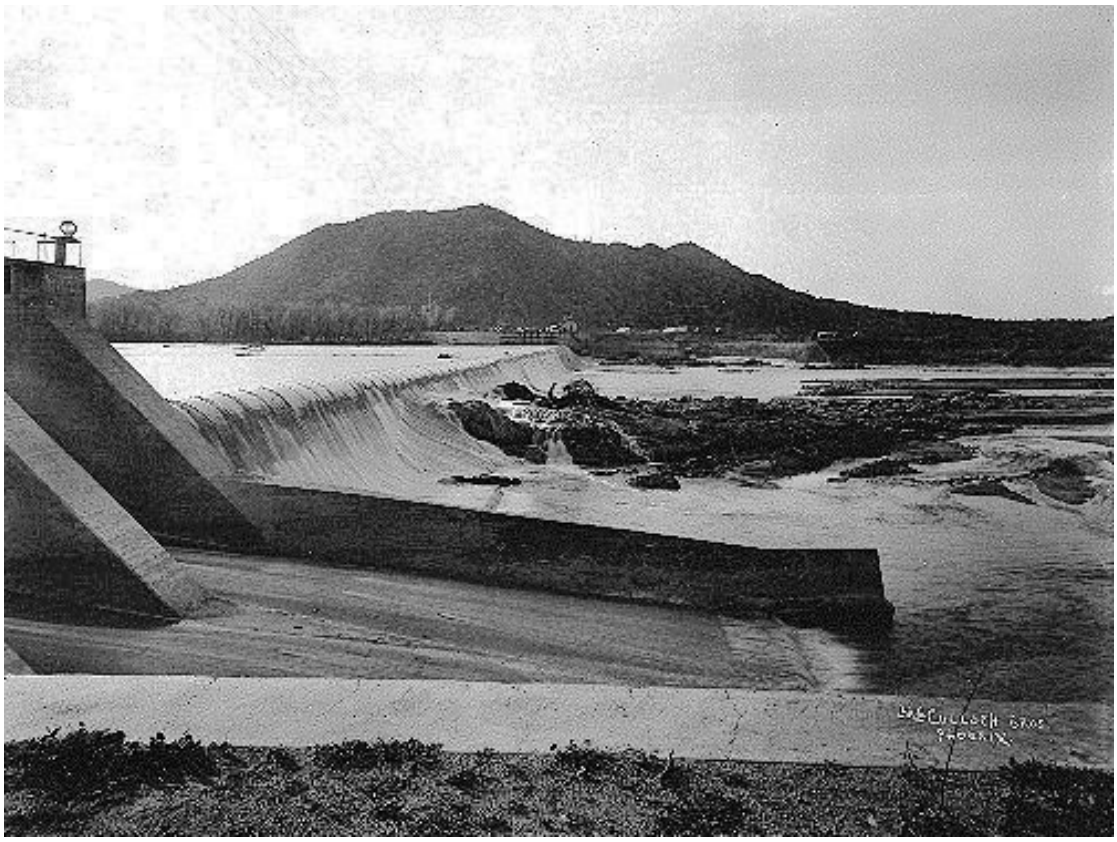

Figure 51: Granite Reef Dam after completion, ca. 1909. Source: Phoenix Public Library, Phoenix, Arizona.

The *Seventh Annual Report of the Reclamation Service* (1908) contained more discussion of diversion dams along the Salt River, again with no indication that these structures in any way hampered navigation on the stream. The report pointed out that before Granite Reef Dam had been completed, other:

> dams by which water was diverted from the river were constructed of brush and rock and were consequently either very seriously damaged or completely carried away by almost every flood . . . [and] [d]uring the period of operation by the Reclamation Service, portions of the Arizona dam have been replaced six times and the joint head dam has been completely replaced once.[107]

[107] *Seventh Annual Report of the Reclamation Service, 1907-1908* (Washington D.C.: U.S. Government Printing Office, 1908), pp. 53-54. For similar discussions about diversion dams and floods on the Salt River see also the *Ninth Annual Report of the Reclamation Service, 1909-1910* (Washington D.C.: U.S. Government Printing Office, 1911), p. 59. Subsequent Reclamation Service annual reports carried less descriptive material on the nature of the Salt River, probably because the Salt River Project was nearing completion.

Not only do these statements underscore the unpredictable nature of the Salt River, but the fact that the dams were constantly being rebuilt – without opposition by navigation interests – points to a river that was not useful for carrying commerce.

2. Unpublished Records of the U.S. Reclamation Service

Like the annual reports of the U.S. Reclamation Service, the agency's unpublished documents further depicted the Salt River as highly erratic and not useful for navigation. While the Reclamation Service's files contain thousands of documents describing the Salt River and the construction of the Salt River Project (none of which indicate that the river was a reliable means of navigation), representative examples are provided here.

On September 4, 1902, Judge Joseph H. Kibbey (who had written the earliest water rights adjudication decision involving the Salt River – the 1892 case of *M. Wormser, et al. v. The Salt River Valley Canal Company* – to be discussed later in this report) submitted to a committee of concerned Phoenix-area citizens a report entitled "Suggestions of Judge Jos. H. Kibbey for Plan to Secure Government Aid for Construction of Tonto Reservoir." Drafted only three months after Congress had approved the *Reclamation Act*, Kibbey's report (which is contained in the Reclamation Service's files at the National Archives branch in Denver) examined the major problems associated with obtaining U.S. Government assistance under the terms of the new law for building what eventually became known as Roosevelt Dam. Among the points Kibbey discussed were how to resolve questions of water rights, how water users should organize themselves to deal with the Reclamation Service, who would own and operate the canal systems, how repayments for construction would be handled, and a multitude of other concerns. Despite the report's comprehensive nature, Judge Kibbey – whose expertise in Salt River matters was

well-known due to his ruling in the *Wormser* case – gave no indication that addressing the needs of navigation interests would be necessary if the dam and other related structures were built.[108]

The efforts by Kibbey and other concerned Phoenix citizens paid off, and shortly after Kibbey had submitted his paper, the Reclamation Service approved the construction of what eventually became known as the Salt River Project. On May 4, 1903, as initial planning for Roosevelt Dam and other project features was taking place, Reclamation Service Consulting Engineer George F. Wisner wrote to Chief Engineer Frederick H. Newell regarding problems that would have to be addressed as planning went forward. Wisner observed that one difficulty was that the reservoir would gradually fill with silt. Seeing that one solution to this problem was to raise the dam, Wisner cautioned against building it too tall because of insufficient water to fill the reservoir every year. Wisner also noted that another issue the U.S. Government might face in building the dam was liability for damages caused during the construction phase. Nevertheless, Wisner made no mention of any problems that might arise by interfering with the navigability of the Salt River.[109]

Also indicating that the Salt River was not useful for navigation was a September 3, 1905, letter written by Reclamation Service employee Louis Hill to Arthur P. Davis, then assistant chief engineer. Describing progress on the construction of Roosevelt Dam, Hill stated that freighting operations along the road from Phoenix to Roosevelt (a portion of which was below Granite Reef Dam) were already taking place:

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[108] Joseph H. Kibbey, "Suggestions of Judge Jos. H. Kibbey for Plan to Secure Government Aid for Construction of Tonto Reservoir Submitted September 4, 1902, to Conference Committee at Phoenix, Arizona," file 27, General Administrative and Project Records, 1902-1919, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

[109] George F. Wisner to F.H. Newell, May 4, 1903, in "Salt River Project, Consulting Engineers Reports, January 1, 1913 – December 31, 1913," General Administrative and Project Records, 1902-1919, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

> It may interest you to know something of the traffic passing over the Roosevelt Road even now, before the contractor has fairly begun hauling in his material and before the oil outfit has begun to deliver even one-half the amount which is demanded from them when we are running at full blast. The amount of freight hauled daily and delivered to the United States . . . to the people living in Roosevelt, those up the Salt River Valley to the Tonto Valley and further on toward Holbrook demands a daily payment to the freighters of at least $750. A low estimate of the value of this freight is $250,000 a month. It hardly seems possible that that much material and provision is used in the district tributary to the road.[110]

With so much freight being hauled from Phoenix to the Roosevelt Dam location by wagon, government engineers surely would have taken advantage of the lower cost of water transportation had the Salt River been navigable. Views of the freighting operations between Phoenix and Roosevelt can be seen below.

[110] Louis C. Hill to A.P. Davis, Sept. 3, 1905, in "Salt River Project, Consulting Engineers Reports, January 1, 1913 – December 31, 1913," General Administrative and Project Records, 1902-1919, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

Figure 52: Freighting supplies to Roosevelt Dam site, ca. 1907. The Salt River was not used to carry supplies either to or from the dam site. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

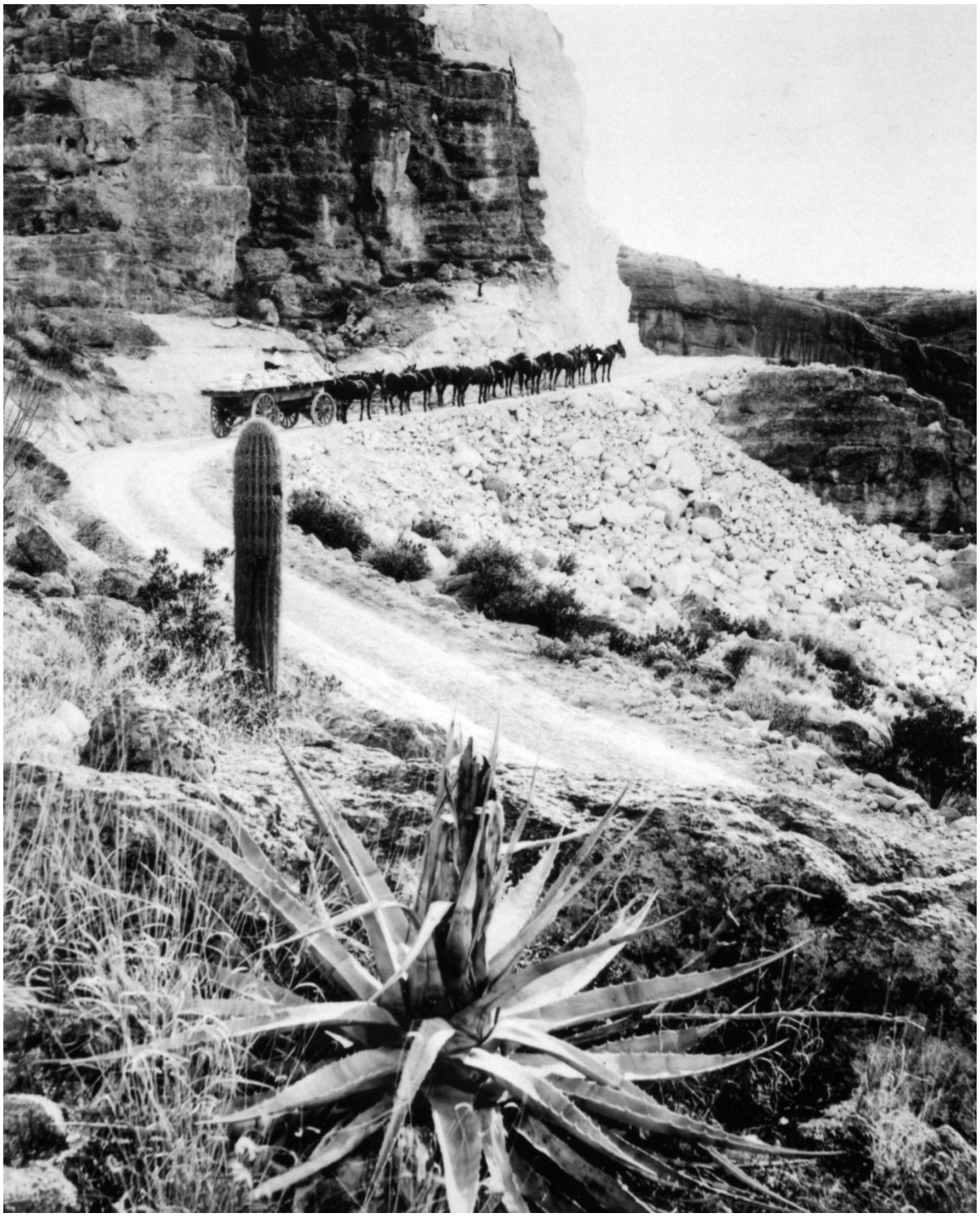

Figure 53: Freighting supplies along Roosevelt Road to dam site, ca. 1907. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

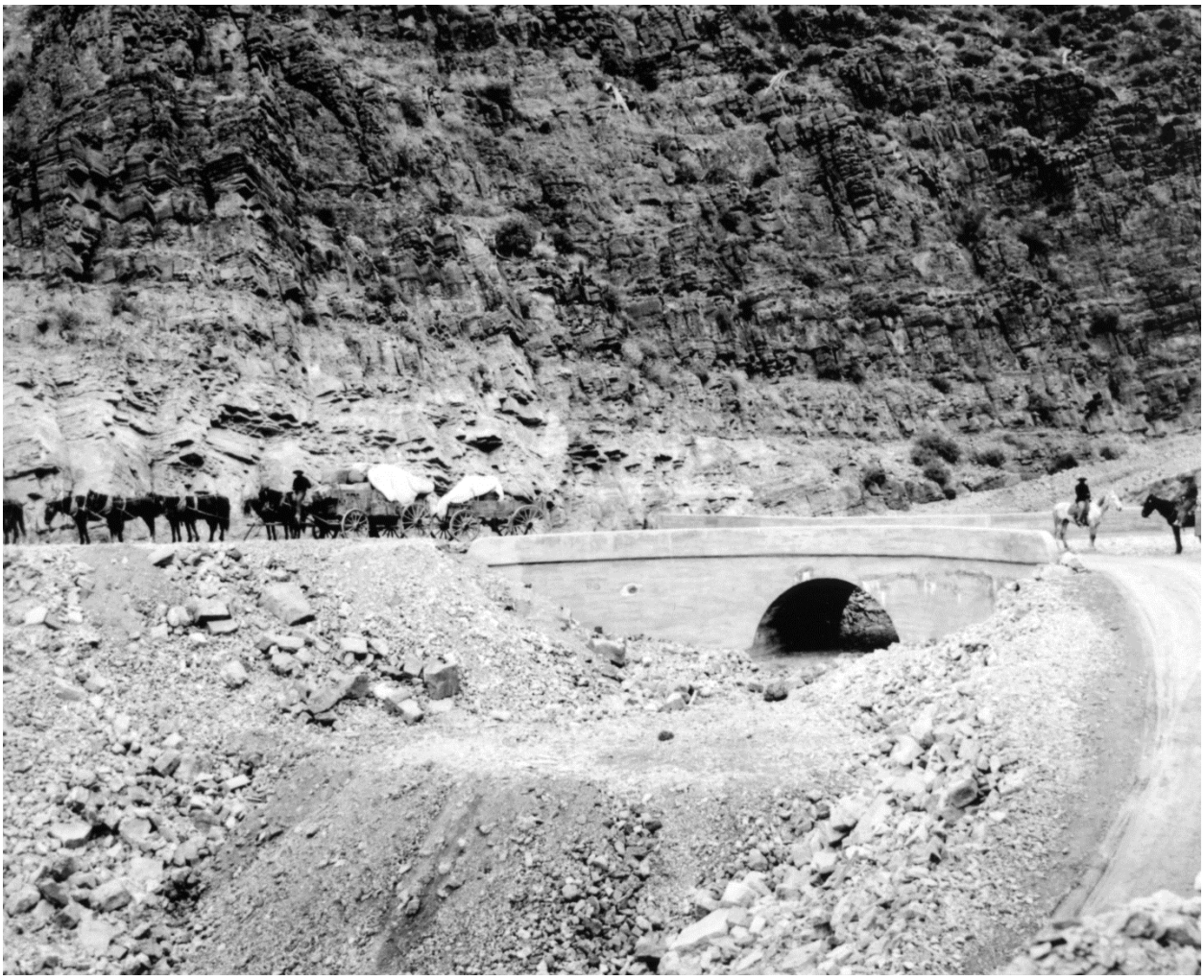

Figure 54: Freighting supplies to Roosevelt Dam site along the Roosevelt Road, 1906. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

Figure 55: Hauling sacks of concrete down from site of Roosevelt Dam to Granite Reef Diversion dam site, ca. 1907. Not only did the Reclamation Service have to haul supplies up to the Roosevelt Dam site, but the Service also had to carry concrete down from Roosevelt, where the Service's concrete plant was located. The river was not used to convey materials in either direction. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

Another unpublished Reclamation Service document revealing the nature of the Salt River around the time Roosevelt Dam was being built is a 1905 report by Gerard H. Matthes. Entitled "Recent Conditions in Salt River Valley, Arizona," the report described the "unusual meteorological conditions which have prevailed throughout the United States during the early part of the present year." In particular, Matthes reviewed how those weather conditions had

affected the Salt River Valley. Matthes noted that there had been unusually high precipitation in the winter and spring months of 1903, and while that had been an advantage to cattle ranchers on high ground, it had caused serious flooding throughout Arizona, especially in the Salt River Valley. Matthes wrote that:

> in the populated districts of Arizona, and in the Salt River Valley more in particular, the excessive precipitation has been the cause of washouts along the railroads, wagon roads, canals, ditches, telegraph and telephone lines, to an extent unparalleled in the history of the valley.

Matthes further observed that the flooding had repeatedly destroyed railroad lines and bridges in and outside of Phoenix, and for a time there had been no available bridge spanning the Salt "for many hundred miles either up or down the river[.]" Matthes pointed out that there had been considerable damage to the irrigation systems in the Salt Valley and that the Salt River bed had shifted due to the flooding:

> The ranches of Salt River Valley sustained damage in many different ways; one after another of the diversion dams maintained across Salt River by the various irrigation enterprises were washed out, and when the waters finally commenced to subside, the owners found themselves confronted with difficult problems regarding the reconstruction of these dams the majority of which had been of a more or less temporary character. All along the river sweeping changes occurred in the river bed, and in more than one instance the new channel was found to be located a long distance away from the old canal head. The continued high water, moreover, rendered it impracticable to reconstruct these dams in season to turn irrigation water in the ditches for the spring irrigation, and at many points in the valley irrigators were left without water for a considerable period. Fortunately for them, however, the copious rains which had previously soaked the soil proved to be the salvation of many a crop. . . . One of the most serious calamities to the people of Salt River Valley occurred on April 13, when a high flood destroyed the timber dam of the Arizona Water Company, commonly known as the Arizona dam. This structure practically controlled all the irrigation water used on the north side of the river, and its loss was a serious blow – more especially to the orchards in the northern part of the valley. The older canals, known as the Salt River Valley, Maricopa and Grand canals, which had been supplied with water by the Arizona Water Company, made immediate preparations to restore their former headgates and were soon able to supply the ranches which were situated under them with irrigating water. The Arizona Water Company is also preparing to rebuild its dam. . . . The protracted floods on Salt River in addition to destroying

> the works of man, did incalculable damage to lands along the river, through the shifting of the river bed and the caving of the banks. At numerous points along the river ravages of this nature assumed large proportions – ranches of large acreage being cut down to small holdings, and in some cases entire ranches disappeared little by little, inclusive of barns and buildings, leaving the owners destitute. At Tempe the river cut into the banks east of the Tempe Buttes which protected the town on the north side of the river, carrying away many acres of valuable farm lands. Considerable apprehension has been entertained by the citizens of that locality, who fear that the river will form a new channel to the south of the Buttes and through the heart of the community.

Despite the detailed description of the damages wrought by the flooding and the difficulties local residents faced in rebuilding diversion dams, bridges, buildings, and other structures, Matthes made no mention of any impact on navigation on the Salt, either by the rebuilding of irrigation works or by the flooding and massive channel changes.[111]

Yet another example of the Reclamation Service expressing its concern over issues that might affect the construction of the Salt River Project can be seen in the agency's interest in *Patrick T. Hurley v. Charles F. Abbott, et al.*, a lawsuit commenced in 1905 to adjudicate the water rights of all irrigators in the Salt River Valley. (This case is discussed in greater detail later in this report.) As the litigation moved forward, U.S. Government officials were quite anxious about the lawsuit's conclusion because the outcome could have considerable impact on water to be stored at Roosevelt Dam. Demonstrating the government's worries, on February 28, 1907, Morris Bien, acting chief engineer of the U.S. Reclamation Service and an attorney for that agency, wrote Benjamin A. Fowler, president of the Salt River Valley Water Users' Association. Bien told Fowler that the "importance of this matter [*Hurley v. Abbott*] is manifest and is undoubtedly appreciated by the water users association and many of the people in the valley." Bien asked Fowler for the status of the litigation, and he added that the "matter is of extreme

[111] Gerard H. Matthes, "Recent Conditions in Salt River Valley, Arizona," Dec. 1905, in "Salt River Project, Consulting Engineers Reports, January 1, 1913 – December 31, 1913," General Administrative and Project Records, 1902-1919, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

importance to the Reclamation Service as the progress in this case must guide its future policy." Observing that the "Government must be protected against any claims to the use of water stored in the Roosevelt Reservoir[,]" Bien opined that it might be necessary to keep the gates of Roosevelt Dam open and not store water until the court case was resolved. While Bien, who was a Reclamation Service attorney, was clearly worried about claims for water that might be stored at Roosevelt, he gave no indication that any of those claims might be to maintain the Salt River's navigability.[112]

Additional evidence of the Reclamation Service's concern with the potential outcome of *Hurley v. Abbott* can be seen in a June 11, 1907, letter from Louis Hill to the director of the agency. Hill noted that ever since the suit had been filed, there had been considerable discussion around the Salt River Valley as to whether the court would have full authority to decide the rights of all concerned parties in relation to the Salt River's supplies. Hill explained that many water users believed that the litigation only would decide the rights of the plaintiff, Patrick Hurley, in relation to those of the named defendants, and therefore many of the water users were not bothering to appear in court or participate in any way. Hill reported that the presiding judge in the case, Edward Kent, viewed this situation with regret because it might result in some irrigators losing their water supplies by default. While Judge Kent had expressed his concern that all parties' interests in the Salt River needed to be resolved, he gave no indication (nor did the Reclamation Service) that any of those concerned parties were navigation interests.[113]

[112] Morris Bien to B.A. Fowler, Feb. 28, 1907, file 118, General Administrative and Project Records, 1902-1919, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

[113] Louis C. Hill to the Director, U.S. Reclamation Service, June 11, 1907, file 118, General Administrative and Project Records, 1902-1919, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

The issue of creating hydroelectric power at Roosevelt Dam and elsewhere also demonstrated a lack of navigability of the Salt River. In 1911, controversy arose over whether hydroelectric power should be developed at the dam and at drops in the canals, and if so, how much. Evidently, proponents of a permanent source of hydroelectric power believed the income from this energy could be used to offset the costs of the dam and project. Nevertheless, the chief electrical engineer for the Reclamation Service at the Salt River Project, O.H. Ensign, urged restraint in the creation of more power than just the amount necessary for pumping purposes. Ensign told Reclamation Service Director Frederick Newell that generating constant hydroelectric power through continuous releases of water might not be possible if sufficient water for irrigation purposes late in the summer months was to be kept at the reservoir. Ensign, however, gave no indication that navigational interests might support steadier flows of water in the Salt River.[114]

One final example of Reclamation Service unpublished documents illustrating that the agency did not consider the Salt River to be navigable is the 1916 report, "Final History, Salt River Project, Arizona." This unpublished synopsis held by the Denver branch of the National Archives covered virtually all aspects of the history of the Salt River Project, and it included descriptions of private Salt River Valley canals in existence prior to the construction of the federal project, roads to Roosevelt Reservoir, and Granite Reef Dam. In relation to the private ditches, the report included discussion of the Swilling Ditch (completed in 1867), the Maricopa Canal (a branch of the Swilling Ditch, 1868), the Tempe Canal (1870), the San Francisco (or Wormser) Canal (1871), the Utah Canal (1877), the Grand Canal (1878), the Mesa Canal (1879),

[114] O.H. Ensign to the Director, U.S. Reclamation Service, Feb. 7, 1911, in "Salt River Project, Consulting Engineer Reports, January 1, 1907 – December 31, 1912," General Administrative and Project Records, 1902-1919, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

the Arizona Canal (1883-1885), the Cross-Cut Canal (1889), and the Highland Canal (1888). (See the map earlier in this chapter for the locations of these ditches.) Although these canals used a considerable portion of the entire flow of the Salt River, the "Final History" made no mention of any objections by parties who might have been concerned with the navigability of the Salt River. The report also indicated that most of these canals built their own diversion dams on the river (although some of them were combined over the years), and while the dams were temporary (except for the Arizona Canal's diversion dam), there apparently were no objections to any interference with the navigability of the Salt River. Noting the shifting channel of the Salt River, the report explained:

> [t]he torrential character of Salt River, together with its tendency to shift its channel to avoid any obstruction, has made the construction of diversion dams [such as the Arizona Dam] of stability a matter of great difficulty. . . . The other dams on the river were temporary affairs if [*sic* – of] brush and rock that had usually been swept away more or less completely by the periodic floods that occur semi-annually with great regularity. At such times it was rarely ever possible to repair or reconstruct the dam till after the floods had subsided. Then little water remained in the river that could be utilized for irrigation. When the dam was intact there was often a meager water supply, and when there was an ample supply of water in the river the dams were often out, and in consequence the valley was generally in a chronic state of water famine. But notwithstanding this condition of uncertainty in regard to the water supply, the agricultural development of the valley has been little less than marvelous.[115]

Under the section of this report dealing with roads, the report noted that the "inaccessibility of the Roosevelt Reservoir" had forced the construction of roads to carry freight and lumber to the dam construction site. One of these, the Roosevelt road (photos of which appear above), had been constructed beginning in 1903, and it had reduced freight expenses considerably by not having to haul everything via Globe, Arizona, and then to the reservoir site. The report noted that building the road had been exceptionally difficult due to the steep

[115] "Salt River Project, Final History (to 1916)," Engineering and Research Center Project Histories, 1911-1991, Box 142, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

mountainous terrain, and in some cases workers had to use lifelines to carry on work. Moreover, once the road had been completed in 1905, its lower elevations had washed out frequently, especially in the canyon just below Roosevelt Dam. Nevertheless, despite these extreme difficulties in hauling materials from Phoenix to the dam locale, the report made no indication that the river might have been used as an alternative means of transportation.[116]

The report also discussed Granite Reef Dam, noting that it took the place of an older timber crib dam that had diverted the Salt River's waters into the Arizona Canal. Granite Reef Dam was built about two and a quarter miles below the older structure beginning in 1905, and it was completed in 1908. The report stated that:

> [a]ll material and supplies came by way of Mesa, the nearest railroad connection, and were hauled by wagon from that point to the dam. . . . A daily stage from Mesa carried mail and passengers.[117]

Again, as had been the case with carrying supplies to Roosevelt, the Reclamation Service apparently never considered using the river to transport goods or people to Granite Reef Dam.

C. Records of the U.S. Department of Agriculture

Long before Congress passed the *Reclamation Act* in 1902, the federal government had been assisting farmers in the West through the U.S. Department of Agriculture. That agency's Division of Soils and the Office of Experiment Stations generated a variety of published and unpublished records characterizing the nature of the Salt River, a few typical examples of which will be discussed here.

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[116] "Salt River Project, Final History (to 1916)," Engineering and Research Center Project Histories, 1911-1991, box 142, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

[117] "Salt River Project, Final History (to 1916)," Engineering and Research Center Project Histories, 1911-1991, box 142, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

1. Published Records of the U.S. Department of Agriculture

One of the earliest Department of Agriculture documents to be published about the Salt River region was Thomas H. Means's *Soil Survey in the Salt River Valley, Arizona,* which appeared as a result of field operations of the Division of Soils in 1900. Dealing principally with soils and geology, the report nevertheless contained useful depictions of the Salt River. For example, in describing the various irrigation canals in the Phoenix area, Means wrote regarding the Salt River that the "water of the river, which sinks into its porous bed below McDowell's Butte, is forced to the surface by the bedrock north of Tempe Butte, so that at Tempe there is always water in the river." Means added more detail about the Salt in his discussion of groundwater:

> Water is found everywhere in the gravels beneath the valley, the depth and amount of matter in solution varying greatly. The level of standing water and its character have no doubt been much changed during the years in which irrigation has been practiced. Little is known of the condition existing before irrigation, except that the water was deeper than now. . . . All the streams are dry most of the year, except in places where the bed rock is near the surface of the ground. For example, the Salt River at McDowell's Butte and for 5 or 6 miles below always contains water, but immediately northwest from Mesa the stream bed is dry during part of the year. At Tempe the water again rises and for a mile the river is above ground. South of Phoenix the stream bed is generally dry, but about 8 miles southwest of Phoenix the water again rises, and from that point the Salt and Gila rivers are above ground for 50 miles or more. The constant flow of the streams when above ground clearly shows that there is a constant flow under the ground through the gravels and sands. Moreover, the increase in underflow indicates that a portion of the water which is applied by irrigation returns to the streams from which it is taken. The irrigation of the great plain around Phoenix will undoubtedly increase the flow of the Salt and Gila rivers near the initial amount. Such an increase has already taken place, but exactly how much cannot be said. Continued irrigation should increase the flow even more, and when all the land below the Arizona Canal is irrigated the flow will be greater than it is now. The subflow is perhaps the most permanent source of irrigation water in the valley. The gravels and sands of the valley act as a storage reservoir, and the resistance to the flow of water through this material acts as a regulator upon the flow.[118]

[118] Thomas H. Means, *Soil Survey in the Salt River Valley, Arizona* (Washington, D.C.: U.S. Department of Agriculture, Division of Soils [1901]), pp. 310, 312-313.

While Means noted that water flowed in the Salt River at various locations, his report did not contradict other observations about the Salt's erratic nature, its changing bed, and the frequency of its floods. In fact, other Department of Agriculture documents underscored these points. For instance, W.H. Code's *Report of Irrigation Investigations for 1900, Office of Experiment Stations, Irrigation in the Salt River Valley* contained a wealth of information about the unreliable nature of the Salt River's flows. In this report, Code wrote that:

> [p]revious to the year 1885 the water of the Salt River was allowed to find its way down a wide sandy river bed to the various canal heads situated along its banks for a distance of about 20 miles. . . . [Before the construction of the Consolidated Canal], the water of the Tempe Canal was allowed to flow down the river, passing through a wide sandy section of the channel some 7 miles in length. This portion of the river bed seemed to absorb water like a sponge, and frequent measurements by different engineers determined the fact that in the summer season especially there was a great waste of water between the dam of the Tempe Canal and that of the Consolidated system located about 7.5 miles up the river. . . . The entire low water supply of the Salt River is taken from the river channel by the time it reaches the head of the Utah Canal. Practically no water passes the Utah dam, and the river bed for several miles is as dry as dust. After following the river channel, however, for a distance of 6 or 7 miles, water again appears, and at a distance of 12 miles below the Utah dam, where the return flow is picked up by the jointhead of the Maricopa and Salt canals . . . the flow in ordinary years is found to approximate 60 cubic feet per second. . . . The river bed is again dry below the dam of the Maricopa and Salt canals, but at the head of the Buckeye Canal, some 24 miles farther down the stream, is again found a volume approximating in ordinary summers 150 cubic feet per second.[119]

It is clear from this excerpt that there were in fact long stretches of the river bed which held no water on a regular and consistent basis even before some of the irrigation canals were built. Furthermore, when the river did in fact carry water, it often came in the form of destructive floods. Code wrote that such inundations brought:

> to the river channel an enormous amount of debris such as brush, limbs, stumps, and whole trees, but creates many canyons and chasms, some of them of dizzy proportions when it is considered that their inception was perhaps due to an

[119] W.H. Code, *Report of Irrigation Investigations for 1900, Office of Experiment Stations, Irrigation in the Salt River Valley*, U.S. Department of Agriculture Experiment Station Bulletin No. 104 (Washington D.C.: U.S. Government Printing Office, 1902), pp. 86-87, 103-104.

> innocent appearing cattle trail leading to the river. The products of such erosions are deposited in the river channel to be swept down to this valley with subsequent heavy floods, together with the debris before mentioned, viz, dead limbs, stumps, trees, etc. The latter are a menace to all irrigation structures along the river, while the heavy sand and fine gravel are deposited in the heads of our canals, seriously diminishing their capacities and entailing great expense in subsequent removal.[120]

The following year, the U.S. Department of Agriculture's *Report of Irrigation Investigations for 1901* offered similar characterizations of an unpredictable river. "The amount of water received from these canals," the report stated, "fluctuates very much during the year, varying with the flow of the Salt River from which they receive their water." Additionally, the report confirmed that the Salt flowed largely in response to precipitation: "The summer rains swell the streams and increase the supply of irrigating water temporarily."[121]

Adding further details about the nature of the Salt River is Alfred J. McClatchie's *Utilizing Our Water Supply*, published by the Office of Experiment Stations in 1902. Although covering water supplies throughout Arizona, the report chiefly dealt with the Salt River. Describing that stream, McClatchie wrote:

> The Salt River, like all streams having a watershed with many steep slopes, is subject to great variations in its flow . . . [and] conditions combine to make a great difference between the winter and the summer flow. After heavy rains in the mountains, especially during the winter, the Salt River is sometimes unfordable for weeks, while during the hot, dry weather of summer it is sometimes reduced to a mere brook, the flow during the winter months of some years being ten to twenty times what it is during some months of the following summer.[122]

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[120] W.H. Code, *Report of Irrigation Investigations for 1900, Office of Experiment Stations, Irrigation in the Salt River Valley*, U.S. Department of Agriculture Experiment Station Bulletin No. 104, (Washington D.C.: U.S. Government Printing Office, 1902), p. 106.

[121] W.H. Code, *Report of Irrigation Investigations for 1901, Office of Experiment Stations, Irrigation Investigations in the Salt River Valley for 1901*, U.S. Department of Agriculture Office of Experiment Station Bulletin No. 119 (Washington D.C.: U.S. Government Printing Office, 1902), pp. 87, 89.

[122] Alfred J. McClatchie, *Utilizing Our Water Supply* (Washington D.C.: U.S. Government Printing Office, 1902), pp. 62-63.

McClatchie also noted the impact of diversion dams and irrigation canals on the Salt's flow. Explaining that prior to construction of the Arizona Dam, the river had been diverted by several dams scattered along twenty miles of the river, McClatchie stated that:

> [a]t the head of the valley is located the Arizona Canal dam, which, during most of the time, intercepts the entire flow of the Salt River, with the exception of a small amount that finds its way under the dam. After carrying the entire volume about four miles along the north side of the river, it turns back into the river channel the portion allotted to the canals on the south side, at a point immediately above the dam of the Consolidated Canal Company.[123]

The significance of this description is that the Arizona Canal's dam, at the time this report was written, diverted the entire flow of the river. McClatchie claimed that there was little if any water in the channel for four miles, and even when some of the water was returned to the bed, it too was diverted by other irrigation company dams. McClatchie made no mention of any objections by navigation interests to the complete diversion of the Salt River's flow.

2. Unpublished Records of the U.S. Department of Agriculture

Within a year of publishing *Utilizing Our Water Supply*, McClatchie reiterated many of the points he had made in that document in a letter to Charles D. Walcott, director of the U.S. Geological Survey. Writing on March 30, 1903, McClatchie urged the federal government to help irrigate the Salt River Valley more fully. As one of the active local proponents of having the new U.S. Reclamation Service build what became Roosevelt Dam, McClatchie restated in his letter many of the points made in *Utilizing Our Water Supply*. In addition, he noted that

> [t]his desirable condition of our valley that I feel would be secured by water storage I desire to see effected by such means and upon such terms as are conducive to the best interests of the farmers, as are in accordance with justice to

[123] Alfred J. McClatchie, *Utilizing Our Water Supply* (Washington D.C.: U.S. Government Printing Office, 1902), p. 89.

> all concerned, and as are in harmony with the policy and welfare of our government.[124]

While McClatchie sought "justice to all concerned," he gave no indication that the construction of the large dam might pose a problem by interfering with navigation on the Salt.

Walcott, McClatchie observed, had previously indicated that if the U.S. Government were to build a reservoir, some of the stored waters might have to go to new settlers on the public domain, rather than to existing farmers served by the private canals. McClatchie thought such a plan would be a mistake since considerable time and expense had gone into building those canals, which were capable of taking water to 250,000 acres had there been sufficient supplies to do so. McClatchie believed any new storage water ought to go to those lands already served by the existing canal system before any went to additional settlers. He added:

> Moreover, the ordinary flow of the river having been already fully appropriated, newly-settled lands would be entitled only to reservoir water, and in the case of the stored supply being exhausted would be wholly deprived of water for which they had contracted with the government. Should such a shortage last an entire season, as past experience indicates is among the possibilities, such newly-settled region would be nearly if not completely ruined.[125]

McClatchie further noted that in order to provide sufficient supplies to lands already under ditches, the nature of the Salt River had to be taken into account. As he explained:

> [t]he great fluctuation of our present water-supply must be understood and taken into consideration, in planning for water storage. As shown in the bulletin before referred to [*Utilizing Our Water Supply* – see above for a discussion of this document], the flow during the winter months of some years is ten to twenty times what it is during part of the following summer; and the flow during any one month may be five to fifteen times as great one year as another. The amount diverted and used varies somewhat less than this, the relation of the greatest amount diverted during any one month of the past eight years to the smallest

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[124] Alfred J. McClatchie to Charles D. Walcott, March 30, 1903, file 27, General Administrative and Project Records, 1902-1919, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

[125] Alfred J. McClatchie to Charles D. Walcott, March 30, 1903, file 27, General Administrative and Project Records, 1902-1919, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

> amount diverted being approximately as ten to one, and the greatest difference in the amount diverted during any two months of one calendar year being as five to one. However, the difference in the amounts diverted during two different weeks of the same year may be as great as twenty-five to one. That is, during some summer week a farmer may receive but one twenty-fifth as much water as he had during a week of the previous winter.[126]

The significance of McClatchie's letter to Walcott is three-fold. First, McClatchie made it clear that by 1903 the entire normal flow of the Salt River was diverted by existing irrigation canals. Second, to carry out this massive utilization of the Salt River's supplies, there were many diversion dams situated along the stream which would theoretically impede any navigation. Third, the flow of the Salt River varied enormously over time, demonstrating the difficulty of relying on it for navigation even if obstructions had not existed. Given all of these circumstances, McClatchie nevertheless gave no suggestion that navigation interests might be adversely affected by the river's erratic flow, the diversion dams, the complete use of the normal flow to water farmlands, or even the potential construction of a new, massive storage reservoir by the U.S. Government.

D. Summary and Conclusions to Chapter 3

The records of the three federal agencies whose responsibilities were most closely associated with water resource development in the West (the Reclamation Service, the Geological Survey, and the Department of Agriculture) all consistently illustrated that none of the officials in those agencies considered the Salt River to be navigable on a reliable basis. Reports by these agencies – both published and unpublished – routinely characterized the stream as varying dramatically in flow, from a mere trickle to wild floods. The accounts also described a river whose channel frequently changed, whose course was blocked by many dams and

[126] Alfred J. McClatchie to Charles D. Walcott, March 30, 1903, file 27, General Administrative and Project Records, 1902-1919, Records of the U.S. Bureau of Reclamation, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

diversion works, and whose water supplies were fully diverted to supply farming needs. Moreover, the U.S. Government documents observed that even when water materialized in the Salt River's channel it frequently disappeared a short distance downstream. For all of these reasons, no contemporaneous observer considered the Salt River to be navigable on a regular and reliable basis.

CHAPTER 4: NEWSPAPERS AND RELATED PHOTOS

A. Background to Newspaper Articles

Newspaper reports offer some of the most frequent descriptions of the Salt River in the years leading up to Arizona's statehood in 1912. To understand the significance of these press accounts, some background information on nineteenth and early twentieth century papers in the American West is necessary. Newspapers were among their respective communities' biggest boosters, not only due to civic pride, but also to attract settlers to growing towns. As enthusiastic promoters of their home communities, local papers frequently printed long articles extolling their respective areas' many advantages, not only for their own readership, but also for readers in other more distant places, to which copies of the paper would be sent to attract newcomers.

Given the booster nature of the western press, it is not surprising that the Salt River, as the major source of irrigation water for the area around Phoenix, was given substantial newspaper space on many occasions and was publicized as one of the region's many blessings. Although the river was praised as the source of water for the many farms, accounts navigation on the stream were conspicuously absent from newspaper accounts of the long list of many benefits the Phoenix area had to offer, and this fact is particularly notable because other regions with navigable waterways boasted about that advantage. This does not mean that there were no reports of boats on the Salt River – indeed, such stories appeared on multiple occasions. Nevertheless, the articles that did cover the presence of boating on the Salt River indicate that such uses were infrequent and involved boating to access diversion dams or obstacles in the river, as ferry services, as a means of rescue from floods, or as recreation or adventure. There also were a few attempts to use the river for navigation, but those plans either were extremely intermittent or were unsuccessful. Furthermore, there were no newspaper stories about how the many diversion dams along the Salt River interfered

with the navigability of the Salt River. Yet despite the uncommon and sporadic nature of accounts of boating on the Salt River, this report will discuss those articles.

Aside from covering the irregular attempts at boating on the Salt River, the Phoenix-area press also carried a wide variety of other stories that shed light on the nature of the stream. For the purposes of this report, those accounts, which are representative of many more like them, are loosely grouped and discussed under the following two additional categories: 1) dams and irrigation, and 2) forms of non-water transportation in the Salt River Valley, including roads carrying commerce adjacent to the Salt River. There were, of course, many stories about flooding.

B. Newspaper Articles about Boating on the Salt River

As noted above, intermittent boating on the Salt River took a variety of forms. One of these was for adventure or recreation. Such articles, however, emphasized how unusual and difficult regular and reliable transportation by water would be.

1. Newspaper Reports on Boating for Adventure or Recreation

On February 17, 1881, the *Arizona Gazette* reported that two individuals planned to float an eighteen-foot-long flat-bottomed skiff from Phoenix to Yuma via the Salt and Gila rivers. The paper reported that the boat appeared "very strong and durable, and able to stand pretty severe buffeting."[127] Whether this expedition was carried out or not is unclear, but later the same year the *Gazette* related that the:

> "Yuma or Bust" party which left Phoenix recently for the purpose of exploring the Salt and Gila rivers were [*sic*] 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. [Question mark in the original.][128]

[127] [No title], *Arizona Gazette*, Feb. 17, 1881.
[128] [No title], *Arizona Gazette*, Nov. 30, 1881.

A few days later, the *Gazette* carried another story with considerably greater detail on the adventurers:

> 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.[129]

The failure of the "Yuma or Bust" expedition did not dissuade others from making similar attempts to put watercraft in the Salt River for recreational purposes. On September 20, 1882, the *Tucson Daily Citizen* reported: "It is rumored that Oury has commenced the construction of a sculler and that he will attempt to navigate [the] Salt River on or about the 8th day of November next."[130] Nevertheless, November 8th came and went with no further news about Oury's boating plan.

Emphasizing the lack of reliable leisure navigation on the Salt River is the fact that many years went by with no other similar stories, and even when another news report involving recreational boating eventually did appear, it involved irrigation canals and just the small lake behind Granite Reef Dam. On July 29, 1912 – just five months after Arizona entered the Union – the *Arizona Republican* reported that entrepreneurs had instituted a plan to run boats on the Consolidated and Eastern canals to carry passengers to Granite Reef Dam. There, a resort was planned with additional boats to be provided for recreation on the small lake behind the dam. The article noted with tongue-in-cheek:

> Boat riding has almost become a lost art in the Salt River valley, but it is probable that a great many of the younger men will soon be wearing sailor costumes and the ladies will keep pace with the fashion. It is expected that shipping news will eventually be a feature of the local valley papers.[131]

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[129] [No title], *Arizona Gazette*, Dec. 3, 1881.
[130] [No title], *Tucson Daily Citizen*, Sept. 20, 1882.
[131] "Late Marine News of Salt River Fleet," *Arizona Republican*, July 29, 1912.

No such "shipping news" ever developed, and there was no suggestion that similar boating could take place on the Salt River itself.

2. Newspaper Reports about Attempts at Navigation

One of the earliest ideas to use the Salt River for commercial purposes, according to the *Weekly Journal Miner* (published in Prescott, Arizona) was advanced by "Steamboat Adams" in the 1860s. The *Miner* later recalled that Adams had run office as Arizona Territory's non-voting delegate to Congress, and as part of that campaign, he had proposed a means of travelling along the Salt and Gila rivers involving a boat with paddle wheels that would double as land wheels to carry vessels over sandbars or dry reaches of those rivers. According to the newspaper, Adams idea was to navigate:

> the Gila and Salt River with steam boats with big broad wheels something on the order of our present traction engine wheels, and when there was water, they were to act as water wheels, and in places where the river sank, they were to carry the boat over [the] dry [riverbed] and for protection it [the boat] was to be provided with a double turret gun, one in front and one behind, [and] in case of Indians, it could be turned on the enemy and in tight pulls either on land or water the firing of the gun at the rear acted as a pusher by the recoil of the charge or a shot from the front or bow would make the vessel back out in case they got stranded.[132]

While nothing came of Steamboat Adams's unusual proposal, a more serious plan emerged in 1872, when Charles T. Hayden, who had started a ferry service across the Salt River in 1871 from Phoenix to Tempe, announced plans to construct a saw mill on the Salt. According to the *Weekly Journal Miner*, Hayden "will soon have a saw mill on Salt River, near Phoenix, and that he intends to float logs down the river" from upstream forests.[133] Hayden's mill can be seen in the stereographic photo below, evidently taken around 1880 from Tempe Butte and looking toward Phoenix. The Salt River can be seen in the background.

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[132] "Republicans at Camp Verde," *Weekly Journal Miner*, Nov. 7, 1900.
[133] [No title], *Weekly Journal Miner*, Dec. 7, 1872.

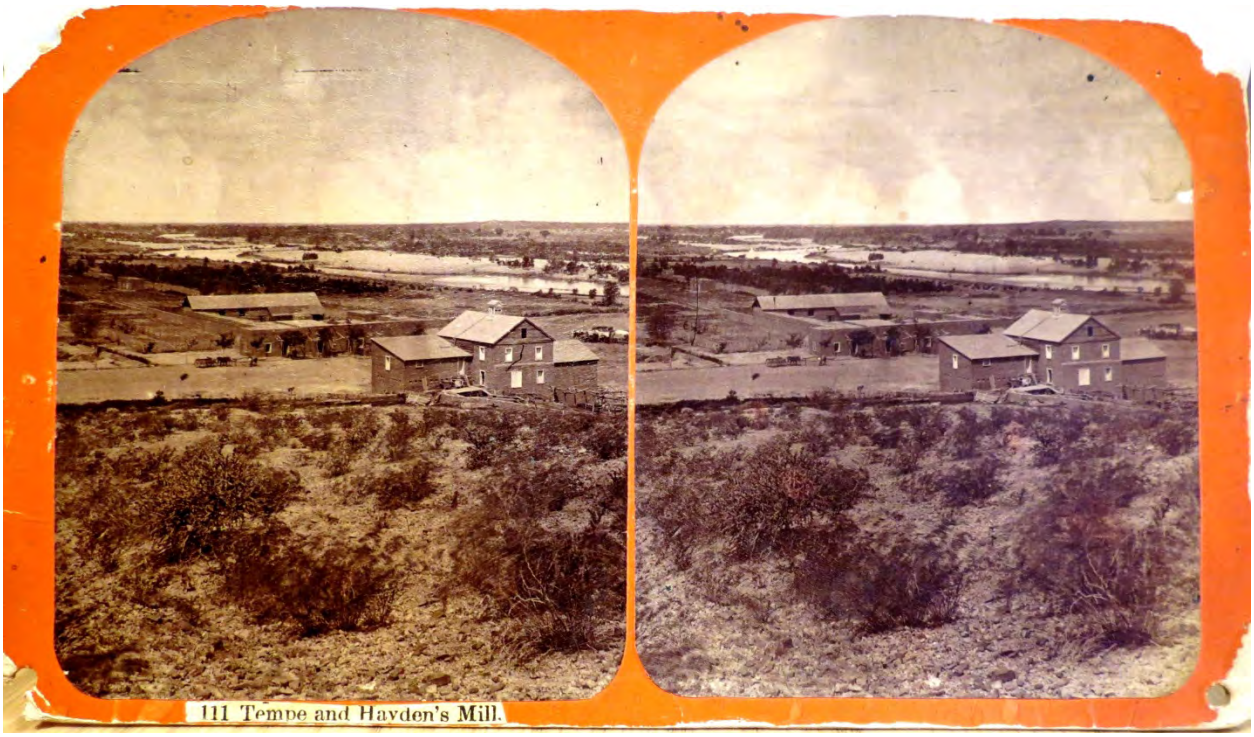

Figure 56: Stereographic photograph of Charles T. Hayden's mill, ca. 1880, as seen from Tempe Butte with Salt River and Phoenix in background. Source: Special Collections, Arizona State University, Tempe, Arizona.

At about the same time that Hayden was planning to float logs to his mill, two other individuals used a flatboat to bring crops from Hayden's Ferry downstream to the Swilling Canal, one of the first non-Indian irrigation ditches along the Salt River. Prescott's *Weekly Journal Miner* enthusiastically reported on May 3, 1873:

> Salt River is navigable for small craft as, last week, L. Vandermark and Wm. Kilgore brought five tons of wheat, in a flat boat, from Hayden's Ferry, down the river to the mouth of Swilling canal and thence down the canal to Hellings & Co.'s mill.[134]

Despite the newspaper's assertion that the Salt River was navigable, however, there were no further reports of anyone else moving cargo on the Salt, and moreover, the following June,

[134] "Items," *Weekly Journal Miner*, May 3, 1873.

the *Miner* reported that Hayden's log-floating plans had failed, largely because the Salt River Canyon above Phoenix and Tempe was blocked by boulders and narrow reaches:

> We had hoped that [the] Salt River would be found "navigable" for saw logs but the recent unsuccessful attempt (an account of which appears in our Salt River Valley letter) to "drive" logs down that plunging stream shuts off all hope of ever seeing a navy yard at Phoenix. There is, to be sure, sufficient water to float the largest pine log but the bowlders [*sic*] and very narrow canons [*sic*] forbid it. Perhaps below the canons forests may exist.[135]

The "Salt River Valley letter," to which the *Weekly Journal Miner* referred, added greater detail about Hayden's unsuccessful attempt to float logs down the river:

> The Hayden party, left up Salt River, to come down in a canoe and drive some logs with them, have returned and pronounce the scheme a failure. With much toil and difficulty, on account of rapids and boulders in the river, they descended a long way, when, having lost their arms, ammunition and provisions, excepting flour, they arrived at a canon so narrow as not to admit of the passage of a log, and were compelled to abandon their boat and foot it. Mr. Hayden is still sanguine of getting sufficient timber on this side of the canons.[136]

It was nearly another decade before the press reported that anyone else considered carrying commerce up or downriver on the Salt River (although there were reports of ferries – to be discussed later in this chapter). Eventually, however, in 1882 the *Arizona Weekly Star* (published in Tucson) carried a very brief note stating: "Porter [no additional name given] is giving close attention to marine navigation and is especially observant of [the] channel of [the] Salt river."[137] There were, however, no follow-up stories about Porter attempting to use the river for any navigation purposes.

There also were apparently no other newspaper articles indicating that anyone else had considered using the Salt River for commercial purposes (other than ferries) – at least up through the date of Arizona's statehood in 1912. This probably is not surprising, given that as the

[135] "A Failure," *Weekly Journal Miner*, June 28, 1873.
[136] "Salt River Valley," *Weekly Journal Miner*, June 28, 1873.
[137] [No title], *Arizona Weekly Star*, Sept. 7, 1882.

nineteenth century wore on, numerous irrigation canals were built that both drained the Salt River's waters as well as blocked up or downriver navigation – had there been any. Moreover, there were no newspaper articles about boatmen objecting to the Salt River being depleted of flows or blocked by dams.

3. Newspaper Reports about Ferries, Fords, Bridges, and Floods

Beginning in the late nineteenth century, a variety of ferries – both temporary and long-term – operated at several locations on the Salt River when flows permitted until bridges made the ferries obsolete. In addition, fording the river predated and later supplemented ferry service, depending on river conditions. Fording the Salt River was only possible during extremely low flows, but when the Salt River flooded, raging water prompted dangerous boat rescues of individuals trapped by high water. In some instances people lost their lives in the Salt River's torrential flows. A sampling of some newspaper articles describing ferries, fording, and floods appear below, and they are representative of many other similar news accounts.

One of the earliest reports of a temporary ferry on the Salt River appeared in the *Weekly Journal Miner*, which in 1882 printed a recollection of an individual nicknamed "Brother Beach" and his temporary ferry in 1865. According to the *Miner*, Beach was an "oldest inhabitant" of the Salt River area, and he recalled having to build a provisional ferry to cross the swollen Salt River:

> we distinctly remember camping for four weeks [in late 1865] on the bank of Salt river with Bob Postle, [Wisconsin] Gov. [Coles] Bashford [who was then Attorney General of Arizona Territory], James S. Giler, Aaron Worthiemer, Tom Saunders, and Dan White . . . waiting for the fierce flowing waters to recede so that a crossing could be effected. As a last recourse, however, we had to return to Wickenburg, construct a small skiff, take our wagons apart, and ferry them over the Salt and Gila rivers [one] piece at a time.[138]

[138] "Items at Large," *Weekly Journal Miner*, March 13, 1882.

Brother Beach may have wanted to ford the Salt River but was forced to build an ad hoc ferry, but another party that attempted to ford despite high water, paid a significant price as a result. The *Arizona Miner* reported on September 12, 1866: "Extraordinary rains have prevailed, and Capt. Krause found both the Salt and Gila rivers very high, and lost one of his escort, Private Feely, in crossing the former."[139]

In contrast to the experiences of Brother Beach and Captain Krause, when Salt River flows were either non-existent or extremely low, fording the Salt River was possible as the following photograph illustrates. Taken in the early to mid-1870s, the photo shows a buggy crossing the Salt River between Phoenix and Tempe near Tempe Butte. Also visible in the photograph above the buggy and to the right is the top of Hayden's Mill just above the tree line.

[139] [No title], *Arizona Miner*, Sept. 12, 1866.

Figure 57: Fording the Salt River ca. early to mid-1870s, with Tempe Butte in background. The top of Charles Hayden's mill can be seen just to the right above the buggy's top. Source: U.S. Library of Congress, Washington, D.C.

Around the time that the above photograph was taken, the *Weekly Journal Miner* printed an article about fording of the stream instead of ferrying. Entitled "Notes on a Trip through Arizona," the November 19, 1870, newspaper article was a lengthy day-by-day account by "One Who Made the Trip," and it not only described how fording the Salt River was difficult at times, even during low flow, but the account also indicated that "scores" of miles of irrigation ditches were already in existence. The account of visiting the Phoenix area also contained other details about the Salt River region:

> Friday, September 30 – Got an early start, and reached the Upper Crossing of Salt river about noon, crossed it and rested near a farmhouse. While approaching the river, we got a fine view of the immense valley in which stands the town of Phoenix, and in which are many of the finest ranches in Arizona. We had friends there whom we would have gone to see but for the fever and ague which was preying upon us. Salt River, or Rio Salado, as some call it, is, next to the Colorado, the largest stream that flows near or through Arizona. The water was low when our party crossed it, yet it was with some difficulty we made the trip. The was, in its bed, and on the banks is made up, principally, of granite and quartz bowlders [*sic*], which strengthened our belief that the stream passes through mineral bearing regions in Central Arizona. Three years ago there were not to exceed ten settlers upon this portion of the river; to-day, there are nearly 800, and the population is rapidly increasing. Scores of miles of ditches to convey water for irrigating have been constructed, and the place is really the granary of Northern Arizona.[140]

Because of the obvious difficulties individuals were having in crossing the Salt River, a year after "One Who Made the Trip" wrote his account of fording the Salt, Charles T. Hayden established a permanent ferry between Phoenix and Tempe. Consisting of a flat-bottomed skiff, the ferry was conveyed across the Salt River when flows were sufficiently deep by means of a rope strung from bank to bank. The operator would then simply pull the ferry across. Hayden's Ferry can be seen below in two views, one photograph taken in 1895 and the other in 1901.

[140] "Notes of a Trip through Arizona by 'One Who Made the Trip,'" *Weekly Journal Miner*, Nov. 19, 1870.

Figure 58: Charles T. Hayden's ferry between Phoenix and Tempe, 1895. Note the line used to move ferry across the Salt River. Source: Special Collections, Arizona State University, Tempe, Arizona.

Figure 59: Charles T. Hayden's Ferry, January 15, 1901. Source: Special Collections, Arizona State University, Tempe, Arizona.

After Hayden had opened his ferry service in 1871, two years later the *Weekly Journal Miner* observed that another entrepreneur was in the process of building a ferry to supplement Hayden's. The new ferry was to cross the Salt River above Hayden's near where the Verde River joined the Salt:

> Mr. Charles Whitlow is building a large ferryboat to use at that crossing of [the] Salt River. Mr. W. has had experience as a boatman on the Ohio and other rivers. Salt River is very high and owing to the great accumulation of snow in the mountains is likely to keep up for some time.[141]

Even with the two ferries on the Salt River, there was still a need for other means to cross that stream at different locations without the having to ford the stream. For instance, due to a flood in 1874, the *Weekly Journal Miner* stated that some sort of other temporary ferry services might become necessary until bridges across the Salt could be constructed:

> The late freshet in [the] Salt River, when, for several days, men and animals were unable to stem its current, and when a crossing was made at but one point on the stream, and that point at Mr. Whitlow's, i.e., the upper or McDowell crossing, goes to show the necessity of a bridge or bridges; but as it would cost a great deal of money to bridge such an immense stream, our Phoenix friends ought, at once, to provide themselves with boats.[142]

In 1880, the same circumstances arose when new flooding stopped communications along the Salt River. The Prescott *Weekly Journal Miner* commented that due to the high water, mail had to be ferried across the Salt, although paper did not specify whether the ferrying service was temporary or permanent:

> A stage arrived this forenoon without any mail. The connections were broken by a great flood in Salt River. Arrangements have been made for ferrying and on tomorrow our mails will begin to come in on time – Good enough, as the proprietors, agents, drivers and all hands are doing their best in the premises.[143]

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[141] [No title], *Weekly Journal Miner*, Dec. 19, 1873.
[142] [No title], *Weekly Journal Miner*, Jan. 30, 1874.
[143] [No title], *Weekly Journal Miner*, Jan. 2, 1880.

By 1881, apparently there were at least three ferry companies in operation at points along the Salt: the Whitlow's Ferry near the mouth of the Verde River, Hayden's Ferry at Tempe, and another ferry service called the Gila and Salt River Ferry Company (specific location unknown). The *Arizona Gazette* reported in April 1881 that the Gila and Salt River Ferry Company had launched a new and bigger boat on the "turbulent waters of the Rio Salinas."[144] Indeed, apparently the Salt River became so "turbulent" in August 1881 that Hayden's Ferry sank in a massive flood. The *Weekly Journal Miner* reported on August 19, 1881, that all rivers in Arizona were then impassable due to the inundation, and then the *Miner* observed:

> Hayden's ferry boat sank yesterday. The Salt, Verde, Santa Cruz and Gila rivers are all overflowed, [and] the Grand canal is all washed out. No mails or stages arrive or depart. The Black Canyon stage, due yesterday, has not yet arrived.[145]

The next year, more severe flooding on the Salt River prompted a ferry to move items across the swollen stream because the stream was not then fordable. The *Tombstone Epitaph Prospector* commented on March 13, 1882:

> The Salt river is on its high horse, and is not fordable. The early stage this morning was unable to cross, and a special coach was sent down to meet it, which returned at noon. However, it brought in only the local mail from Maricopa and a little baggage which was ferried across, as no trains had arrived at the time the first stage left.[146]

Some of the newspaper articles describing ferries reported that such means of crossing the river could be dangerous. On April 14, 1884, for instance, the *Arizona Gazette* reported that mail being transferred across the Salt River by ferry was lost when the current washed the ferry down the stream, and it collided with another larger ferry.[147]

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[144] [No title], *Arizona Gazette*, April 21, 1881.
[145] "The Flood," *Weekly Journal Miner*, Aug. 19, 1881.
[146] "Items at Large," *Tombstone Epitaph Prospector*, March 13, 1882.
[147] "Mail Lost," *Arizona Gazette*, April 14, 1884.

Even as late as 1900, ferries continued to transport people and vehicles across the Salt River. The photograph below shows "Mr. Wilson's" ferry on the Salt, which apparently was three miles west of Hayden's Ferry.

Figure 60: "Mr. Wilson's" ferry across the Salt River, 1900. Note the size of the skiff and the adjacent log footbridge. Source: Special Collections, Arizona State University, Tempe, Arizona.

Over the following years, people continued to try to ford the Salt River when the stream was too low for ferries to operate, especially near Phoenix and Tempe. Several photographs below illustrate that this means of crossing the Salt River sometimes could be fraught with difficulties, depending on the stream's depth. Even after bridges were built for vehicles after 1910, people still attempted to ford the Salt River when flows were low.

Figure 61: Fording the Salt River from Phoenix to Tempe, ca. 1910. Source: Special Collections, Arizona State University, Tempe, Arizona.

Figure 62: Automobiles being towed out of the Salt River near Phoenix, ca. 1910. Source: Special Collections, Arizona State University, Tempe, Arizona.

Figure 63: Fording the Salt River near Phoenix, ca. 1910. Source: Special Collections, Arizona State University, Tempe, Arizona.

Figure 64: Stuck in the sand in the Salt River, 1914. Source: Salt River Project Archives, Phoenix, Arizona.

Figure 65: Automobile stuck in Salt River, 1915. Source: Special Collections, Arizona State University, Tempe, Arizona.

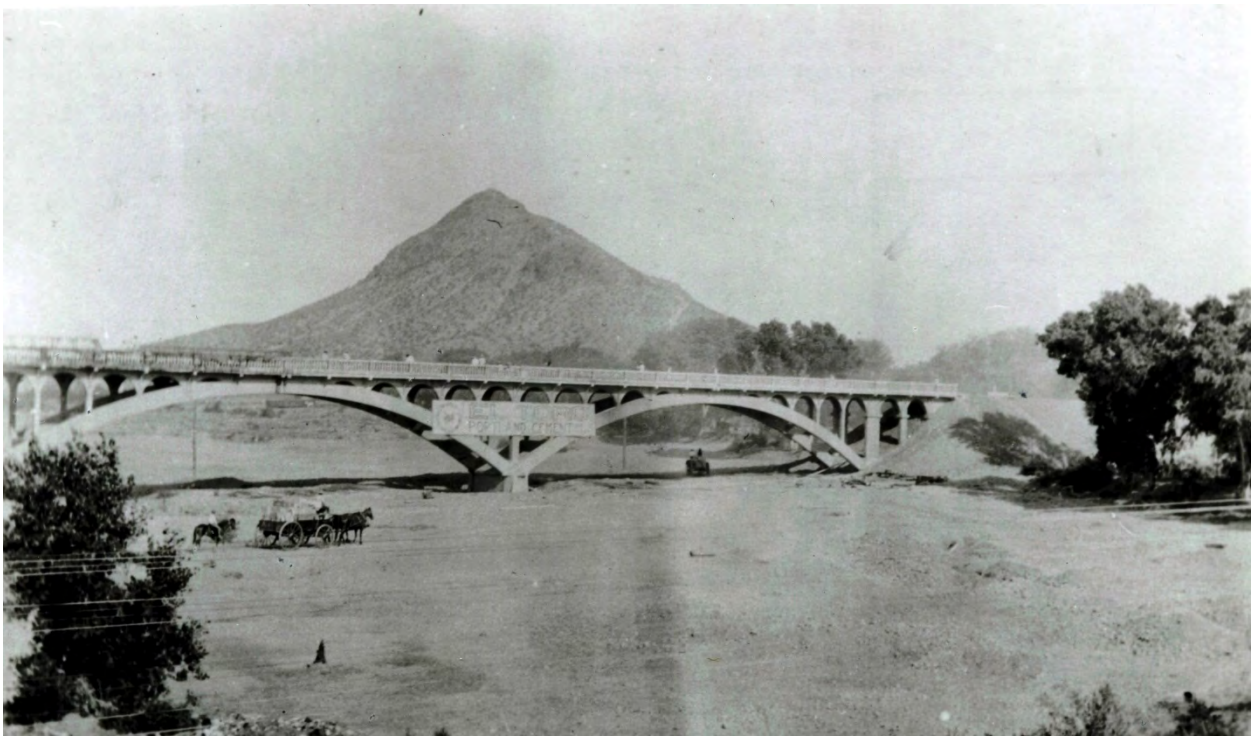

Figure 66: Wagon fording Salt River, ca. 1914. Note second wagon under Ash Avenue Bridge. Source: Special Collections, Arizona State University, Tempe, Arizona.

As the greater Phoenix area grew, demands for bridges developed to supplement or replace the haphazard ferries, but there was debate over where to construct bridges due to the Salt River's repeated flooding and the resulting channel changes. Reporting on this situation, in March 1891, the *Prescott Evening Courier* noted that the *Tempe News* – perhaps not surprisingly – had declared that the only safe location to construct a bridge over the Salt River was at Tempe.[148]

At about the same time, Phoenix-area residents began to call for levees to be built to protect the region from the Salt River's repeated flooding. The *Weekly Tombstone Epitaph*, for instance, carried a brief note on January 17, 1892, that the "citizens of Phoenix have issued a call for a meeting to provide means to build a levee on [the] Salt river."[149] The levee idea may have appeared logical to many area residents, but the expense of such a barrier along the Salt River was formidable, prompting some individuals to petition Congress to pay for the estimated $10,000 cost. Yet the *Los Angeles Express* (quoted in the *Weekly Journal Miner*) claimed that federal lawmakers would never authorize such an expense because appropriations for levee-building related only to navigable waterways, and the Salt River, in the *Express*'s view, was not navigable. As the *Express* explained:

> The People of Phenix [*sic*], Arizona, have memorialized Congres [*sic*] to appropriate $10,000 for a levee designed to protect a portion of the country in that neighborhood from Salt River floods. The prospect is that the application will be rejected by the House Committee on Commerce, which controls the appropriations for river and harbor purposes. River and harbor improvements are made by the national government for the purpose of benefitting navigation. It is held that the only warrant for them, under the Constitution, is that clause of the instrument which gives Congress the right to regulate commerce between the states. The theory is that the improvement of navigable rivers and harbors is a help to interstate commerce. The levees constructed by the government on the Mississippi are part of the system of works designed to improve the navigation of the great river. These levees likewise serve to protect the low lands from floods, but that is not their primary purpose. Unless the construction of levees on [the] Salt River were shown to be in the interests of navigation, and were recommended

[148] [No title], *Prescott Evening Courier*, March 2, 1891.
[149] [No title], *Weekly Tombstone Epitaph*, Jan. 17, 1892.

> by government engineers, there would be no chance for the work to find a place in the river and harbor bill.[150]

In fact, the Salt River floods – as everyone in the region knew – were so commonplace that press accounts about them occasionally resorted to gallows humor to make the bad news more palatable. On April 15, 1897, the *Weekly Phoenix Herald* commented:

> The conduct of Salt River is becoming notoriously disreputable. If someone don't bail the old tank out pretty soon, they will have to bring the ferry-boat in out of the wet. It is discouraging to have so much water [that] you cannot float a boat in a country that brags on its sunshine and perennial drouth.[151]

As the repeated news articles about flooding indicated, the Salt River could be extremely hazardous, and sometimes individuals failed to be cautious when the river was high. For example, on February 28, 1901, the *Arizona Weekly Republican* carried a news story about a Mrs. F.L. Warner, who had nearly drowned in the swollen Salt River:

> Mrs. Warner started for Phoenix in a single buggy and when she reached the river thought the crossing could be made safely. She drove into the stream and was over half way across it when the buggy filled with water. Mrs. Warner was washed out of it and carried downstream. Just at that moment, Jack Hibbard of Mesa city, who was en route to Phoenix, appeared on the bank from which Mrs. Warner had entered. He jumped out of his vehicle and plunged into the chilling flood. Before he reached the struggling woman, she had drifted down the stream almost a hundred yards, and it was with difficulty that he could make a landing with her, though he finally did so, coming out on the same side of the stream from which they had entered. Mrs. Warner was more dead than alive when they reached a place of safety. . . . The horse and buggy also succeeded in reaching the same side from which it entered, the latter in rather a dilapidated condition.[152]

The many occurrences of the rampaging Salt River waters that caused incidents such as the one involving Mrs. Warner, as well as the extensive uses of the Salt River's waters for irrigation, prompted a tongue-in-cheek remark by a member of the Arizona Territorial Legislature a few days after Mrs. Warner's brush with death in the Salt. On March 2, 1901, the

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[150] "River Improvement," *Los Angeles Express* (no date) quoted in the *Weekly Journal Miner*, Feb. 3, 1892.
[151] "Tempe Department," *Weekly Phoenix Herald*, April 15, 1897.
[152] "High Water Incident," *Arizona Weekly Republican*, Feb. 28, 1901.

Arizona Republican carried a story describing debates by the Territory's legislators over the "Ivy Irrigation Bill," a measure written by House delegate James P. Ivy aimed at resolving multiple water-related issues throughout Arizona. As part of that discussion, according to the *Republican*, Ivy "presented a list of the subsequent [water] appropriations, showing that if the water appropriated were actually in the Salt river it would be a navigable stream capable of bearing the heaviest battleship upon its lofty bosom and that Phoenix, Tempe, and Mesa would be seaport towns."[153] Despite Ivy's sarcasm, he made no mention of any boating interests objecting to the over-appropriation of the Salt River's waters.

In August 1904, the *Prescott Evening Courier* noted that the Salt River was so engorged with floodwaters that the stream was too dangerous to cross even by ferry,[154] and a little over five months later, the raging Salt River again tore through the Phoenix region, this time having deadly consequences. The *Arizona Republican* reported in early February 1905 that John Tilzer had drowned while trying to save his family from the extreme Salt River flows. Tilzer, who lived on an island in the Salt River, was attempting to reach his stranded wife and children when the violent river capsized his boat after it snagged on a barbed wire fence in the flooded stream. Tilzer's family was ultimately saved by rescuers, who also used a boat, but the effort was hazardous because, as the *Republican* noted, "waves were breaking over the summit of it [the boat]." The sheriff, who coordinated the rescue, believed the river was so dangerous that he said he would not undertake a similar rescue attempt for $500.[155]

The 1905 Salt River flooding was indeed devastating, and in addition to the February inundation in which Tilzer lost his life, the river tore through the Phoenix and Tempe areas again in

[153] "A Half Day's Work," *Arizona Republican*, March 2, 1901.
[154] "The River is Up," *Prescott Evening Courier*, Aug. 25, 1904.
[155] "Had Two Warnings," *Arizona Republican*, Feb. 5, 1905.

April of that year. Several photographs are reproduced below showing the 1905 inundations along the Salt River. The first photo is the February flood; the other pictures illustrate the April event.

Figure 67: Salt River flood, February 1905. Source: Special Collections, Arizona State University, Tempe, Arizona.

Figure 68: Salt River flood at foot of Seventh Street, Phoenix, April 1905. Source: Special Collections, Arizona State University, Tempe, Arizona.

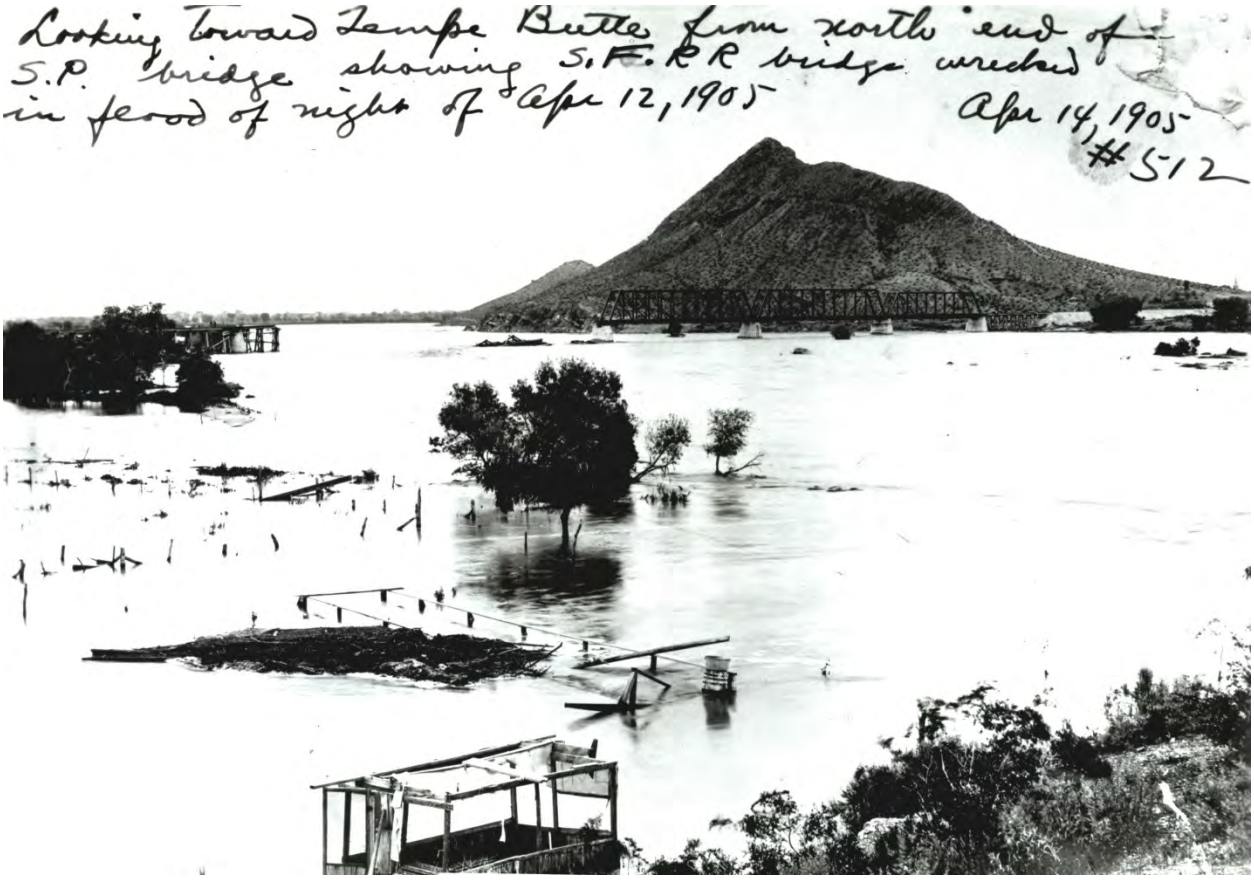


Figure 69: Salt River flood, April 1905. Note destroyed railroad bridge in background. Source: Special Collections, Arizona State University, Tempe, Arizona.

Figure 70: Salt River railroad bridge destroyed by April 1905 flood. Source: Arizona Memory Project (online photographs from multiple archival sources).

Not only did the sheriff who had rescued Tilzer's family from the February 1905 flood find the Salt River's flood flows dangerous, but so too did the U.S. Reclamation Service as they built Roosevelt Dam and the Salt River Project. In December 1905, the *Arizona Republican* reported that Reclamation Service engineers had tried to take advantage of the temporarily high flow of the Salt River to use a boat to inspect various diversion facilities and related works on the river. Nevertheless, the paper stated that the engineers "found the Salt river a poor stream for navigation, . . . and in the voyage of a mile, they were shipwrecked twice, though without loss of life or

property." The government engineers finally gave up trying to utilize the river and resumed inspections by horse on shore.[156] Not only could the engineers not use a boat to inspect the Salt River, but the frequent floods on the stream repeatedly interrupted work on Granite Reef and Roosevelt dams until Roosevelt Dam became tall enough block some of the inundations.[157] Shown below are two photographs. The first is damage caused by a 1908 Salt River flood to the nearly completed Granite Reef Dam; the second is Roosevelt Dam under construction during a similar flood event.

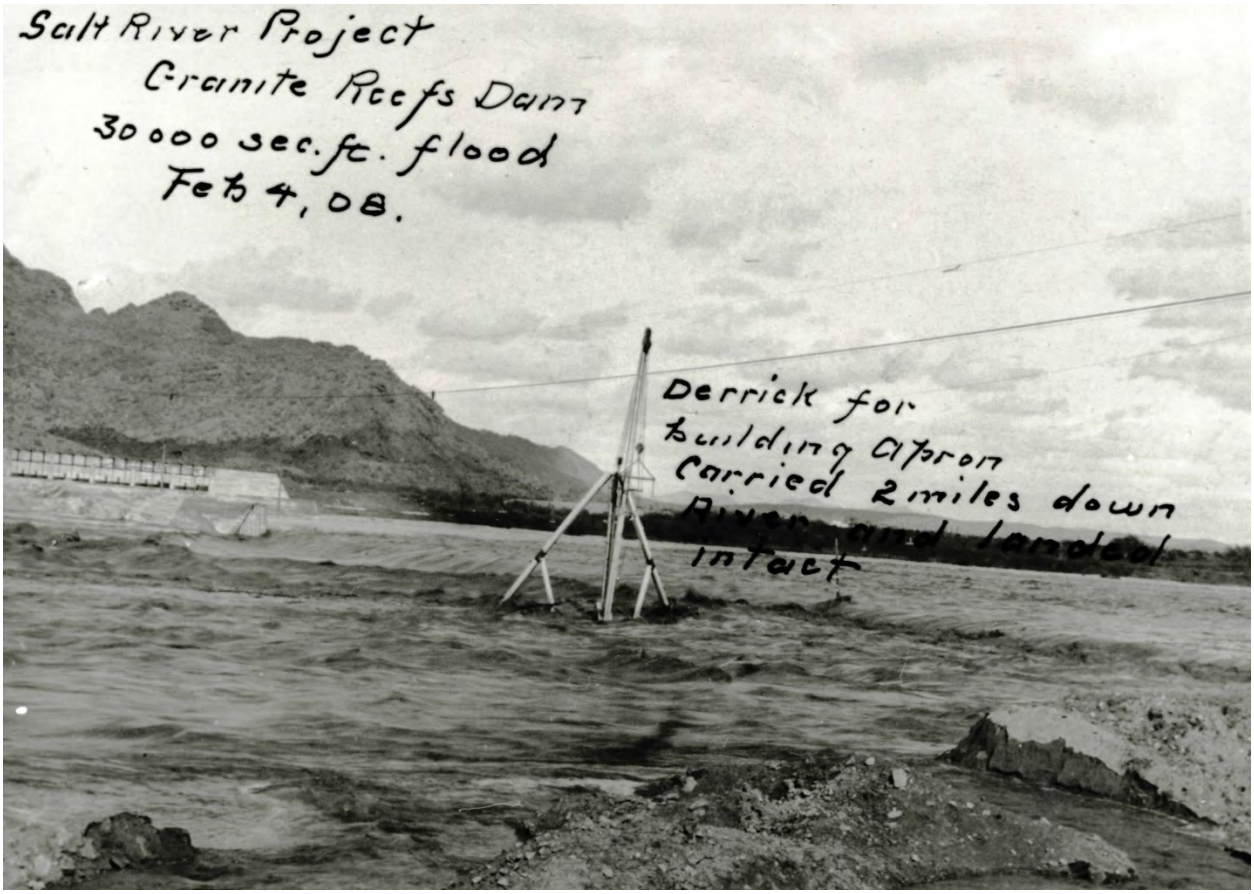


Figure 71: Flood damage at Granite Reef Dam (then under construction), February 4, 1908. Source: Salt River Project Archives, Tempe, Arizona.

[156] "The Price Fixed on the Canals," *Arizona Republican*, Dec. 9, 1905.
[157] "Dam Safe," *Prescott Evening Courier*, Nov. 21, 1907.

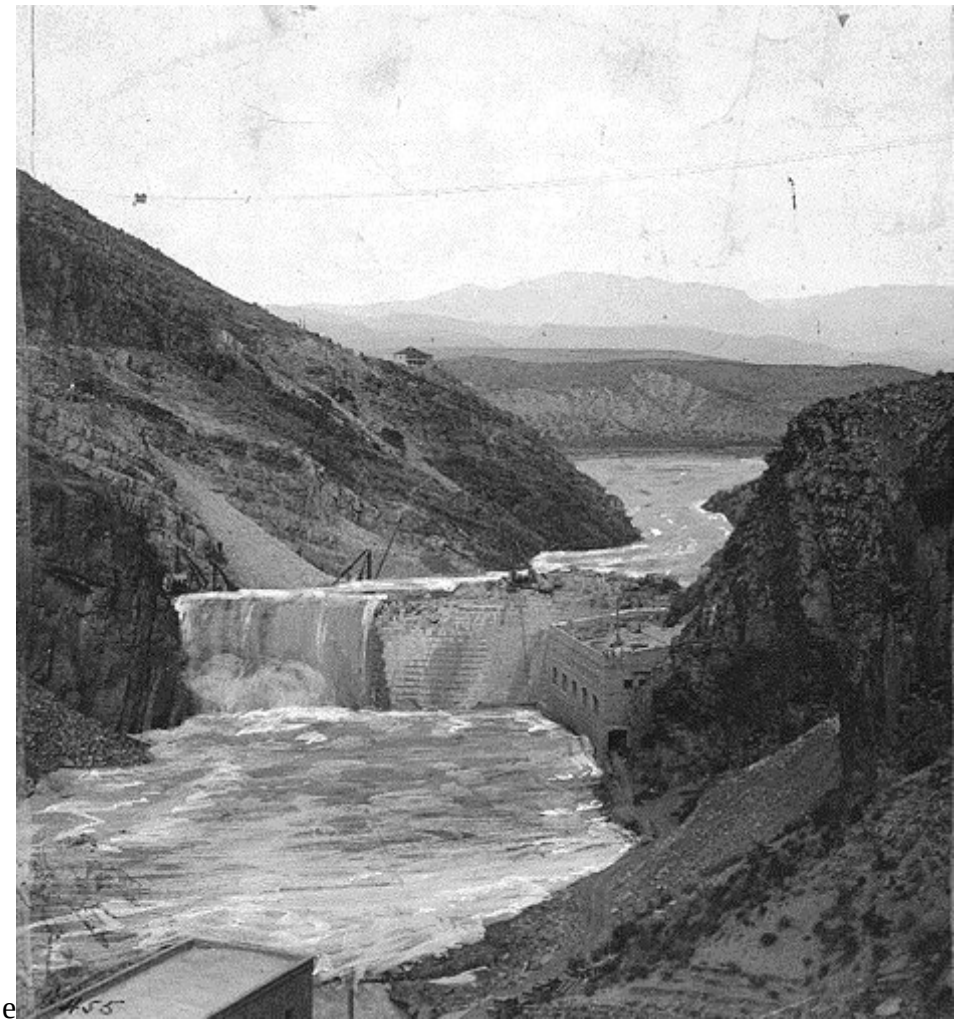
e 

Figure 72: Roosevelt Dam under construction during flood, ca. 1907 or 1908. Source: Phoenix Public Library, Phoenix, Arizona.

Yet even the 1910 completion of Roosevelt Dam (and its dedication by President Theodore Roosevelt – shown below) could not stop all Salt River floods. In fact, some flows coming from the upper reaches of the Salt River simply overtopped Roosevelt Dam and yielded treacherous flooding downstream. Under the headline of "Tucsonian Has Close Call in Salt River," the *Tucson Daily Citizen* reported in January 1911:

> Ernest Brandt, of Tucson, how has reason to dread the variable "heavy" current of Salt river, having lost a burro, all of his provisions, bedding, samples of ore, and nearly his life in that dubious stream Monday evening. Brandt, who has a gypsum mine in the Tucson district, was on his way to Phoenix to meet a man named

Boulder, who professed to be interested in acquiring an interest in the gypsum. He was traveling overland with four burros laden with packs of various kinds. When he came to the Salt river he found the river at flood tide, but attempted the ford, trusting to luck. He made a bad guess, and in the darkness he battled against the muddy water, while his burros floundered about, trying to breast their way across. Finally, he managed to reach the northern bank with three of the animals. The fourth was lost and probably drowned. To cap the climax of his ill fortune, Brandt was unable to locate Boulder, the man whom he sought.[158]

Figure 73: President Theodore Roosevelt dedicating Roosevelt Dam in 1910. Despite its size, Roosevelt Dam did not stop all flooding on the Salt River. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

[158] Tucsonian Has Close Call in Salt River," *Tucson Daily Citizen*, Jan. 18, 1911.

An illustration of how floods continued to plague the Salt River even after the completion of Roosevelt Dam can be seen below in a photograph of that structure's spillways being overtopped by high water in 1912.

Figure 74: Roosevelt floodways overflowing, 1912. Source: Records of the U.S. Bureau of Reclamation, U.S. National Archives branch, Denver, Colorado.

Ultimately, the problems associated with ferries, fords, and flooding prompted the construction of bridges over the Salt River in the Phoenix area. As observed in many of the previous photographs, railroad bridges had been built over the stream in the late nineteenth century, but beginning in the early 1900s, bridges for people, wagons, and motorized vehicles

were built. Several views of these bridges appear below, and the photographs further illustrate the unsettled nature of the Salt River.

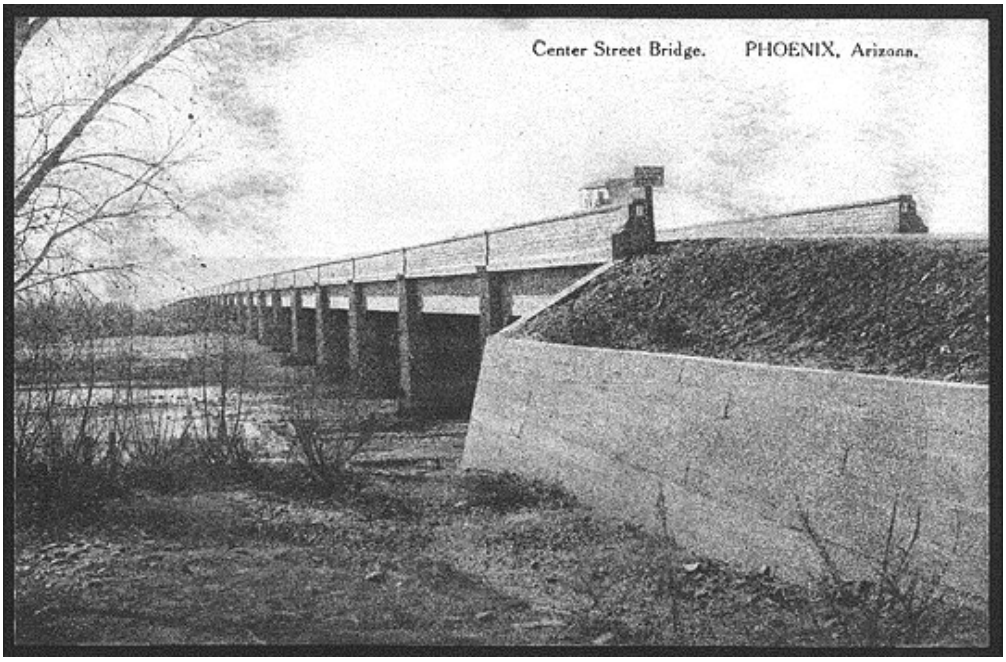


Figure 75: Center Street Bridge in Phoenix, ca. 1910. Note low flow in the Salt River. Source: Phoenix Public Library, Phoenix, Arizona.

Figure 76: Ash Avenue Bridge between Phoenix and Tempe under construction using convict labor, 1912. Note heavy flow in Salt River. Source: U.S. Library of Congress, Washington, D.C.

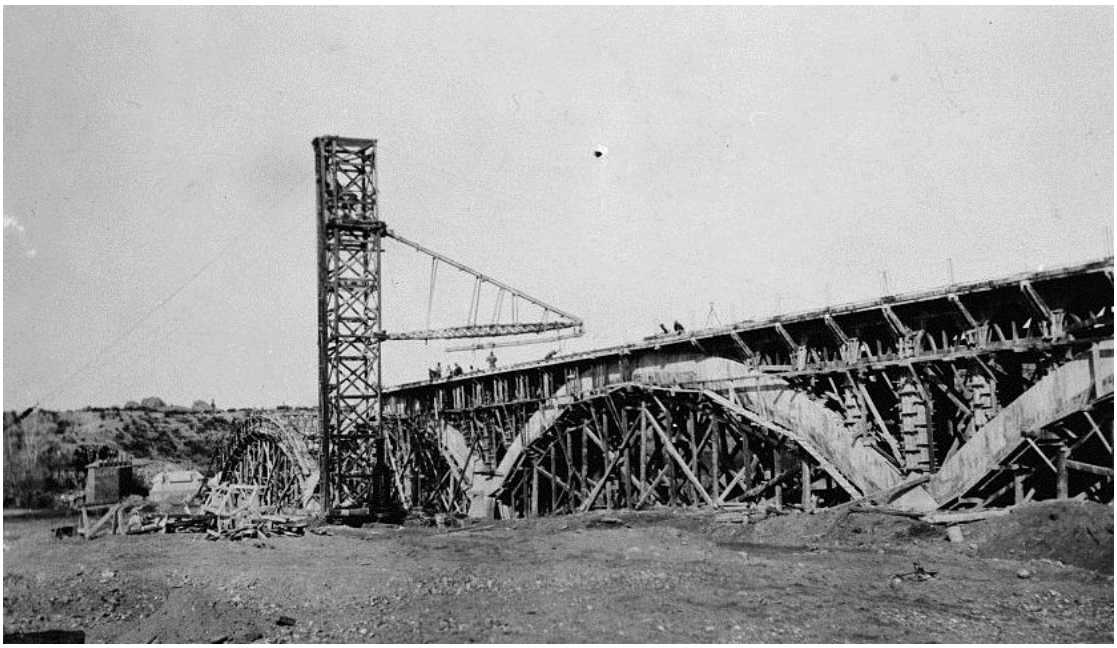


Figure 77: Ash Avenue Bridge under construction, 1912. Note dry Salt River bed. Source: U.S. Library of Congress, Washington, D.C.

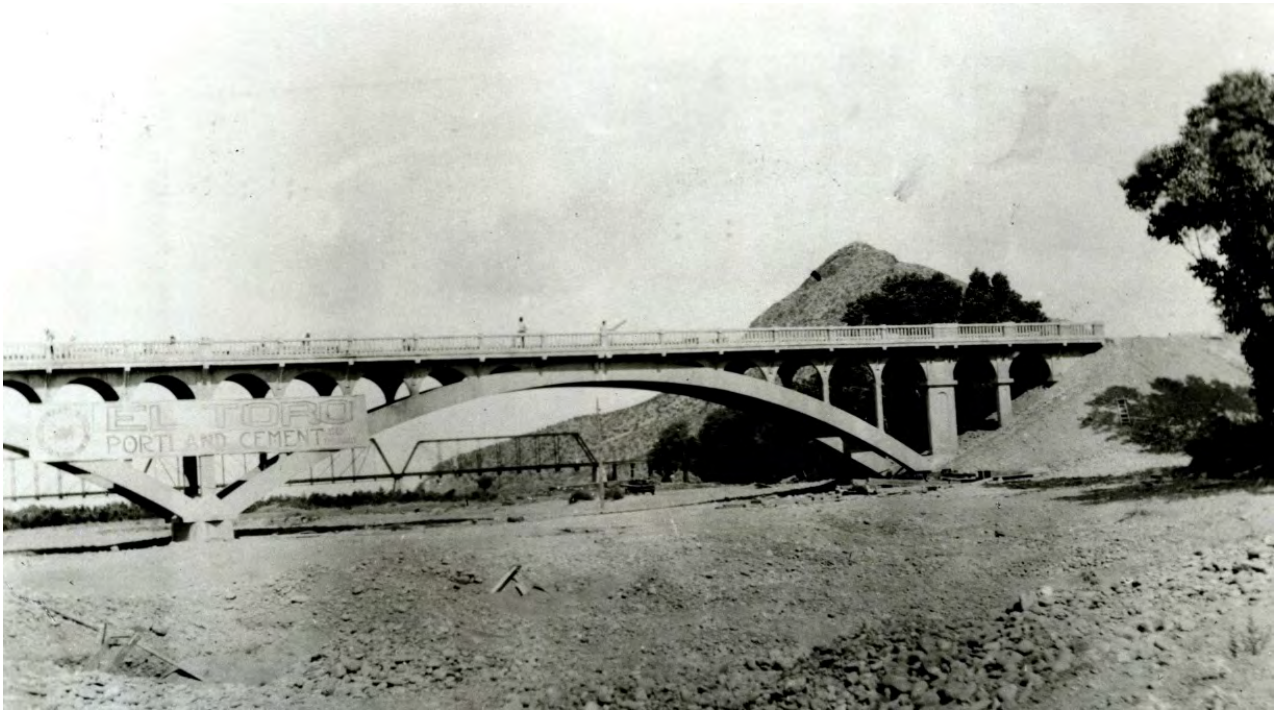


Figure 78: Ash Avenue Bridge, ca. 1913. Railroad bridge and Tempe Butte in background. Note dry Salt River. Source: Special Collections, Arizona State University, Tempe, Arizona.

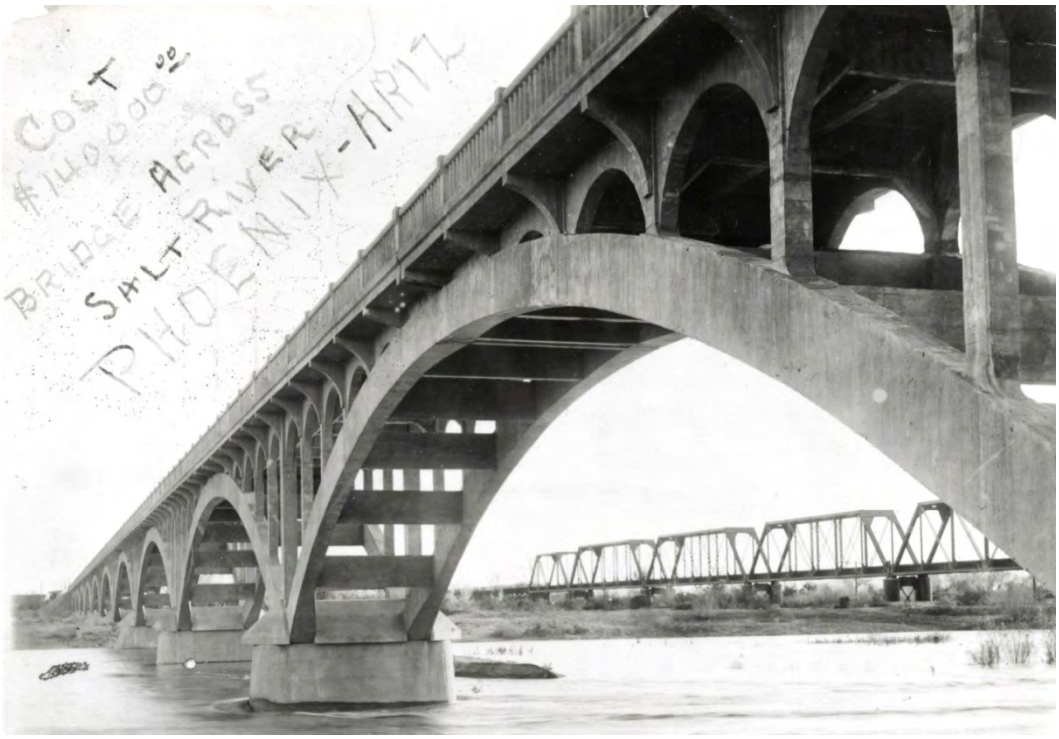


Figure 79: Ash Avenue Bridge over Salt River during high water, ca. 1913. Note cost of bridge. Source: Special Collections, Arizona State University, Tempe, Arizona.

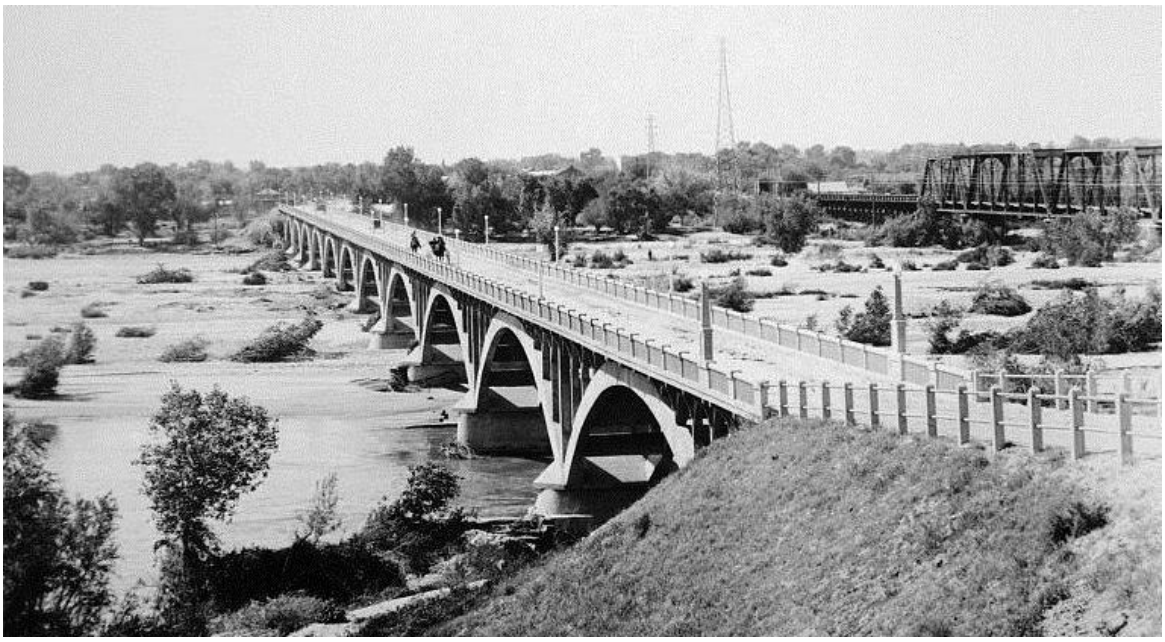


Figure 80: Ash Avenue Bridge, ca. 1913. Note low flow in the Salt River. Also note the bent brush in the bed of the river from repeated floods. Source: U.S. Library of Congress, Washington, D.C.

Figure 81: Ash Avenue Bridge during flood, ca. 1913. Source: Special Collections, Arizona State University, Tempe, Arizona.

C. Newspaper Reports about Dams and Irrigation

With the Salt River being so torrential and inconsistent in its flows, the most obvious use of the Salt River was for irrigation supplies, especially when the stream could be controlled by diversion dams and/or Roosevelt Dam. The Phoenix-area press constantly reported on these activities. For example, the *Tombstone Daily Prospector* carried a news report on July 27, 1887, that Cameron H. King, Arizona Territory's commissioner of immigration (a position which was aimed at attracting newcomers to Arizona) had declared that the Colorado River was navigable. King's position presumably would have made him likely to comment on all of Arizona's benefits, including any stream's navigability – yet he made no mention of the navigability of the Salt River. King did, however, describe the Salt River and its abundant water supply available for irrigation:

> The Salt river supplies more water than all the streams in Southern California combined; the Gila, as it flows through Pinal, Maricopa and Yuma counties, could supply water for treble the quantity of land that can be brought under canals, while the Colorado is navigable for more than one hundred miles above the town of Yuma. Many of the canals in these valleys are owned by the proprietors of the lands, and therefore are taxed only for keeping the ditches in repair. When this is not the case, the canals sell the water at a fixed rate, making a charge upon the land cultivated, varying from one dollar to one dollar and a half per acre.[159]

About a year after King's comments, the *Phoenix Herald* reprinted an article from the *Indianapolis News*. The report noted that C.W. Mills, a resident of Phoenix, had gone to Indiana to attract settlers to Arizona. The Indianapolis paper had printed all Mills's glowing descriptions about Phoenix and the surrounding region. Regarding the Salt River, Mills had told the *News* that "all farming must be done by irrigation, but the valley is already well supplied by irrigating canals, some of them broad and deep enough to use for boating purposes." Mills made no mention of any boating on the Salt River, however – something he surely would have done (given his purpose in going to Indiana) had the stream been useful for transporting commerce and people.[160]

In another booster piece regarding irrigation, the *Phoenix Daily Herald* reported in August 1888 on Phoenix's advantages, including its water supply for farming. The article was a reprint of a story that had run in the Carrolton, Ohio, *Chronicle*, and the *Chronicle* story had been a letter from a resident of Phoenix to the newspaper in Ohio bragging about Phoenix's many blessings, including connections with the outside world via the Maricopa and Phoenix Railroad. No mention was made, however, of any water-borne commerce on the Salt River. Instead, the river was described as:

> affording more water for irrigation than is found in the counties of San Diego, San Bernardino and Los Angeles in California combined. Twelve irrigating canals, at an approximate cost of one million dollars, have been taken from the Salt river, under which 30,000 acres of land have been reclaimed, and it is only a question of a short time when all the land in the valley will be in a high degree of cultivation.

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[159] [No title], *Tombstone Daily Prospector*, July 27, 1887.
[160] "An Arizona Colony," *Phoenix Herald*, June 2, 1888.

The letter then added detailed descriptions of the benefits of the Phoenix area, and the letter's author, J.M. Long, wrote: "In conclusion I desire to say that in all my travels through this western country as secretary of the historian, Hubert Howe Bancroft, no place has impressed me as has this valley." Bancroft, Long's employer, was an extremely prominent historian (after whom the Bancroft Library at the University of California, Berkeley, is named) engaged in writing comprehensive histories of the American West. By virtue of his training by Bancroft, Long surely would have noted if the Salt River had been navigable. However, he provided no description of navigation or its possibility on the Salt River.[161]

At about the same time, however, other individuals were utilizing a flat-bottomed skiff to assist with the construction (or repair) of the Arizona Canal, one of several major irrigation ditches in the Phoenix area. Shown in the 1885 photograph below (and its close-up view that follows) are two men in the foreground, and a group of people standing on what appears to be the headgate of the canal. Just above those individuals are two channels of the Salt River on the right side of the photo flowing from left to right, and the closer channel has already been blocked off with rock and dirt to divert flows into the headgate. The upper channel is partially open, and a work party is using a line to pull themselves along the backed-up water while apparently working on closing the remaining gap.

[161] "A Place Fit for the Gods," *Phoenix Daily Herald*, Aug. 14, 1888.

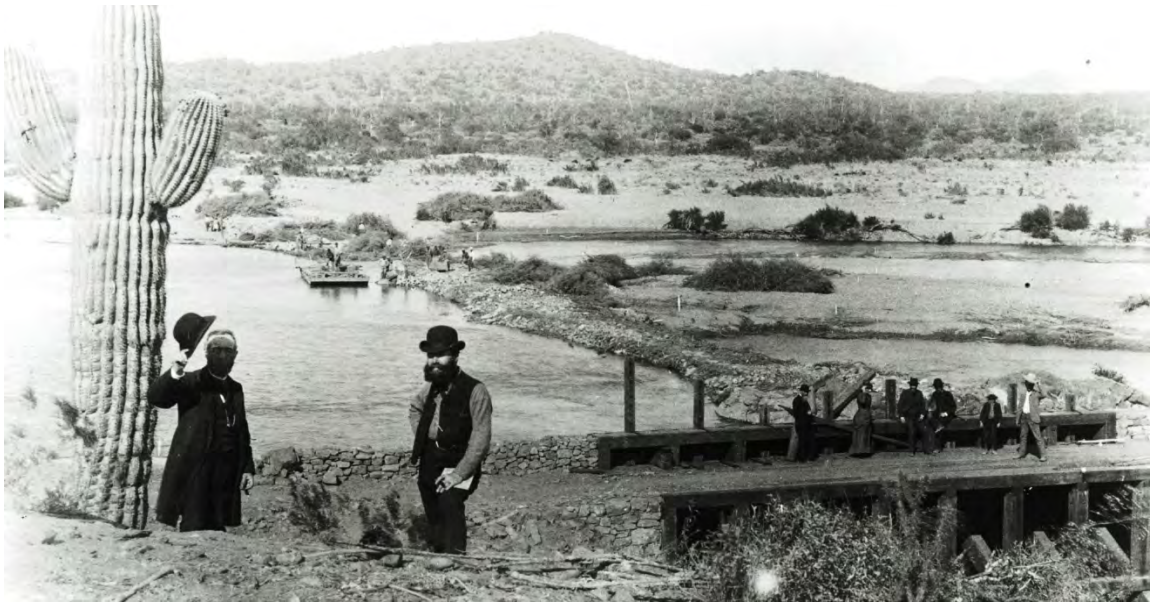

Figure 82: Arizona Canal construction (or repair), 1885, with skiff in background. Note headgate in foreground, and immediately above the group of people on the headgate is one channel of the Salt River (blocked by rocks and dirt). The remaining channel above is still open, but workers on the skiff appear to be filling that channel to divert all of the Salt River into the headgate. Source: Special Collection Collections, Arizona State University, Tempe, Arizona.

Figure 83: Close-up view of flat-bottomed skiff working on Arizona Canal Diversion Dam, 1885. Note Line across open channel of Salt River being used to pull skiff. Source: Special Collections, Arizona State University, Tempe, Arizona.

By the turn of the century, Phoenix-area newspapers began to report on the proposal to construct a large storage reservoir on the upper Salt River where the Reclamation Service eventually built Roosevelt Dam. Because Arizona was then a territory and the reservoir was to be funded by a bond issue tied to Maricopa County, proponents of the massive reservoir pressed Congress to pass an act allowing the county to make this monetary commitment. The *Arizona Republican* reported on March 19, 1902, on the debate then taking place over this issue, noting that the size of the bond issue was causing some opposition to the dam's financing. Although opponents of the reservoir scheme fought it on fiscal grounds, there was no resistance by parties involved in navigation on the Salt River.[162]

When Congress passed the *Reclamation Act* in June 1902, citizens around Phoenix shifted their reservoir efforts to seeking to have that irrigation facility built under the terms of the new law. The Phoenix press carried a multitude of stories on a near daily basis about the growing effort around the region to have the reservoir built by the federal government. While the newspapers also reported that not all parties agreed on the government's role, the existing resistance was based largely on the unfounded claim that the individuals would lose control of their water rights. None of the opposition, however, stemmed from navigation interests contending that the dam might interfere with their enterprises.[163]

Aside from reports about the main storage reservoir, stories also appeared in the Phoenix press about individual dams along the Salt. On March 24, 1905, the *Arizona Republican* reported that a group of settlers near Phoenix was building a wing dam in the Salt River to direct the current away from their farmlands. Although the paper indicated that the dam was successfully changing

[162] "South Side Objections," *Arizona Republican*, March 19, 1902. See also articles appearing in the *Republican* over the next few months.

[163] "The Reservoir Campaign," *Arizona Republican*, July 20, 1902. See also articles in the *Arizona Gazette*, Aug. 1, 2, 3, 5, 9, 10, 1902.

the course of the river, there was no indication that any navigation interests objected to the dam or the alteration of the channel.[164] The *Republican* also reported about a year later that the diversion dam at the Arizona Canal was one of the best in Arizona. Although massive compared to other diversion dams, the article noted that there were apprehensions about the dam's strength in floods. Nevertheless, the report contained no references to the dam's presence based on interfering with navigation on the Salt River.[165]

D. News Reports on Non-water Transport in the Salt River Valley

Newspaper articles discussing roads and railroads underscored that commerce was conducted overland and not on the Salt River. For instance, on January 19, 1895, the *Phoenix Daily Herald* published a lengthy booster article on the advantages of the Phoenix area. Written in a question-and-answer format, the article contained nearly a hundred detailed questions and answers about the town, particularly about irrigation and farming. Significantly, while the answers were designed to attract settlers and contained considerable information about commerce in the area, the discussion regarding transportation noted that there were local streetcars as well as two principal railroads. No mention was made of commerce carried on the Salt River – a topic that certainly would have warranted comment had the stream been used for transportation.[166]

The Salt River's potential use for commerce was also ignored in an *Arizona Republican* article dated June 26, 1902. In that account, the *Republican* reported that the Secretary of the Interior would probably order the construction of the San Carlos Reservoir on the Gila River (upstream from the confluence with the Salt) under the terms of the newly-enacted *Reclamation Act*. The paper added that "the construction of that will be of advantage to Phoenix, since it will result in

[164] "The Current Turned," *Arizona Republican*, March 24, 1905.
[165] "Best Rock Dam on Salt River," *Arizona Republican*, May 26, 1906.
[166] "The Salt River Valley," *Phoenix Daily Herald*, Jan. 19, 1895.

the development of a considerable agricultural area in Pinal County, which will be brought into connection with this city by the Phoenix and Eastern Railroad." While floating goods down the Gila and then boating them up the Salt also would have been possible had those streams been navigable, the paper completely disregarded this prospect, thus illustrating the difficulty in using those rivers for transportation.[167]

As plans for building Roosevelt Dam (then called Tonto Dam) began to take more solid form, the press carried numerous stories about how freight and people would be carried to the construction site. While some of these stories related specifically to areas above Granite Reef Dam, most accounts dealt with the entire distance of the river from Phoenix to Roosevelt. In mid-August 1903, for example, the *Phoenix Enterprise* wrote that entrepreneurs were considering building a trolley to the dam location to avoid the lengthy road via Globe to Roosevelt. The paper added that:

> [t]he details of this scheme, however, are not yet worked out, but that there will be a trolley line to the reservoir is almost an assured fact. Much of the cost of this line can be saved in the difference between wagon and [trolley] car freight.[168]

Nevertheless, despite the concern with the expense of moving freight, the paper gave no indication that anyone considered using the Salt River itself for transportation.

In addition to a trolley line, entrepreneurs also considered construction of a wagon road from Phoenix to the Roosevelt Dam site. An *Arizona Gazette* article pointed out that such a road might be impossible due to its cost, but the piece noted that even if the road could not be built, freight to the dam site would not be handled on the Salt River. Instead, it would go via Globe:

> The proposed wagon road to Phoenix is not seriously talked of for the reason that it is impracticable. It would cost $150,000, an amount out of all proportion to the benefit that would be derived from it, and the farmers would have to pay for it.

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[167] [No title], *Arizona Republican*, June 26, 1902.
[168] [No title], *Enterprise*, Aug. 14, 1903.

> Besides, a wagon road from the mouth of Tonto [Creek] to Phoenix available for freighting is impossible. Globe will handle all the freight.[169]

While shipping supplies by road via Globe involved going a considerable distance out of the way, the *Gazette* article never suggested that using the river might be an alternative.

Regardless of the *Gazette*'s gloomy assessment that a road from Phoenix to the reservoir location was not possible, five days after the article had appeared, the *Arizona Republican* reported that surveys were already underway for such a road. Demonstrating that the Salt River itself was not considered viable for taking goods and equipment to the reservoir site, the newspaper made it clear that the road was for hauling supplies:

> This road of course is designed at present only for the hauling of telephone poles and wire and the supplies for the men engaged in construction work. The telephone line is the most pressing need and is to be rushed to completion as soon as possible. If it shall transpire that the close acquaintance with that route will follow the building of the line proves it to be a better one than any other suggested, or proves that it can with less expenditure of money than on any other be made into a good freight road, it is likely it will be made into a permanent highway and graded for freight handling.[170]

In early September 1903, the *Arizona Gazette* reported on a discussion by the Reclamation Service's Arthur P. Davis on the need for a good road from Phoenix to the Roosevelt Reservoir site. The article pointed out that while freight could go by road via Globe, it would be considerably more costly than to take freight directly to the reservoir site if a road could be built from Phoenix. Davis stated that he was not sure the Reclamation fund would pay for the road, but he added:

> All things considered we would prefer that the freight came this way. If we could have a road whereby we could make the distance in one day with a buggy and two days with a wagon, it would be a great improvement over the inconvenience we have to endure by going by way of Globe.

The cost in hauling freight to the reservoir site was indeed expensive due to the sheer volume. As Davis explained:

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[169] [No title], *Arizona Gazette*, Aug. 25, 1903.
[170] [No title], *Arizona Republican*, Aug. 30, 1903.

> Fuel oil will be the greatest amount of freight that will have to be handled, in fact, there will be about twice as much of this as anything else, to be hauled. It will take about 15,000,000 pounds of oil, and the cost of hauling from Mesa will be about two cents a pound. Then there will be about 100 tons of steel and 200 tons of other material.

The *Gazette*'s report carried no indication that Davis ever contemplated using the Salt River itself to carry these supplies.[171]

Once the road from Phoenix to Roosevelt had been completed, there were many accounts of travelers who made the difficult journey by stage to the dam site. On January 27, 1908, the *Arizona Gazette* reported on the events of one such stagecoach trip. Noting that the journey took eight hours and covered sixty miles, the article also stated that there was a considerable amount of wagon freighting taking place on the road:

> There are many men and teams engaged in hauling stuff to Roosevelt by wagons. On one trip the stage will meet forty wagons. Four to six horses are generally used and the outfits travel in pairs, the owners or drivers camping together.

There was no suggestion that any freighting was being done on the Salt River, though the article was quite long and detailed about other activities along the river and at Roosevelt.[172]

One final example illustrated the lack of navigability of the Salt River. On August 30, 1908, the *Arizona Republican* carried an account that a ferry boat to be used on the lake behind Roosevelt Dam had arrived by overland transportation in Mesa and was being freighted by wagon to the reservoir:

> A large ferry boat, to be used on the lake at the Roosevelt dam, left Mesa yesterday morning for its destination. W.H. Otterson had a team of twelve horses attached to two large freighting wagons which was used in the transportation of the boat. It has an ample capacity for a team and a wagon, and it is proposed to use this to connect passengers with the Mesa-Roosevelt and Globe stage routes.

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[171] [No title], *Arizona Gazette*, Sept. 2, 1903. See also "The Tonto Road," *Arizona Republican*, March 8, 1904.
[172] [No title], *Arizona Gazette*, Jan. 27, 1908.

Had the Salt River been navigable, presumably there would have been no need to haul the ferry to Roosevelt Dam by wagon.[173]

E. Summary and Conclusions to Chapter 4

As one of the most dominant features of the topography of the Salt River Valley as well as the source of irrigation water for hundreds of farms in the years leading up to Arizona's statehood in 1912, the Salt River constantly figured in news accounts by the Phoenix-area press and other papers around the territory. These newspaper stories illustrated a river that varied enormously in flow, from completely dry to raging torrents. They also emphasized the crucial importance the stream played to the economic well-being of the region. Nonetheless, despite countless articles detailing nearly every aspect of the Salt River, there is no indication in the press reports that the stream was useful for transportation or that it could have been employed in that manner. Instead, the newspaper articles observed repeatedly that roads and railroads were the principal means of carrying goods and people. In those cases where boats were used on the Salt, the manner in which those stories were written made it clear that such instances were the exception rather than the rule. Even ferries (which actually were means to avoid the river, not to use it to carry goods and people along its course) found the Salt River unpredictable and occasionally dangerous.

The importance of newspaper accounts *not* showing the Salt River to be regularly navigable is emphasized by the fact that had the stream been useful for transportation on a regular and reliable basis, the booster qualities inherent in late nineteenth and early twentieth century American West newspapers surely would have prompted the Arizona press to bring this attribute of the Salt to the attention of readers far and wide. That the local papers did not deem the river to be navigable on a regular basis, therefore, is doubly significant.

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[173] "Ferry Boat for Roosevelt," *Arizona Republican*, Aug. 30, 1908.

CHAPTER 5: MISCELLANEOUS DOCUMENTS

The following documents, gathered from many different sources, reinforce the evidence found in federal surveys, federal and state patents, other government documents, and newspapers indicating the lack of navigability of the Salt River. Included in this discussion are engineering documents, which often contain historical as well as technical information, accounts of explorations and remembrances, various records of the frequent floods that occurred on the Salt, legislative action and litigation involving the river, and more recent historical studies. This material, which ranges chronologically from 1870 to 1988, supports the findings in other parts of this report that the Salt River was erratic, unreliable, frequently dangerous due to floods, and blocked by obstructions such as sand bars, gravel beds, boulders, and diversion dams in many places. These documents are representative of many more illustrating the same conclusions regarding the Salt.

A. Explorations and Remembrances

Many explorers travelled in Arizona Territory prior to the beginning of heavy settlement in the 1860s and 1870s. Fortunately, some created journals or remembrances of those expeditions which help reveal the historical character of the Salt River. The account of a journey made through Arizona by General George Stoneman, John Huguenot Marion, and others in the autumn of 1870 is a good example. Marion, the author of the account, was born in Louisiana in 1836 or 1837. After moving to Arizona, he became a newspaper man, and in 1870, he accompanied Stoneman on a trip to Camp Verde on the Verde River. Although they camped on the Verde, Marion included a description of the Salt River. Writing on September 30, 1870, Marion noted that they reached the:

> upper Crossing of Salt river about noon, crossed it and rested near a farmhouse. While approaching the river, we got a fine view of the immense valley in which stands the town of Phoenix, and in which are many of the finest ranches in Arizona. We had friends there whom we would have gone to see but for the fever and ague [chills] which was preying upon us. Salt River, or Rio Salado, as some

> call it, is, next to the Colorado, the largest stream that flows near or through Arizona. The water was low when our party crossed it, yet it was with some difficulty that we made the trip. The wash, in its bed, and on its banks is made up, principally, of granite and quartz bowlders [sic], which strengthened our belief that the stream passes through mineral bearing regions. . . .[174]

Marion gave no indication that his group or anyone else used watercraft on the Salt River here or at any other portion of the trip.

Just two years later, another exploration was undertaken by Lieutenant George M. Wheeler of the U.S. Army Corps of Engineers. This trip was designed to obtain topographical knowledge of Arizona and Nevada, report on the progress of engineering explorations, and to determine the mineral resources, influence of climate, and amounts of woodland, water, and other qualities which might affect settlers. With this information, the area was to be mapped by the Corps of Engineers. Following the expedition, a report was submitted to Congress complete with a daily log of the journey that contained many descriptions of the region.

In Wheeler's log, four Arizona rivers were mentioned: the Colorado, Gila, Verde, and Salt. It was only during the segment of the journey that covered the Colorado River, however, that any reference was made to using boats for transportation. In a portion of the report titled "Means of Communication," Wheeler noted that "[t]he close of the [nineteenth] century bids fair to be the era, above all others, of increased rail communication." In this same section, he also observed the need for a wagon road route from Salt Lake City to Prescott, Arizona, but he did not discuss the possibility of using the available waterways such as the Salt River for transportation. Because Wheeler did note the use of navigation on the Colorado River, it is clear that he was aware of the utility of rivers as a means of transport. Yet aside from the Colorado River, Wheeler was pessimistic about the use of rivers in the West:

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[174] J.M. Marion, *Notes of Travel Through Arizona in 1870* (Tucson: University of Arizona Press, 1965), pp. 48-49.

> One of the urgent wants felt in the promotion of our mining industry is that of increased and cheapened inland transportation. River transportation upon our western coast is, to a great extent, a failure, as beyond the Columbia and Colorado Rivers, 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 railroads.

Wheeler's statement was made having observed the Gila, Verde, and Salt rivers years before the construction of most diversion and storage dams obstructed these streams. For these reasons, it is clear that Wheeler and his party did not consider the Salt River to be navigable.[175]

Dorothy Robinson, an early Phoenix settler, also remembered the Salt River in the late nineteenth or early twentieth century, and she commented on its erratic and undependable nature:

> Before the Roosevelt dam was built, land was worth about twenty-five dollars an acre. Water was rarely plentiful. It was either too low to flow into the heads of canals or else was a raging torrent which swept away everything before it, including the dams and headgates.[176]

Clearly, Robinson's recollections echoed those of other early observers that the Salt River was unpredictable and unreliable for transportation.

B. Comments by Engineers and Others

In addition to the early accounts and remembrances of the Salt River, engineers in the early twentieth century were very active in assessing the river's uses. Due to the decision by the U.S. Reclamation Service to make the Salt River the site of its first irrigation project, a multitude of reports on what became the Salt River Project as well as its predecessor private canals were produced by prominent non-Reclamation Service engineers. Many also corresponded with each other about the factors involved in building this famous project. The engineers' reports and

[175] George M. Wheeler, et al., *Report on Exploration of the Public Domain in Nevada and Arizona*, House Ex. Doc. 65, 42nd Cong., 2nd Sess., (Washington D.C.: U.S. Government Printing Office, 1872), p. 53.

[176] Dorothy Robinson, "The Heritage of the Salt River Valley," [ca. 1912] folder 69, box 11, Dorothy Robinson Papers, Mss. 69, Arizona State University, Tempe, Arizona.

correspondence represented here fully support the conclusions reached in other documentation that the Salt River was not navigable.

One such report, written by consulting hydraulic engineer James D. Schuyler in 1902, drew preliminary conclusions about the Consolidated, Mesa, and Tempe canals and the Salt River. Describing the river where the canals headed as "sandy," Schuyler noted that "loss by percolation was very great." He further observed that the Consolidated Canal had been designed in part to carry water to the Mesa and Tempe canals and it had cut down substantially on the loss of water in the river channel. Though exact measurements of the loss were not available, Schuyler's report emphasized that without the Consolidated Canal, much of the flow would sink underground in this reach of the stream.[177]

Frank Trott's letter to Howard S. Reed on June 27, 1913, further documented the nature of the Salt River's bed. In describing the reasons for the construction of the Indian Lateral by the Arizona Canal Company, Trott, the local court water commissioner, wrote that "[t]he river bed between the Utah and the Tempa [*sic*] dams, a distance of about four miles, was wide, crooked and very sandy, and during the normal and low water period, that is during most of the year, a large percentage of this water was lost by evaporation and seepage." He also observed that "a bar was constantly being formed in front of the upper Indian dam."[178] Both this obstacle as well as the crooked, sandy nature of the Salt River's bed in this stretch of the river would have made regular navigation impossible.

[177] James D. Schuyler, "Preliminary Report on the Consolidated Canal of Arizona, The Power Available Under It, the Disposal of Silt in the Canal, and the Subterranean Water Supply of Salt River Valley," April 29, 1902, p. 3, James Dix Schuyler Collection, No. 135, Water Resources Center Archives, University of California, Riverside, California.

[178] Frank Trott to Howard S. Reed, June 27, 1913, Land Records, Salt River Project Archives, Phoenix, Arizona.

E.C. Murphy's letter to Marshall O. Leighton on March 10, 1912, supports this characterization of the Salt River. Including a copy of a report on the available water-power and reservoir sites on the Salt River Indian Reservation, Murphy noted that the Salt River flowed mainly in response to precipitation, but "[t]he rainfall [on the Salt River Indian Reservation] is small and very erratic." Presumably, the river's flow also would have been unpredictable. Augmenting that conclusion was Murphy's discussion of "Utilization of Water" on the Salt River. "From 1870 to 1894," he wrote, "several canals were built. Each canal had its own diversion dam which was a more or less temporary affair of brush and rock that was swept away or damaged by each passing flood."[179] Clearly, as noted elsewhere in this report, floods were a regular occurrence on this highly erratic stream.

C. Legislative Action and Litigation

Officials in Arizona, representing the courts as well as the lawmakers, agreed with the engineers that the Salt River was useless for the purposes of navigation. For example, the Arizona Territorial Legislature, meeting in its second session, passed on December 28, 1865, a "Memorial Asking Congress for an Appropriation to Improve the Navigation of the Colorado River." Seeking $150,000 to remove obstacles such as sand bars, snags, boulders, and other obstructions in the Colorado's bed, the memorial declared that "*the Colorado River is the only navigable water in this Territory[.]*" (Emphasis added.) It also noted that if the improvements were carried out, the Colorado would be navigable as far as Callville, where a wagon road would connect the Colorado with Salt Lake City.[180]

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[179] E.C. to Murphy to M.O. Leighton, March 10, 1912, Land Records, Salt River Project Archives, Phoenix, Arizona.

[180] "Memorial Asking Congress for an Appropriation to Improve the Navigation of the Colorado River," *Acts, Resolutions, and Memorials of the Territorial Legislature of Arizona, 1865* (N.p., n.d), copy at Arizona Historical Foundation, Arizona State University, Tempe, Arizona.

Less than thirty years later, the courts in the territory also began to look at the valley's resources. On March 31, 1892, Joseph H. Kibbey, judge of Maricopa County's district court, handed down his opinion in *M. Wormser, et al. v. The Salt River Valley Canal Company, et al*. The decision adjudicated the rights of various water users on the Salt River. Before turning to a discussion of relevant law and findings of fact in the case, Judge Kibbey first discussed the history of water use in the Salt Valley that led to the litigation. Kibbey wrote that the soil in the Salt Valley was very fertile when supplied with water, but the climate's aridity made irrigation necessary. The watershed of the Salt River, he observed, was:

> extensive, and the river is consequently subjected to very great variations in the volume of water which it carries. During the winter months of December, January, February and until the middle of May there is a large volume flowing in the river, more than adequate for the irrigation of all the lands in the valley.

Kibbey then discussed the history of the various canals established in the valley to take advantage of the water supply of the river. These included Jack Swilling's ditch (constructed beginning in 1867 – and later taken over by the Salt River Valley Canal Company and the Maricopa Canal Company), the Tempe Irrigating Canal (begun in 1870), the San Francisco Canal (started in 1874 and 1875 by M. Wormser), the Utah Canal (1877), the Grand Canal (1878), the Mesa Canal (1879), the Arizona Canal (which posted a notice of appropriation in 1883), the Highland Canal Company (notice of appropriation in 1887), and the Cross-Cut Canal and Power Company (which began construction of a canal linking the Grand, Maricopa, and Salt River Valley canals in 1889). All of these canals were named as parties to the suit, as was Charles T. Hayden, who began taking water through the Tempe Canal for his mill in 1874. Kibbey wrote that the earlier canals diverted water primarily for hay, grain, and garden vegetables, confining diversions to the time of year when water was most abundant (the winter months). He added, however, that as settlement increased,

other crops had been planted (such as fruits, vines, and alfalfa) that required water year round. Ultimately, diminishing supplies during the summer months led to the filing of the lawsuit.

Kibbey wrote that on February 7, 1887, the Salt River Valley Canal Company, the Maricopa Canal Company, M. Wormser (as owner of the San Francisco Canal), the Mesa Canal Company, Charles T. Hayden, the Tempe Irrigating Company, the Utah Canal Company, and the Grand Canal Company filed suit against the Arizona Canal Company to have their respective rights adjudicated. Judge Kibbey added that the plaintiffs stated that the Salt River was not navigable. According to the plaintiffs, the Salt River was:

> a natural *unnavigable stream* rising in the mountains in the eastern part of the territory and running thence in a westerly direction to its junction with the Gila river in Maricopa county. [Emphasis added.]

Kibbey also added that the plaintiffs had argued there were 150,000 acres of irrigable lands in the Salt Valley, but that the volume of water in the Salt River was so diminished during the summer season that the amount of water flowing in it did not exceed 18,000 miners' inches. Kibbey defined a miner's inch to be 1/40 of a cubic foot per second, so the flow was not above 450 cubic feet per second. He noted that the plaintiffs reviewed the history of their appropriations on the river (which totaled 62,500 miners' inches), and they stated that they had built several dams to divert the water into their ditches. Kibbey's review of the litigation then explained:

> The plaintiffs further allege that on or about the 1st day of January, 1887, being long subsequent to the appropriation and use by them and their grantors of the several quantities of water hereinabove mentioned, the Arizona Canal company, defendant in violation of the plaintiffs' rights entered upon the river at a point above any the dams and ditches of plaintiffs and about twenty-eight miles east of the city of Phoenix, and by means of a dam constructed across the river there, capable of holding all of the waters flowing in the river, and by means of a canal commencing at the dam and running thence northwesterly, of a size sufficient to carry all the waters flowing in the river during a dry season at a time when the water is needed by the plaintiffs, diverted and turned out of the river a large quantity of water of the river, and by such diversion prevented the water from reaching the ditches of the plaintiffs, and had diminished the quantity of water to such an extent that the plaintiffs and each of them was prevented from procuring a

> sufficient supply of water for their crops aforesaid, whereby such crops are now suffering and are in immediate danger of actual destruction.

Based on this complaint, the plaintiffs asked Kibbey to force the defendants to remove their dam and not interfere with the flow of the Salt River. The complaint was later amended to change some of the plaintiffs to defendants and to modify some of the complaints. The case went to trial in March 1890 and final arguments took place in February 1891. The trial resulted in 6,000 pages of evidence. Following a discussion of the relevant law, Kibbey presented his findings of fact regarding the relative rights of various appropriators.[181]

The significance of this lawsuit is fourfold: First, Judge Kibbey acknowledged the varying flows of the Salt River; second, the plaintiffs complained that the Arizona Canal had begun diverting all of the water in the river during dry seasons, leaving none for downstream canals; third, the construction of the Arizona Dam across the river had not resulted in any objections from navigation interests, nor were any such entities named as plaintiffs in the suit. Fourth, the plaintiffs had declared the Salt River to be non-navigable. All of these points suggest that the larger Salt River Valley community did not consider the Salt to be navigable.

Approximately twenty years later, another critical court decision was handed down in the Territory of Arizona which supported the same conclusion regarding the nature of the Salt River as the *Wormser* decision. On March 1, 1910, Judge Edward Kent of the third judicial district court of the Territory of Arizona issued the Kent Decree in *Patrick T. Hurley v. Charles F. Abbott, et al*. The provisions of the decree were to take effect on April 1, 1910. The ruling described the physical attributes of the Salt River Valley, and then reviewed the history of irrigation stating that at the time of the decision there were about 151,000 acres of land under attempted cultivation. Much of this

[181] *M. Wormser, et al. v. The Salt Valley Canal Co., et al*., March 31, 1892, No. 708, Maricopa County District Court, Phoenix, Arizona, with quotations at pp. 1, 5, 9.

area, Kent noted, was served by irrigation canals diverting from what was known as the Joint Head. Judge Kent then provided additional details about irrigation from the Salt River:

> Although all the water flowing in the Salt river is, in the lower stages of the water in the river, diverted by canals which have their heads at such points in the river, nevertheless additional land lying to the westward, not covered by the ditches aforesaid, is irrigated by means of ditches which have their heads in the river below the Joint Head. This is made possible by the peculiar conditions which obtain in the river whereby, though dry above, water rises in the channel of the river below, forming a new source of supply independent of that diverted above.

Reviewing the history of the various ditches in the valley and the litigation in *Wormser, et al. v. Salt River Valley Canal Company*, Judge Kent contended that in that case, Judge Kibbey had not determined the rights of individual water users but only the amounts of water that each canal could divert in order to irrigate the number of quarter sections it served. Kent further observed that there never had been any attempt to enforce the decree in the *Wormser* suit because the canal companies subsequently had reached their own agreements on how to divide the river's waters. Although these compacts used the entire normal flow of the Salt River, Kent wrote that the accords were occasionally contested by individual water users who felt they were not getting the water they deserved under a particular canal.

Kent added that in 1903, the U.S. Reclamation Service had begun construction of Roosevelt Dam on the Salt River just below its confluence with Tonto Creek and the resulting reservoir was beginning to store water as of the date of Kent's decision and decree. Kent wrote:

> The object of the dam and the purpose of the Government in its erection is [*sic*] to store in the reservoir the surplus water in the Salt river over and above the amount of the normal flow of the river appropriated and used. The Government also finished the construction in the year 1908 of a permanent diversion dam across the Salt river known as the Granite Reef dam at a point about twenty-five miles east of Phoenix, three miles below the conflux of the Verde river, from which dam water is now being diverted into the Arizona canal for the use of the land lying on the north side of the river, and which now diverts a large portion and which is capable of diverting all of the water necessary for the land on the south side of the river.

Adding that the Salt River Valley Water Users' Association had been formed to represent irrigators in what became known as the Salt River Project, Kent explained that Patrick T. Hurley had instituted a lawsuit in 1905 to settle the respective rights of water users throughout the valley. The United States intervened due to its interest in the Salt River Project and its representation of Indians in the valley. In his decree (the outcome of much testimony on the respective duties of water and reclaimed lands in the valley), Kent then reviewed the principles of prior appropriation in Arizona, *observing that those principles applied to non-navigable streams and that they therefore were relevant to the Salt River litigation*. He also said it was necessary to ascertain how much water was available in order to apportion it among the various canals for the different water users. "The amount of water flowing in the river," Kent observed, "varies greatly in each month in the year, and in a given month in each year. No accurate or probable estimate of the amount of water that will be available either by the month of by the year can be predicted." To support this statement, he included in his opinion a table of precipitation and canal diversions for the past fourteen years. Kent then reviewed how much water was to be allowed to each canal to compensate for evaporation and transmission losses, and he gave his view that 48 miners' inches was sufficient flow, in addition to evaporation and transmission losses, for good crop production.[182]

The significance of the decree rendered in *Hurley v. Abbott* (known as the Kent Decree) is similar to Judge Kibbey's decision in the *Wormser* case. Again, a prominent judge – this time

[182] *Patrick T. Hurley v. Charles F. Abbott, et al.*, March 1, 1903, No. 4564, Third Judicial District Court of the Territory of Arizona, in and for the County of Maricopa, with quotes at 4, 7, 10. In a much more recent lawsuit, filed on July 17, 1972, in U.S. District Court, another judge confirmed the *Wormser* and *Hurley* opinions on non-navigability of the Salt. In this case, the Salt River Pima-Maricopa Indian Community had sued the Arizona Sand and Rock Company and several others seeking recognition that the bed of the Salt River (in which the defendants were mining sand and gravel) was actually owned by the Indians. The plaintiffs sought damages and removal of the defendants, claiming that under the executive order which had created the Indians' reservation (June 14, 1879), the bed of the river to the middle of the channel was considered part of their land. As part of the order consolidating the suits, Judge W.D. Murray declared: "*The Salt River is not now and never has been a navigable river*." See p. 1068 in "In the Matter of the Navigability of the Salt River [From Granite Reef Dam to the Gila River Confluence], Admin. Docket No. 94-1, Before the Arizona Navigable Streambed Adjudication Commission."

Edward Kent – had declared that all of the water in the Salt River had been diverted, and he and noted the river's strange character of rising at some places on the valley floor and disappearing at others. In addition, Kent had termed the Salt River to be non-navigable. Furthermore, Kent wrote about the wide fluctuations in flow, claiming the stream was "unpredictable." Additionally, Kent discussed the then-recent construction of Granite Reef Dam across the river, but he never alleged this type of structure would be an impediment to navigation. Similarly, there are no indications that navigation interests played any role in this lawsuit.

D. Other Miscellaneous Documents

The engineers, legislators, and judges were clear and unequivocal about their perceptions of the Salt River. According to their descriptions, the river rose far above flood stage on a regular basis, and during times of normal flow, sank beneath the surface of its wide, sandy bed in many places. Neither condition was conducive to consistent navigation. Aside from engineers' reports and correspondence, evidence of the floods was found in many other historical sources. For instance, accounts of flooding on the Salt River were contained in the meeting minutes of the Salt River Valley Water Users' Association. Transcribed by Frank H. Parker, the Association's secretary, Parker noted the flood in November 1905:

> The floods due to storms on November 26th destroyed the Arizona dam, rendered the headworks useless, and seriously damaged the canal for a distance of two miles from the head, and also seriously damaged the joint headworks of the Maricopa and Salt River Valley Canals.[183]

During the same month, the Committee of Sixteen, formed by the Salt River Valley Water Users' Association to make adjudication recommendations in the *Hurley v. Abbott* case, produced a report on the river's conditions. Stressing its wide variations in flow, the report stated:

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[183] "Minutes of the Salt River Valley Water Users' Association Meeting," March 5, 1906, Land Records, Salt River Pima-Maricopa Indian Reservation, Salt River Project Archives, Phoenix, Arizona.

> We further find that during the past ten years the fluctuating flow of the Salt and Verde rivers which has been actually diverted and beneficially used upon the said lands lying under all the various canals, has amounted to an average flow of 24,884 miners' inches and has varied from a minimum flow of 3,000 miners' inches to a maximum flow of 85,000 miners' inches.[184]

The sporadic nature of the river was further documented by a 1908 booster-type brochure trumpeting the attributes of Phoenix. James H. McClintock, Arizona historian, journalist, and author of the brochure, noted that:

> [t]he Salt River Valley has within it about 200,000 acres of land in private ownership. Only three-fifths of this area now is cultivated, for the Salt is an erratic sort of stream. For weeks its flow may forbid passage at any ford, and yet within a month the traveler may cross dryshod.[185]

According to Herbert R. Patrick (who had surveyed the area around the Salt River as part of the northern boundary of the Gila River Indian Reservation in 1899, these sandy, spasmodic conditions had been present long before the twentieth century. In a short bulletin called *The Ancient Canal Systems and Pueblos in the Salt River Valley*, created for the Phoenix Free Museum in 1903, Patrick wrote regarding the ancient Hohokam communities that once dominated the Salt River Valley:

> [A]s their colonies increased in population and resources, and as their canals were damaged by floods and as they required more extensive tracts of land they went a little higher up stream, where high and more permanent banks gave better foundation and protection, and there built larger and better canals, and probably found a better supply of water, where it was not as apt to sink in the bed of the river.[186]

The construction of canals and dams on the river is one of the most important pieces of evidence indicating the non-navigability of the Salt River. With irrigation being the primary use of

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[184] "The Committee of Sixteen to the Salt River Valley Water Users' Association," Nov. 1905, Water Resources Center Archives, University of California, Berkeley, California, with quote at p. 5. The "Kent Decree," issued in *Hurley v. Abbott*, defined a miner's inch as one-fortieth part of one cubic foot of water flowing per second of time.

[185] *Phoenix, Arizona in the Great Salt River Valley* (Phoenix: Phoenix and Maricopa County Board of Trade, 1908), p. 9.

[186] Herbert R. Patrick, *The Ancient Canal Systems and Pueblos of the Salt River Valley, Arizona*, Phoenix Free Museum Bulletin No. 1 (Phoenix: Phoenix Free Museum, 1903), p. 6.

the river, many diversion dams were built throughout the decades following the Swilling Ditch's construction in 1868, and because of the frequent floods, many had to be re-constructed numerous times. For example, the Hudson Reservoir and Canal Company (whose water rights were later acquired by the U.S. Reclamation Service) filed notice on April 15, 1893, that it intended to appropriate all the surplus and flood water of the Salt River above that stream's confluence with the Verde and that it intended to build a dam on the Salt ten miles above the confluence with the Verde to store such waters. In addition, the notice provided that another dam was to be constructed near the confluence of the Salt and Tonto Creek at approximately the site where Roosevelt Dam was later built. Finally, the notice indicated that the company planned to divert the stored waters for irrigation uses in the Salt River Valley. There was no evidence at the time or subsequently that any navigation interests objected to the dams or diversions.[187]

Speeches given by two prominent Arizona personalities shortly after the turn of the century also support the river's historical non-navigable character. Joseph H. Kibbey, judge in the *Wormser* case, spoke in 1907 to the Fifteenth National Irrigation Congress in Sacramento, California. In his speech, Kibbey focused mainly on the implementation of the 1902 *Reclamation Act* and the disputes that were arising as a result of its passage. Predictably, Kibbey used the situation in the Salt River Valley as an example of the difficult situations that were evolving under the law. In discussing the fight over the waters of the Salt River, Kibbey stated that:

> [i]t is the blindest sort of folly to treat the fluctuations of the river, which could be foreseen by the most casual obserevr [*sic*], and which had forced themselves upon the attention of every water user in the valley, as an unusual condition. . . .

[187] Notice of Hudson Reservoir and Canal Company to appropriate water, April 15, 1893, in file "Salt River Project. Water Appropriations," General Administrative and Project Records, 1902-1919, Record Group 115, U.S. National Archives branch, Rocky Mountain Region, Denver, Colorado.

The extremely erratic nature of the river was known to all residents of the valley according to Kibbey.[188]

Early Phoenix resident Carl Hayden (son of Charles Hayden) agreed. In his speech in front of the U.S. House of Representatives on February 3, 1916, the subject was flood control on non-navigable streams. House Resolution 122 had been introduced by the Speaker of the House, and Hayden interpreted the Speaker's intention to be the creation of "a committee having jurisdiction over all bills relating to flood control whether the floods occur on navigable or non-navigable streams." Hayden explained his support of this resolution: "I come from a State where we have dry rivers and no harbors, and I want to see a committee established that will give consideration to the flood problems on non-navigable streams." In commenting on the constitutionality of federal funding for flood control on non-navigable streams, Hayden argued that such an expenditure was not only in the local interest, but also in the national interest. He claimed that railroads were often affected by floods, which hurt interstate commerce, and that the U.S. Postal Service was also consistently interrupted by flooding. He also argued that the care of national defense would be assisted by funding for flood control, asserting that "troops cannot be readily moved or supplied when the rivers are in flood." Hayden's remarks in this speech make it clear that in his view all Arizona streams were non-navigable, including the Salt River. What Hayden sought, therefore, was money to curb flooding on the state's unpredictable streams, including the non-navigable Salt.[189]

E. More Recent Historical Studies

More recent studies confirm historical documents about the nature of the Salt River. A master's thesis from the University of Arizona supports the conclusions about the erratic nature of

[188] Joseph H. Kibbey, "Address of Hon. Joseph H. Kibbey Delivered Before 15th National Irrigation Congress at Sacramento, CA.," Sept. 4, 1907, Water Resources Center Archives, University of California, Riverside, California.

[189] Carl Hayden, "Speech of Hon. Carl Hayden, of Arizona, in the House of Representatives, Thursday, February 3, 1916," folder 11, box 653, Carl Hayden Papers, Mss. 001, Arizona State University, Tempe, Arizona.

the Salt River. John Porcello's 1988 thesis studied the area from the confluence of the Salt and the Gila rivers to just above the Salt's confluence with the Verde River to determine groundwater presence. Although focusing on underground supplies, the study was augmented by important historical data about the Salt River's surface flow.

Porcello described the Gila and Salt Rivers as perennial streams "only in reaches upstream of the study area, [and] have been completely diverted by extensive canal systems serving agricultural and municipal water demands since the middle of the 19th century." Adding that "[b]y the 1890s, water use by farms and small towns had resulted in the diversion of the entire flows of both the Salt and Gila Rivers," he noted that "[u]nregulated flows impacting the East Valley were highly seasonal prior to 1910, more than half the annual flow occurring between October and April and the remainder resulting from spring discharges and flash floods during the summer months."[190]

Another relatively recent report substantiating these historical conclusions was an overview written for the Salt River Project by Jay Ziemann about the history of the San Francisco Canal. As part of the series entitled *Historic American Engineering Record*, Ziemann noted in this report that:

> despite what appeared at the time to be modernizing efforts, the San Francisco Canal was still an unlined ditch, plagued by seepage and evaporation problems. . . . High water in the river would frequently wash out the canal headings. These problems seemed to be recurring nightmares for the developers of the Salt River Valley in the 1870s and 1880s.

Though most nineteenth-century canals were constructed with rock and brush, Ziemann observed that "there were economic consequences for the hastily built. Everyone in the valley realized that they could not continue to reconstruct every time the river was high."[191] The destruction that high water caused as well as the dry fields brought by low water shows how

[190] John Joseph Porcello, "Pre-Development Hydrologic Conditions of the Salt River Indian Reservation, East Salt River Valley, Central Arizona, With an Emphasis on the Ground-Water Flow Regime," (M.S. thesis, University of Arizona, 1988), pp. 14, 21, 30.

[191] Jay Ziemann, "HAER No. AZ-8, San Francisco Canal," [n.d.] pp. 25, 30, Salt River Project Archives, Phoenix, Arizona.

difficult regular navigation would have been on the Salt River. Water levels could simply not be depended upon.

Karen Smith, another recent historian of the Salt River, reached the same conclusion. In her doctoral dissertation which was later published as *The Magnificent Experiment, Building the Salt River Reclamation Project, 1890-1917* (1986), Smith described the Salt River Valley:

> On the face of it, the growth of metropolitan Phoenix from a dusty village located near the Salt River to the ninth-largest city in the United States has been something of an anomaly. There was no major railroad connection to Phoenix until the 1920s, *no harbor or navigable river* to spawn commerce, and no major trail or crossroads to lure tired travelers to stop. [Emphasis added.][192]

F. Summary and Conclusions to Chapter 5

Despite the variety of the sources discussed above, the same conclusion was reached in every case. Each organization, person, and agency's evidence demonstrated characteristics which made the Salt River unreliable for the purposes of consistent navigation. The prevalence of floods, dams, and a sandy bed combined to cause major impediments to any sort of use of the river for reliable navigation.

[192] Karen L. Smith, *The Magnificent Experiment, Building the Salt River Reclamation Project, 1890-1917* (Tucson: University of Arizona Press, 1986), p. ix.

CHAPTER 6: WESTERN WATERCRAFT

At the turn of the twentieth century, the only river in the Southwest considered by most observers to be navigable was the Colorado, which, as a result, became a testing ground for boats with shallow drafts and lightweight construction. Regularly navigated from its mouth at the Gulf of California past Yuma to approximately present-day Bullhead City, the Colorado River was the subject of many stories in a multitude of newspapers, promotional publications, as well as in published government documents. The significance of such boating on the Colorado River was not lost on prospective businessmen, possible settlers, and military officials, all of whom hoped for easier access to the interior parts of the southwestern United States, not only on the Colorado, but on other rivers as well.

From accounts of expeditions on the Colorado River, therefore, some details about boat technology in relation to southwestern rivers around the time of Arizona statehood can be discerned. This is not to say that river travel was not attempted on other southwestern streams – indeed, it was because water travel in the nineteenth century was by far the most economical method of internal communication. Nevertheless, river navigation on other southwestern streams proved to be unreliable and risky, and the Colorado River was the only stream in the region where regular navigation occurred. Therefore, a brief examination of the history of navigation on the Colorado in this chapter can provide useful insight into the nature and technology of watercraft used for transportation on that river and whether similar craft might have plied the Salt River.

Aside from accounts of actual expeditions on the Colorado River, additional information about southwestern watercraft operation can be found in reports written to describe general advances in boat construction as well as from historical photographs, both of which are also

discussed in this chapter. This information, when combined with experiences on the Colorado River, can help shed light on the navigability of Arizona's streams such as the Salt River.

A. Accounts of Navigation on the Colorado River

Following the acquisition of much of the western part of the United States in the 1840s and 1850s, federal authorities sent many explorers to the West to determine what the new region held. Most often, these parties consisted of military officers who kept journals of their travels, making note of the natural environment, Indians, fort locations, and possibilities for settlement. Some of these expeditions included references to travel on western rivers, notably the Colorado, although not all specified what types of vessels were used.

1. J.C. Ives and the Ship *Explorer*, mid-1850s

One of the first such journeys was led by Lieutenant Joseph Christmas Ives (better known as J.C. Ives). Ives was sent in the mid-1850s to pilot a small steamboat, the *Explorer*, up the Colorado River from the Gulf of California to the Virgin River to assess that Colorado's utility as a navigable waterway. Following his return to the East, Ives wrote a report about his expedition (which was later published). Completed on March 23, 1858, Ives's written pre-publication account (available at the National Archives branch in College Park, Maryland) discussed the problems associated with navigating the Colorado River. Ives explained that the Colorado River was extremely difficult to navigate because the "channel is exceedingly circuitous and constantly shifting," and he further noted the repeated presence of sand bars and shoals. Ives added:

> boats rarely make a trip between tide water and Fort Yuma without grounding many times a day. By working them about in the shifting sand . . . and as a last

> resort, by lightening the boat of the cargo, these shoals may always be passed with more or less labor.[193]

Ives also offered a recommendation for a type of boat for future use on the Colorado River if the U.S. Government wanted to use it for transportation on a regular basis. Due to the hazardous and difficult conditions, Ives suggested an "iron stern wheel boat, with the hull 100 feet long and the greatest breadth of beam 22 feet built sufficiently [illegible] to ensure a draught when light, not exceeding 12 inches." Ives included in his published report a sketch of the *Explorer*, which is reproduced below together with several drawings the *Explorer* as it went through the lower Colorado River's gorges. Following those items is a view of a craft similar going up the Colorado River in about 1870. Although Ives believed that five trips a year could be made on the Colorado above Yuma in such watercraft, he repeatedly asserted that it was an extremely troublesome stream to navigate due to the rip and spring tides near its mouth, the constantly shifting channel, the numerous obstacles along the river, and finally, the rapids near the mouth of the Virgin River.[194]

[193] J.C. Ives, "Report Upon Navigable Portion of Colorado River, March 23, 1858," pp. 1, 2, 7, box 2, Entry 726, Records of the Office of Explorations and Surveys, Miscellaneous Records, Records of the Office of the Secretary of the Interior, Record Group 48, U.S. National Archives II, College Park, Maryland. Ives's report was subsequently published as J.C. Ives, *Report upon the Colorado River of the West, Explored in 1857 and 1858 by Lieutenant Joseph C. Ives, Corps of Topographical Engineers* (Washington, D.C.: U.S. Government Printing Office, 1861).

[194] J.C. Ives, "Report Upon Navigable Portion of Colorado River, March 23, 1858," pp. 1, 2, 7, box 2, Entry 726, Records of the Office of Explorations and Surveys, Miscellaneous Records, Records of the Office of the Secretary of the Interior, Record Group 48, U.S. National Archives II, College Park, Maryland.

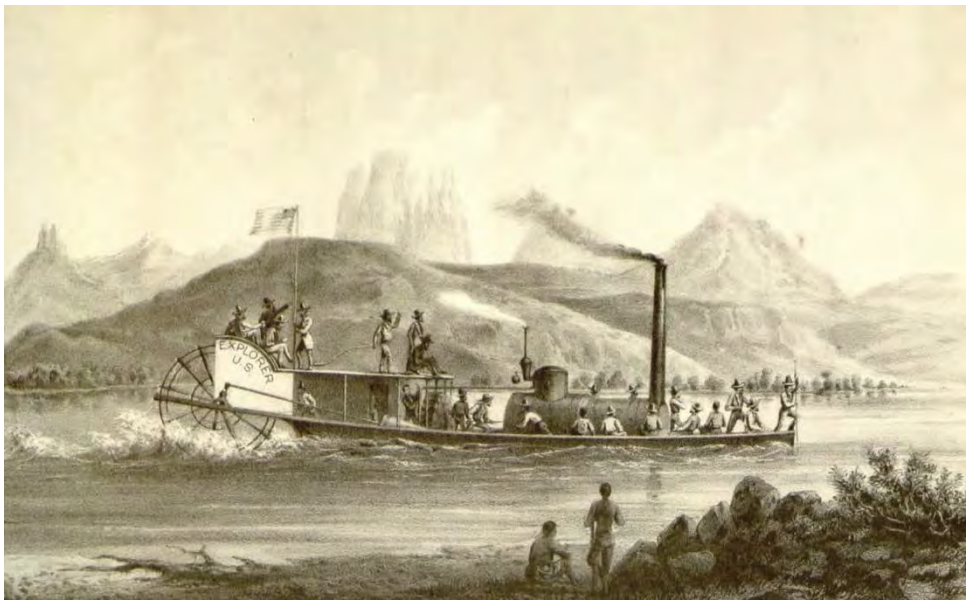

Figure 84: J.C. Ives's sketch of the *Explorer* navigating the Colorado River, ca. mid-1850s. Source: Joseph C. Ives, *Report upon the Colorado River of the West* (1861).

Figure 85: Drawing of Ives's exploration of the Colorado River at West Mohave Canyon, mid-1850s. Note Ives's boat at bottom of sketch. Source: Joseph C. Ives, *Report upon the Colorado River of the West* (1861).

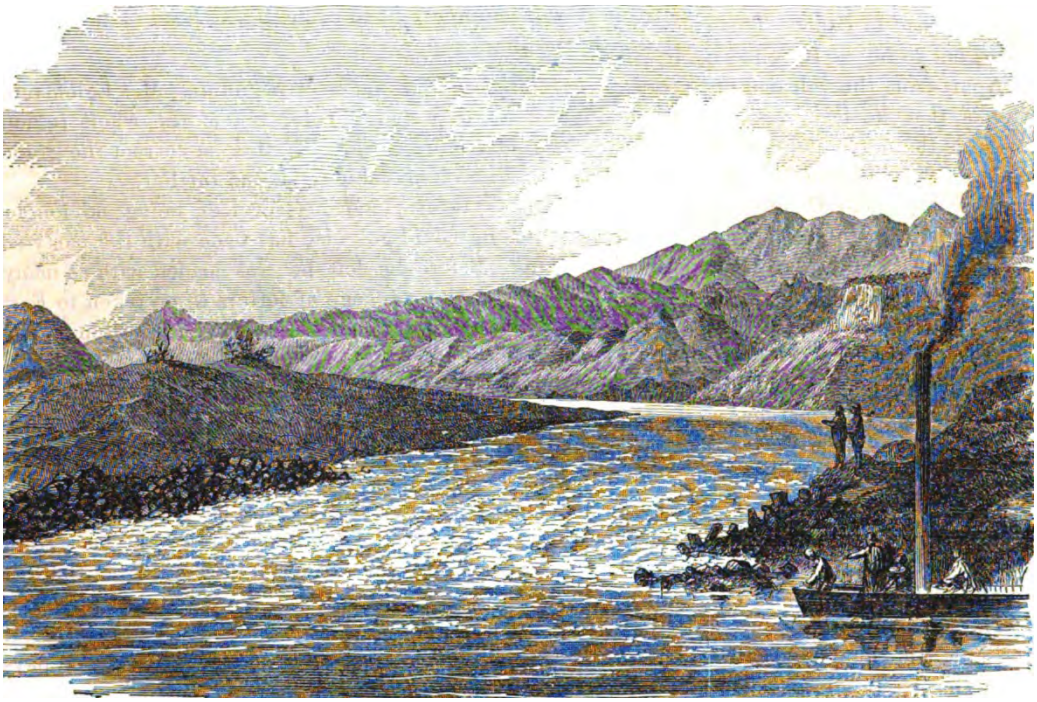

Figure 86: Drawing of Ives's exploration of the Colorado River at Deep Rapid, mid-1850s. Note Ives's boat at right. Source: Joseph C. Ives, *Report upon the Colorado River of the West* (1861).

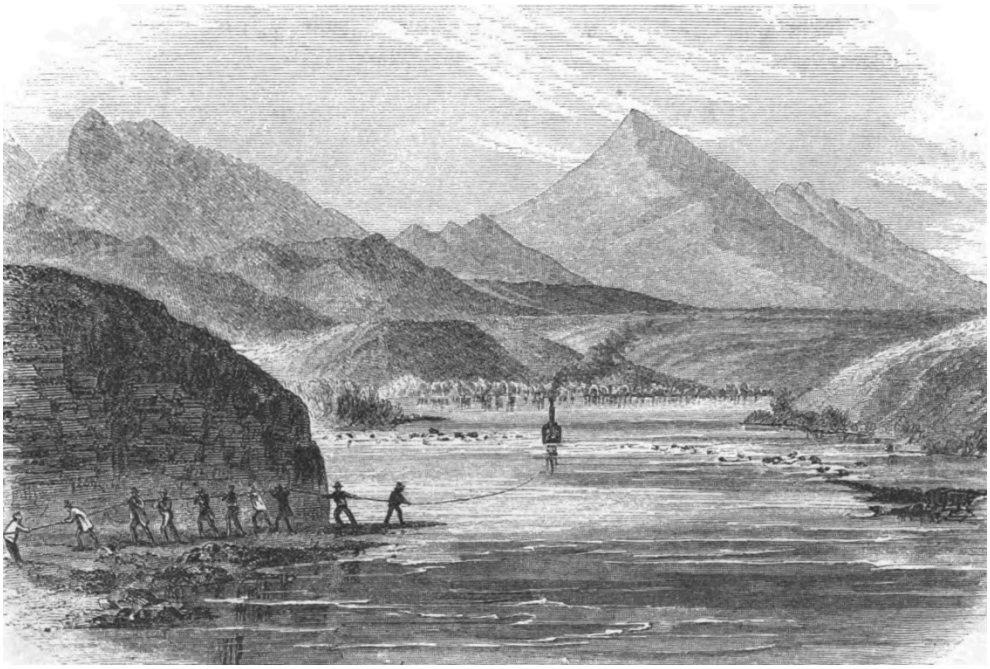

Figure 87: Drawing of Ives's exploration of the Colorado River – lining the boat through rapids, mid-1850s. Source: Joseph C. Ives, *Report upon the Colorado River of the West* (1861).

Figure 88: Photograph of the type of stern wheel steamboat suggested by J.C. Ives for navigating the Colorado River, ca. 1870. This photo was taken near present-day Lee's Ferry, Arizona. Source: www.grandcanyonhistory.

2. John Wesley Powell and the Grand Canyon, 1869 and 1871-1872

Ives's expedition up the Colorado River in the mid-1850s may have been one of the earliest attempts to navigate that stream, but probably the most famous expeditions on the Colorado were the two led by explorer John Wesley Powell (two photos of whom appear below). Unlike Ives, who had used a steamboat to go upstream on the Colorado, Powell went downstream in wooden dories through the Grand Canyon (which Ives never reached), first in 1869, and then again in 1871-1872. Powell made it clear after the first trip that while he had survived the experience, the multitude of rapids and other obstacles along this portion of the Colorado River made it hardly practicable as a possible water-based access route to the interior part of North America. Indeed, his experiences and those of his crew on the first trip proved to be so frightening that several crewmembers opted to

climb out of the canyon (where they were subsequently killed by Indians) rather than continue on the river.[195]

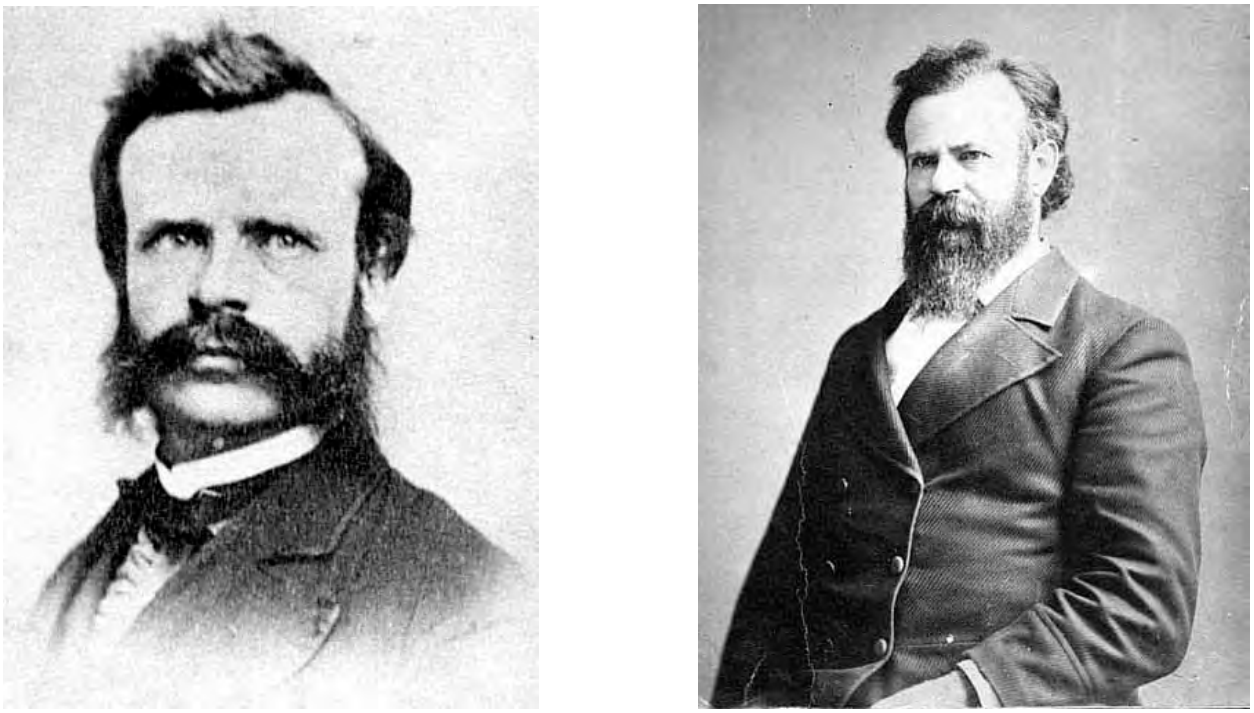

Figure 89: Photographs of John Wesley Powell in 1869 and 1874. Source: U.S. National Park Service online photograph collections.

Powell made a second trip down the Colorado River and through the Grand Canyon in 1871-1872, this time focusing more on gathering scientific information than he had on the first excursion. This expedition – unlike the first – was made during low water, and while the rapids on this trip were not as terrifying as during the first venture, the second journey still faced major difficulties bypassing rocks and rapids.[196] On this second trip, Powell brought a photographer, and some of the resulting photos documented the nature of the dories Powell used on both trips (see below).

[195] See generally Wallace Stegner, *Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West* (Boston: Houghton-Mifflin, 1954).

[196] http://3dparks.wr.usgs.gov/3Dcanyons/html/glencanyon.htm (accessed May 9, 2005). For details on Powell's expeditions down the Colorado, see *Exploration of the Colorado River of the West and Its Tributaries Explored in 1869, 1870, 1871 and 1872, under the Direction of the Secretary of the Smithsonian Institution* (Washington, D.C.: U.S. Government Printing Office, 1875).

Figure 90: Photograph of Powell's dories on the Colorado River, 1871-1872. Note the lashed-on armchair on the boat in the foreground; Powell commanded the expedition from the chair. Source: U.S. National Park Service online photo collection.

Figure 91: Photograph of Powell's crew with dories in the Grand Canyon, 1871-1872. Source: U.S. National Park Service online photo collection.

Figure 92: Photograph of a closer view of Powell's dories on the Colorado River, 1871-1872. Note the arm chair lashed to the top of the boat in the background. Source: Grand Canyon National Park Collection, Grand Canyon, Arizona.

Figure 93: Another photographic view of Powell's dories on the Colorado River, 1871-1872. Source: Grand Canyon National Park Collection, Grand Canyon, Arizona.

Figure 94: Photograph of Powell's dory tied up in the Grand Canyon with the armchair strapped on top. Note life rings tied to the chair. Source: U.S. National Park Service online photograph collection.

Figure 95: Photograph of Powell's expedition on the Colorado River, 1871-1872, with boats tied up. Source: U.S. National Park Service online photograph collection.

Figure 96: Photograph of John Wesley Powell's second expedition through the Grand Canyon, 1871-1872. Source: U.S. Library of Congress, Washington, D.C.

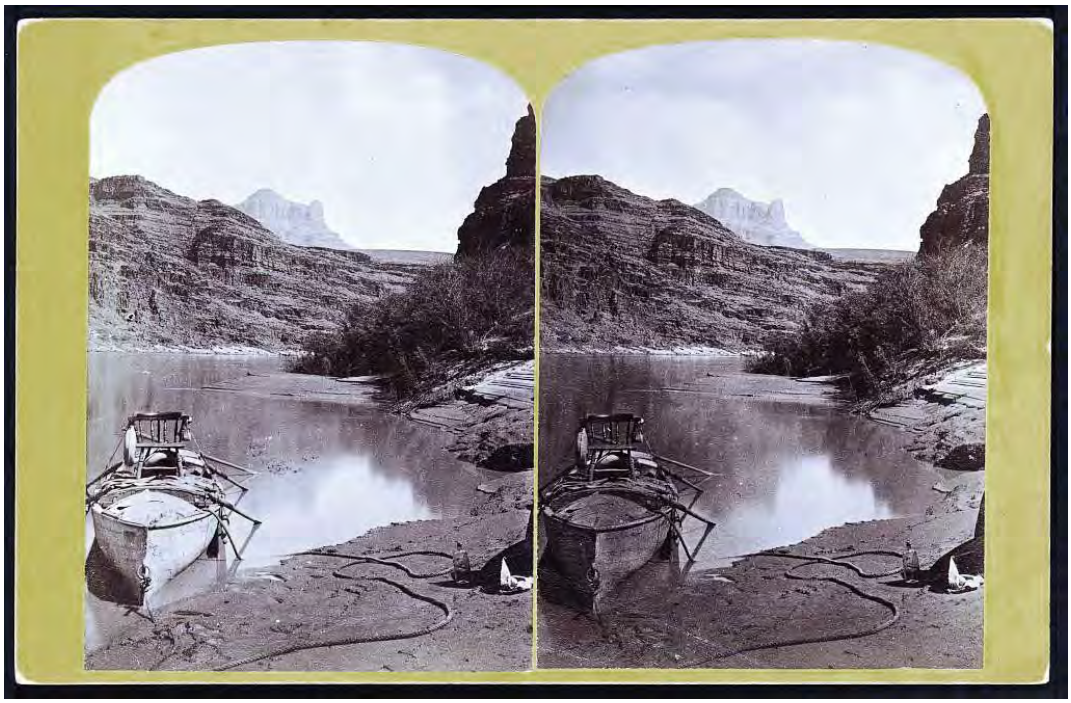

Figure 97: Stereographic photograph of the dory used by John Wesley Powell on second expedition through the Grand Canyon in 1871-1872. Note that strapped to top of the dory is an arm chair, where Powell sat. Source: U.S. Library of Congress, Washington, D.C.

Figure 98: Photograph of one of Powell's boats at rapids in the Grand Canyon, 1871-1872. Source: U.S. National Park Service online photograph collection.

Figure 99: Photograph of Powell's boats tied up near rapids in the Grand Canyon, 1871-1872. Source: U.S. National Park Service online photograph collection.

Figure 100: Photograph of Powell's boats tied up or ashore in the Grand Canyon, 1871-1872. Source: U.S. National Park Service online photograph collection.

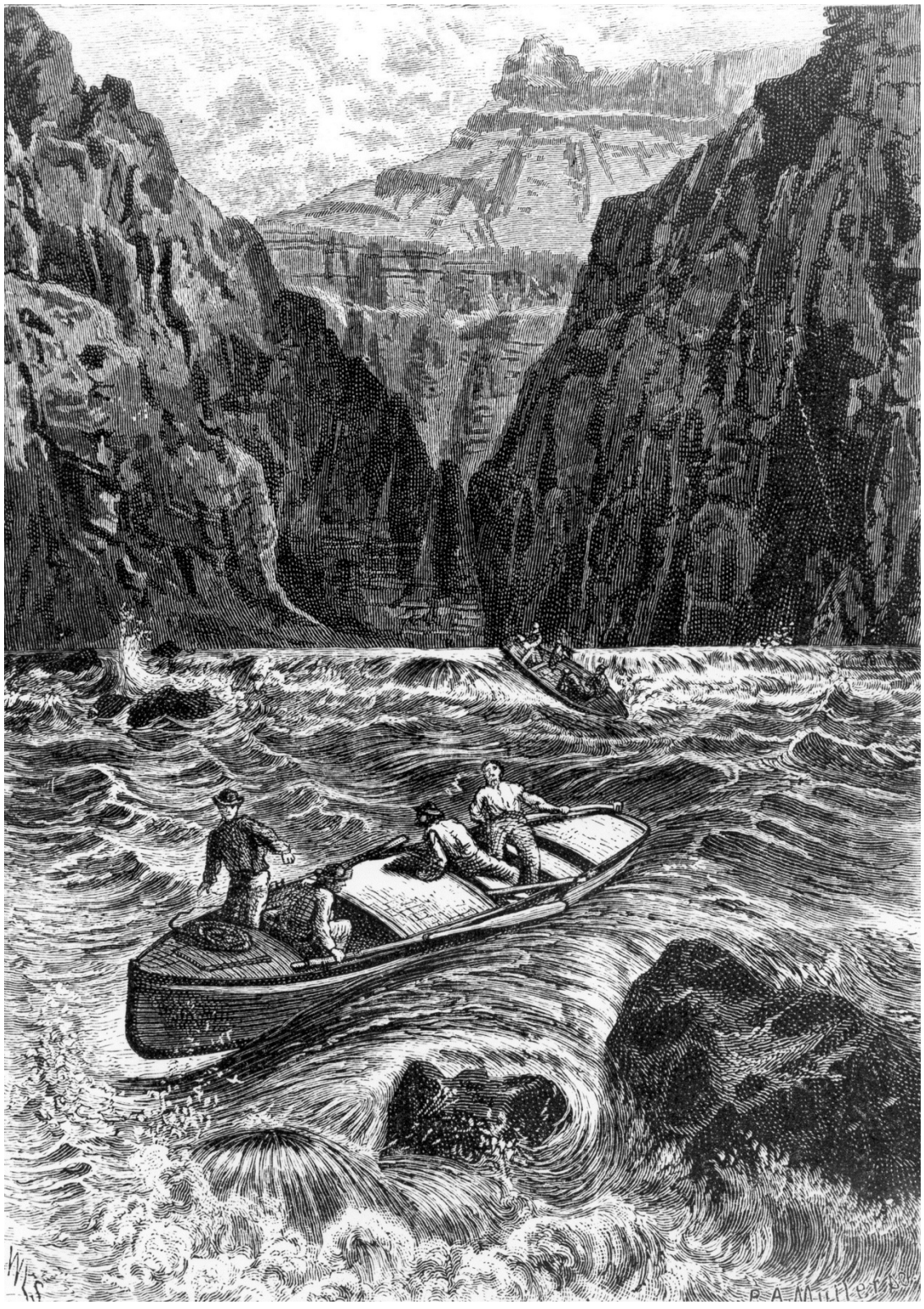

Figure 101: Sketch of the Powell expedition running rapids in the Grand Canyon, 1871-1872. Source: U.S. National Park Service online photograph collection.

Figure 102: "Our First Camp," Powell expedition through the Grand Canyon, 1871-1872. Source: U.S. National Park Service online photograph collection.

3. George M. Wheeler Expedition up the Colorado River, 1871

Another boating expedition – this time up the Colorado River – was made in 1871 just as Powell was heading through the Grand Canyon the second time. Headed by Lieutenant George M. Wheeler, the upriver expedition had been directed by Congress to explore the American West and to make topographic maps of that region as well as report on its characteristics. As part of his effort, Wheeler and his party were to locate the head of navigation on the Colorado River. Wheeler's expedition started from Camp Mojave, Arizona Territory, on September 15, 1871, and using small row-boats, the group made it upstream to the mouth of Diamond Creek (often having to portage around rapids). They covered a distance of two hundred sixty miles in thirty-one days. A photograph of Wheeler's departure from Camp Mohave can be seen below. Following

that is a stereographic view of the Wheeler expedition in the Black Canyon on the Colorado River (near where Hoover Dam is located today), and then appears a photograph of the expedition at “Camp Bighorn” on the Colorado.

Figure 103: Photograph of George M. Wheeler's upstream Colorado River expedition leaving Camp Mohave, Arizona Territory, 1871. Source: U.S. Library of Congress, Washington, D.C.

Figure 104: Stereographic photograph of Wheeler expedition up the Colorado River at Black Canyon, 1871. Source: U.S. Library of Congress, Washington, D.C.

Figure 105: Photograph of Wheeler expedition up the Colorado River, 1871, at Camp Big Horn. Note boats on the beach. Source: U.S. Library of Congress, Washington, D.C.

4. Other Accounts about Navigation on the Colorado River

Other reports of attempts to navigate the Colorado River added to the growing belief that the Colorado had some transportation possibilities. An early history of Arizona, entitled *The History of Arizona Territory Showing its Resources and Advantages with Illustrations: Descriptive of its Scenery, Residences, Farms, Mines, Mills, Hotels, Business, Houses, Schools, Churches, Etc.* (1884), for instance, provided excellent descriptions of the rivers of Arizona as well as boats in the late nineteenth century. This publication noted that the steamship *Explorer* (probably not Ives's boat discussed earlier in this chapter, which had fallen into disrepair) soon was expected to ascend the Colorado River. The *Explorer* was fifty-four feet long from the bow to the stern wheel. This was about half the length that Ives had recommended for the Colorado River, presumably to make the craft more maneuverable in the shifting channel. Nevertheless, the *Explorer*'s draft was reported to be two and a half feet, considerably more than Ives believed to be feasible on the Colorado River, at least if it was to ascend as far as the Virgin River.[197]

While this account of a watercraft capable of navigating upriver on the Colorado River appeared promising, that view, however, should be tempered by the fact that *The History of Arizona Territory* – like many similar regional chronologies of the day – had been paid for by western promoters eager to attract businesses and settlers to the sparsely populated American Southwest. Joseph Ives's earlier report, therefore, is probably more objective regarding the Colorado's possibilities as an upriver transportation artery, at least below the Grand Canyon. Nevertheless,

[197] *History of Arizona Territory Showing its Resources and Advantages with Illustrations: Descriptive of its Scenery, Residences, Farms, Mines, Mills, Hotels, Business, Houses, Schools, Churches, Etc.* (San Francisco: Wallace W. Elliot & Co., 1884).

other attempts by steamboats confirmed that the Colorado River could, in fact, be used by such craft.[198]

Other accounts printed in U.S. Government documents further acknowledged the possibilities of using the Colorado River below the Grand Canyon as an artery of commerce and transportation. A letter January 30, 1907, letter from J.A. Mellon, the captain of the Colorado River steamer *Cochran*, to the Bureau of Corporations, noted that the Cochran weighed 237 tons and drew 20 inches of water when light and an additional 1 inch of water for every 10 tons of freight. According to other records of the Bureau of Corporations, another Colorado River steamship (actually, more like a barge), the *Silas J. Lewis*, weighed 100 tons, drawing seven inches of water with no load and one inch more for every eleven tons.[199]

B. Western Watercraft in General

Regarding western rivers more generally, the 1909 report of the commissioner of Corporations provided additional insight on the state of navigation in the Southwest around the time of Arizona statehood in 1912. This document contained information about the types of vessels being used for navigation at the time. The report noted that "[o]n the western rivers there soon appeared the well-known flat-bottom, stern-wheel steamboat, adapted to the shallow waters of those streams, the design of which has not greatly changed for half a century." The vessels, the report added, "used in the river trade are still mainly built of wood."[200] When specifically discussing river steamers, the report stated that:

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[198] For details on various steamboats used on the Colorado River, see Kay Muther, "Paddle-wheelers on the Colorado," *Wild West Magazine*, Aug. 2004.

[199] *Report of the Commissioner of Corporations on Transportation by Water in the United States, Water-Borne Traffic* (Washington D.C.: U.S. Government Printing Office, 1909), pp. 370-371.

[200] *Report of the Commissioner of Corporations on Transportation by Water in the United States, General Conditions of Transportation by Water* (Washington D.C.: U.S. Government Printing Office, 1909), pp. 128-129.

> [r]equirements on the western rivers are the least possible load draft, economical speed, readiness of handling the vessel, and freight and passenger capacity. In the case of towboats large reserve power is an important item.[201]

Although the report conceded that little change had been made in the stern-wheel, light-draft steamers in two decades, it declared that recently "a new type of light-draft steamer has been developed, with screwpropeller built in a tunnel in the after part of the vessel."[202]

Water Trails West, a more recent compilation of essays by western writers regarding various western streams, included one article containing additional information about navigation on the Colorado River as well as other western waterways. This essay, by Donald H. Bufkin and C.L. Sonnichsen, indicated that boats larger than the one proposed by J.C. Ives were used successfully on the Colorado. According to Bufkin and Sonnichsen, the largest ship to use the Colorado was the *Mohave II*. With a length of 175 feet (over three times that of the *Explorer* described in the *History of Arizona Territory* and one and three quarters as long as Ives's boat), the *Mohave II* had a 32-foot beam. This was 10 feet wider than Ives's recommendation. The *Mohave II* was approximately 190 tons and drew less than two feet of water. (Ives suggested only one foot, while the *History of Arizona* claimed two and a half). Other boats similar to the *Mohave II* in use in the West, according to Bufkin and Sonnichsen, were all over 100 feet in length and over 25 feet in width. Further, these vessels were generally stern-wheeled, making them easier to navigate streams filled with sandbars and shallow water.[203]

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[201] *Report of the Commissioner of Corporations on Transportation by Water in the United States, General Conditions of Transportation by Water* (Washington D.C.: U.S. Government Printing Office, 1909), p. 138.

[202] *Report of the Commissioner of Corporations on Transportation by Water in the United States, General Conditions of Transportation by Water* (Washington D.C.: U.S. Government Printing Office, 1909), p. 139.

[203] Donald H. Bufkin and C.L. Sonnichsen, "Steamboat Through Hell: River Traffic on the Colorado of the West," in *Water Trails West*, (Garden City, N.J.: Doubleday & Company, 1978), pp. 218-230.

C. Summary and Conclusion to Chapter 6

The state of boating technology around the turn of the century makes it clear that the Salt River was not susceptible to navigation before or at the time of Arizona's statehood. The erratic and irregular flow in the Salt was not consistent enough in its ordinary state to support boats used for transporting commerce. A dependable and reliable draft of two feet could not be had in a river that was sometimes only a few inches deep, although at flood stage, the Salt could contain very deep water. Then, however, the raging torrents were too dangerous to be navigated. Even the dories used by John Wesley Powell to go down the Colorado River in 1869 and 1871-1872 or the rowboats used in the Wheeler expedition in 1871would have had a difficult time using the Salt River on a regular basis – as can be seen in historical newspaper reports in Chapter 4 of this report. Furthermore, the Salt's shifting nature made its course undependable as well as dangerous. The status of watercraft at the time of Arizona's statehood in 1912 – as described in historical literature and illustrated in photographs – make it clear that no such vessels could have been utilized on a regular and dependable basis on the Salt River.

SUMMARY AND CONCLUSIONS

Since modern settlement began in the Salt River Valley in the mid-nineteenth century, there have been a multitude of documents created describing that stream. These cover a wide spectrum of published and unpublished sources, including federal and state (and territorial) materials, newspaper accounts, diaries, journals, reminiscences, historical photographs, and other archival records.

Some of the most important sources for ascertaining the nature of the Salt River prior to and at the time of Arizona's statehood in 1912 are survey field notes and plats created by U.S. Government surveyors as they carried out their responsibilities mapping Arizona. Directed by manuals conveying precise instructions, surveyors were to make careful note of the region in which they were working, and they were provided with specific instructions about how to record the presence of navigable bodies of water. The area through which the Salt River flows below Granite Reef Dam and the confluence with the Gila River was fully surveyed in 1868, and resurveys were done for sections of the river in 1888, 1899, and 1910-1911. Significantly, although these surveys were undertaken by different parties at different times and under various seasonal conditions, none of the federal surveyors indicated in his field notes or on the related plats that the Salt River was navigable. On the contrary, their field notes and plats illustrated a stream that varied enormously in flow, that had a constantly changing channel, and that sank into the bed in places only to reemerge slightly downstream. Moreover, the notes and plats contain references to roads paralleling the Salt, suggesting that transportation was carried out on land and not on the river.

Supporting the U.S. Government surveys' determination that the Salt River was not navigable are federal government homestead patents, U.S. grants to Arizona, and Arizona's disposition of those lands. Over two hundred twenty-five patents were issued by the U.S. Government Land Office to parcels of land through which the Salt River ran. In every single case

when these patents were formalized, the United States made no effort to deny title to the applicants based on a possible claim of ownership due to Arizona's sovereignty. In addition, in some cases the patent files that accompanied the applications made it clear that what the prospective homesteader wanted was the actual bed of the river itself. Furthermore, when lands were granted to Arizona through which the Salt River flowed, the state made no effort to obtain in-lieu selections for the acreage covered by the stream's bed – as it would have been entitled to do had the Salt River been navigable at the time of statehood. And, when Arizona subsequently disposed of lands it had acquired from the federal government through which the Salt River ran, the state made no indication that it was withholding the bed of the river due to navigability.

The federal and state grant and patenting process is significant in relation to determining the Salt River's navigability because with so many different parcels and transfers of land involved, a large number of parties ultimately reached the same conclusion – that the Salt River was not navigable. Each applicant who requested land through which the river flowed implicitly asserted the river's non-navigability; each federal official approving a homestead application or grant to Arizona reached the same conclusion, as did each state authority who sold Arizona's federally-granted lands. Not only did many individuals all indicate the same finding with regard to the Salt River's non-navigability, but they did so over a lengthy span of time beginning in the nineteenth century and continuing well past statehood, and their actions covered a large and diverse geographic area along the Salt.

Further strengthening the finding that the Salt River was not navigable before or in 1912 are other published and unpublished records of the U.S. Government and related historical photographs. Records of the U.S. Reclamation Service, the Geological Survey, and the Department of Agriculture all describe a stream that was extremely erratic in flows, unreliable in relation to channels, subject to

severe floods, blocked by obstacles (both natural and man-made), prone to extensive seepage losses, and potentially dangerous. While the duties of the Reclamation Service, the Geological Survey, and the Department of Agriculture brought them most directly into contact with the Salt River, records generated by other federal agencies (notably, the Indian Service) substantiated these conclusions. Related historical photographs amply illustrate the textual observations by federal agencies.

Newspapers and additional historical photographs also support the idea that the Salt was not navigable before or at statehood. While there were stories in the Arizona press about boating on the river, those articles emphasized how unusual such activities were, not how regularly they happened. Moreover, the press stressed that roads and railroads carried commerce in the Salt River region, not the stream itself. And, of course, the newspapers took note of the tremendously destructive Salt River floods and how those altered the channel and surrounding landscape. Historical photos back up the press's observations.

Much like the press, explorers' journals, personal reminiscences, private engineering reports, correspondence, other historical documents, and more recent historical studies all reached the same conclusion regarding the lack of navigability of the Salt River. Indeed, the Arizona Territorial Legislature, as one of its first acts in 1865, declared that the only stream in Arizona to be was navigable was the Colorado. From this wealth of information, covering a huge array of documentary sources, only one conclusion can be reached: The Salt River was not navigable on or before February 14, 1912, in its ordinary and natural condition.

APPENDIX – LITTLEFIELD VITA

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EDUCATION:

Ph.D. American history. University of California, Los Angeles, 1987. Dissertation: "Interstate Water Conflicts, Compromises, and Compacts: The Rio Grande, 1880-1938." Fields: history of California and the American West, water rights history, legal history, environmental history.

M.A. American history. University of Maryland, College Park, 1979. Master's thesis: "A History of the Potomac Company and Its Colonial Predecessors." Fields: business history, colonial history, early republic history, trans-Appalachian West history, British history.

B.A. English literature. Brown University, 1972.

CONSULTING AND EXPERT WITNESS EXPERIENCE:

2008-present: Research historian and consultant for McAfee & Taft in Tulsa, Oklahoma (attorney Robert Joyce). Providing historical research, written report, and testimony regarding lead and zinc mining and land use in northeastern Oklahoma for use in *Quapaw Tribe of Oklahoma, et al., v. Blue Tee Corp, et al.*, U.S. District Court for the Northern District of Oklahoma, Civil Action No. 03-CV-486-CVE-PJC.

2006-2007: Research historian and consultant for Loeb & Loeb in Los Angeles (attorney Anthony Murray). Provided historical research and deposition testimony regarding the history of natural disasters (mudslides, floods, fires, earthquakes, etc.) in Southern California for use in *Dane W. Alvis, et al., v. La Conchita Ranch Company, et al.*, Ventura County (California), Superior Court Case No. CIV 238700.

2005-present: Research historian and consultant for the Stinson Beach County Water District in Marin County, California (counsel: Hanson, Bridgett, Marcus, Vlahos & Rudy of San Francisco). Providing historical research on the history of the water rights of the District.

2005: Research historian and consultant for the Lake Arrowhead Community Services District (counsel: Best, Best & Krieger of Riverside, California). Provided historical research and documentation on the history of water rights associated with Lake Arrowhead in southern California. Testified before the California State Water Resources Control Board concerning the District's pre-1914 water rights claims (and post-1914 claims).

2004 – 2006: Research historian and consultant for City of Santa Maria, California (counsel: Best, Best & Krieger of Riverside, California). Provided historical research and documentation on the history of water rights of the U.S. Bureau of Reclamation's Santa Maria Project (California) for use in *Santa Maria Valley Water Conservation District v. City of Santa Maria, Southern California Water Company, City of Guadalupe, et al.*, Santa Clara County (California) Superior Court, Case No. CIV 770214. Deposed and subsequently testified as an expert witness at trial.

2004 – Present: Research historian and consultant for City of Pocatello, Idaho (counsel: Beeman & Associates of Boise, Idaho, and White & Jankowski of Denver, Colorado). Providing historical research and documentation on the history of Pocatello's water rights for use in Snake River Basin Adjudication (*In Re: the General Adjudication of Rights to the Use of Water From the Snake River Drainage Basin Water System, State of Idaho v. United States; State of Idaho; and all unknown claimants to the use of water from the Snake River Drainage Basin Water System*, County of Twin Falls (Idaho) District Court, Case No. 39576. Provided affidavit testimony.

2003 – 2004: Research historian and consultant for U.S. Bureau of Reclamation (Mid-Pacific Region). Providing historical research and a report on the history of the water rights of the Friant Unit of the Bureau's Central Valley Project (California).

2002: Research historian and consultant for the Alameda County Water District (counsel: Hanson, Bridgett, Marcus, Vlahos & Rudy of San Francisco). Provided historical research on the history of the water rights of the District.

2001 – 2007: Research historian and consultant for Paloma Investment Limited Partnership (counsel: Mesch, Clark & Rothschild of Tucson, Arizona). Provided historical research and deposition regarding whether the Gila River was commercially navigable in 1912 when Arizona became a state for use in *Flood Control District of Maricopa County v. Paloma Investment Limited Partnership* and *Paloma Investment Limited Partnership v. Flood Control District of Maricopa County*, Maricopa County (Arizona) Superior Court, Case No. CV97-07081.

2000 – 2001: Research historian and consultant for Salt River Project, Arizona (counsel: Salmon, Lewis & Weldon of Phoenix, Arizona). Provided historical research and documentation on Zuni Indian water rights and land claims in Arizona and New Mexico for use in *In re the General Adjudication of All Rights to Use of Water in the Little Colorado River System and Source*, Apache County (Arizona) Superior Court, Case No. 6417.

2000 – 2001: Research historian and consultant for the Maryland Attorney General. Provided historical research and affidavit testimony on the 1785 "Mount Vernon" interstate compact between Maryland and Virginia for use in U.S. Supreme Court case of *Virginia v. Maryland*, No. 129 Original.

2000: Research historian and consultant for the Salt River Project, Arizona (counsel: Salmon, Lewis & Weldon of Phoenix, Arizona). Provided historical research and documentation on water rights of the Gila River, Arizona, for use in *In Re: The General Adjudication of All Rights to Use Water in the Gila River System and Source*, Maricopa County (Arizona) Superior Court, Case No. W1-203.

1998 – 2000: Research historian and consultant for the Idaho Attorney General. Provided historical research on whether the Salmon River and selected tributaries were commercially navigable in 1890 when Idaho became a state.

1998 – 1999: Research historian and consultant for the Idaho Coalition, a landowners' group (counsel: John K. Simpson of Rosholt, Robertson & Tucker of Boise, Idaho, and Shawn Del Ysura of J.R. Simplot Company of Boise, Idaho). Provided historical research, and affidavit testimony on the impacts of various dams in the Columbia River and Snake River watersheds on anadromous fish for use in Snake River Basin Adjudication (*In Re: the General Adjudication of Rights to the Use of Water From the Snake River Drainage Basin Water System, State of Idaho v. United States; State of Idaho; and all unknown claimants to the use of water from the Snake River Drainage Basin Water System*, County of Twin Falls (Idaho) District Court, Case No. 39576.

1998 – 2000: Research historian and consultant for Sacramento Municipal Utility District of California (counsel: Ronald Aronovsky of Alden, Aronovsky & Sax of San Francisco). Provided research on land site history for use in *Sacramento Municipal Utility District v. California Department of Transportation, Sacramento Housing and Redevelopment Agency, et al*., Sacramento County (California) Superior Court, Case No. 96AS04149.

1997 – 2005: Research historian and consultant for City of Las Cruces, New Mexico (counsel: Stein & Brockmann of Santa Fe, New Mexico). Provided historical research on the City's water rights for use in *State of New Mexico v. Elephant Butte Irrigation District*, Dona Ana County (New Mexico) District Court, Case No. CV 96-888.

1997 – 2003: Research historian and consultant for Fort Hall Water Users' Association, Idaho (counsel: Richard Simms of Hailey, Idaho). Provided historical research and report the Association's water rights in relation to the Shoshone and Bannock Indian land cessions on the Fort Hall Indian Reservation in Idaho for use in *Fort Hall Water Users' Association, et al., v. United States of America*, U.S. Court of Federal Claims, Case No. 01-445L.

1997 – 2004: Research historian and consultant for Kern Delta Water District (counsel: McMurtrey, Hartsock & Worth of Bakersfield, California). Providing historical research and report on Kern Delta's water rights for use in *North Kern Water Storage District v.*

Kern Delta Water District, et al., Tulare County (California) Superior Court, Case No. 96-172919. Testified in that case as an expert witness historian for ten days in the initial trial, which was remanded for additional testimony and evidence. Provided additional research and written reports on water rights for the remanded trial.

1996 – 1998: Research historian and consultant for Idaho Attorney General. Provided historical research on water rights in relation to the Deer Flat National Wildlife Refuge for use in Snake River Basin Adjudication (*In Re: the General Adjudication of Rights to the Use of Water From the Snake River Drainage Basin Water System, State of Idaho v. United States; State of Idaho; and all unknown claimants to the use of water from the Snake River Drainage Basin Water System*, County of Twin Falls (Idaho) District Court, Case No. 39576.

1995 – 1998: Research historian and consultant for U.S. Department of Justice. Provided historical documentation on the history of water rights on the Santa Margarita River at U.S. Marine Corps Base, Camp Pendleton, in southern California.

1995 – Present: Research historian and consultant for the Salt River Project (counsel: Salmon, Lewis & Weldon of Phoenix, Arizona). Providing historical documentation and reports on whether the Salt, Gila, and Verde rivers were commercially navigable in 1912 when Arizona became a state. Testified between 1997 and 2005 several times before the Arizona Navigable Stream Adjudication Commission regarding the navigability of the Salt, Verde, and Gila rivers. Testified on the same subject in 1998 and 1999 before the Arizona State Legislature.

1995 – 2001: Research historian and consultant for Nebraska Department of Water Resources (counsel: Simms & Stein of Santa Fe, New Mexico). Provided historical documentation and report on water rights and the history of *Nebraska v. Wyoming*, 325 U.S. 589 (1945), for use in U.S. Supreme Court case of *Nebraska v. Wyoming*, Original No. 108, regarding the apportionment of the waters of the North Platte River. Deposed in that case, but the case was settled before trial.

1993 – 1994: Research historian and consultant for Simms and Stein, attorneys specializing in water law in Santa Fe, New Mexico. Provided historical documentation and affidavit testimony on Arapaho and Shoshone land claims and cessions along the Wind River in Wyoming for use in *In Re: the General Adjudication of All Rights to Use Water in the Big Horn River System and All Other Sources, State of Wyoming*.

1991 – 2003: Research historian and consultant for Legal Counsel, Division of Water Resources, Kansas State Board of Agriculture (counsel: Montgomery & Andrews of Santa Fe, New Mexico). Provided historical research on water rights and history of apportionment of the Republican River and its tributaries among Kansas, Nebraska, and Colorado for use in U.S. Supreme Court case of *Kansas v. Nebraska and Colorado*, No. 126 Original, regarding the interstate apportionment of the Republican River. Provided affidavit testimony.

1991 – 1993: Research historian and consultant for Nickel Enterprises (Bakersfield, California; counsel: Anthony Murray of Carlsmith, Ball, Wichman, Murray, Case, Mukai & Ichiki of Long Beach, California. Provided historical documentation and report on the navigability of the Kern River for use in *Nickel Enterprises v. State of California*, Kern County (California) Superior Court, Case No. 199557. Testified as an expert witness historian in this case for eleven days.

1989 – 1990: Research historian for Pacific Enterprises, Los Angeles, California. Directed historical research for and coauthored a corporate history of this southern California holding company entitled *The Spirit of Enterprise: A History of Pacific Enterprises, 1867-1989* (1990).

1988 – 1989: Research historian and consultant for Water Defense Association, Roswell, New Mexico (counsel: Simms & Stein of Santa Fe, New Mexico). Provided historical documentation of water rights claims along the Bonito, Hondo, and Ruidoso rivers in southeastern New Mexico for use in *State v. Lewis*, Chaves County (New Mexico), Case Nos. 20294 & 22600, Consolidated.

1986 – 1990: Research historian and consultant for Legal Counsel, Division of Water Resources, Kansas State Board of Agriculture (counsel: Simms & Stein of Santa Fe, New Mexico). Provided historical documentation and report on water rights and interstate apportionment of the Arkansas River between Kansas and Colorado for use in U.S. Supreme Court case of *Kansas v. Colorado*, October Term 1985, Original No. 105, regarding the interstate apportionment of the Arkansas River. Deposed and later testified as an expert witness historian for twelve days.

1986 – 1989: Research historian and consultant for Legal Counsel, State Engineer Office, State of New Mexico. Provided historical documentation and report on water rights in the Carlsbad Irrigation District in southeastern New Mexico for use in *State v. Lewis*, Chaves County (New Mexico) Case Nos. 20294 & 22600, Consolidated.

1986 – 1987: Historical consultant for *National Geographic Magazine*. Advised editors on June 1987 article, "George Washington's Patowmack Canal."

1984 – 1986: Research historian and consultant for Legal Counsel, State Engineer Office, State of New Mexico. Provided historical documentation and report on the history of water rights on the Rio Grande and interstate apportionment disputes between New Mexico and Texas for use in *El Paso v. Reynolds*, U.S. District Court, Civ. Case No. 80-730-HB.

AWARDS AND OTHER PROFESSIONAL EXPERIENCE:

2008: Winner of the National Council on Public History's Consultant Award.

July 1, 2007 – present: Member, Board of Directors, California Supreme Court Historical Society.

August 2006: Faculty lecturer for Continuing Legal Education (CLE) International, Arizona Water Law Conference. Taught course on "Historians and Water Rights – The Role of Historians in U.S. Supreme Court Interstate Stream Litigation."

1999: Gave keynote address at New Mexico Water Resources Institute's 44th Annual New Mexico Water Conference on "The History of the Rio Grande Compact of 1938."

January 1992 – 1994: Member of Board of Editors of *Western Historical Quarterly*.

1991 – 1995: Lecturer, Department of History, California State University, Hayward. Taught a graduate seminar on environmental history and also taught courses on American history and California history.

1980 – 1984: Editorial Assistant, *Pacific Historical Review*. Edited scholarly articles and book reviews.

1979 – 1979: Lecturer, University of Maryland's University College off-campus program. Taught courses on the history of the American West and U.S. History surveys at the Pentagon and at a military base.

PUBLICATIONS:

Books:

Conflict on the Rio Grande: Water and the Law, 1879-1938. University of Oklahoma Press (2009).

The Spirit of Enterprise: A History of Pacific Enterprises, 1867-1989 (coauthor, 1990).

Articles:

"Jesse W. Carter and California Water Law: Guns, Dynamite, and Farmers: 1918-1939," *California Legal History* (2009).

"History and the Law: The Forensic Historian in Court," *California Supreme Court Historical Society Newsletter* (2008).

"The History of the Rio Grande Compact of 1938," in Catherine T. Ortega Klett, ed., *44th Annual New Mexico Water Conference – Proceedings – The Rio Grande Compact: It's the Law* (Las Cruces: New Mexico Water Resources Research Institute, 2000).

"The Forensic Historian: Clio in Court," *Western Historical Quarterly* (1994).

"The Rio Grande Compact of 1929: A Truce in an Interstate River Apportionment War," *Pacific Historical Review* (1991).

"Eighteenth Century Plans to Clear the Potomac River: Technology, Expertise, and Labor in a Developing Nation," *Virginia Magazine of History and Biography* (1985).

"The Potomac Company: A Misadventure in Financing an Early American Internal Improvement Project," *Business History Review* (1984).

"Water Rights During the California Gold Rush: Conflicts over Economic Points of View," *Western Historical Quarterly* (1983).

"Maryland Sectionalism and the Development of the Potomac Route to the West, 1768-1826," *Maryland Historian* (1983).

Book Reviews:

Sarah S. Elkind, *Bay Cities and Water Politics: The Battle for Resources in Boston and Oakland* (Lawrence: University Press of Kansas, 1998), in *Environmental History* (2000).

David C. Frederick, *Rugged Justice: The Ninth Circuit Court of Appeals and the American West, 1891-1941* (Berkeley: University of California Press, 1994), in *Pacific Historical Review* (1995).

Daniel Tyler, *The Last Water Hole in the West: The Colorado - Big Thompson Project and the Northern Colorado Water Conservancy District* (Niwot, Colorado: University Press of Colorado, 1992), in *Montana: The Magazine of Western History* (1994).

Lloyd Burton, *American Indian Water Rights and the Limits of Law* (Lawrence: University Press of Kansas, 1991), in *Journal of the West* (1994).

Zachary A. Smith, ed., *Water and the Future of the Southwest* (Albuquerque: University of New Mexico Press, 1989), in *Western Historical Quarterly* (1991).

F. Lee Brown and Helen Ingram, *Water and Poverty in the Southwest* (Tucson: University of Arizona Press, 1987), in *The Public Historian* (1990).

David J. Eaton and Michael Andersen, *The State of the Rio Grande/Rio Bravo: A Study of Water Resource Issues Along the Texas/Mexico Border* (Tucson: University of Arizona Press, 1987), in *New Mexico Historical Review* (1988).

Pat Kelley, *River of Lost Dreams: Navigation on the Rio Grande* (Lincoln: University of Nebraska Press, 1986), in *Pacific Historical Review* (1988).

Marc Reisner, Cadillac Desert: The American West and Its Disappearing Water (New York: Viking Penguin, Inc., 1986), in *Environmental History Review* (1987).

Thomas F. Hahn, *The Chesapeake and Ohio Canal: Pathway to the Nation's Capitol* (Metuchen, N.J.: Scarecrow Press, Inc., 1984), in *Business History Review* (1987).

PROFESSIONAL AFFILIATIONS:

American Historical Association, American Society for Environmental History, California Committee for the Promotion of History, California Historical Society, California Supreme Court Historical Society, National Council on Public History, Ninth Judicial Circuit Court Historical Society, Organization of American Historians, Western History Association, Western Council on Legal History.