

**CALAMITY ON THE CANALS:
Entrepreneurial Failure, Legal Quagmires, And Natural Disasters
On The Graham County Irrigation Canals, 1895-1993
By George A. Platz**



Green fields stretching for some 40 miles along the Upper Gila River in Graham County, Arizona, provide an unexpected oasis of farmland in the midst of hundreds of thousands of square miles of mountains and desert. Those fields are not only a beautiful sight; they are largely responsible for the existence of Safford, Thatcher, Pima and other thriving communities in Arizona's Upper Gila Valley, and they continue to make a substantial contribution to the economy of the area.

And those 40 miles of green fields in turn owe their existence to a network of irrigation canals, most of which were dug by hand and horsepower in the late 1800s, as shown in the following photograph dating from around 1900:

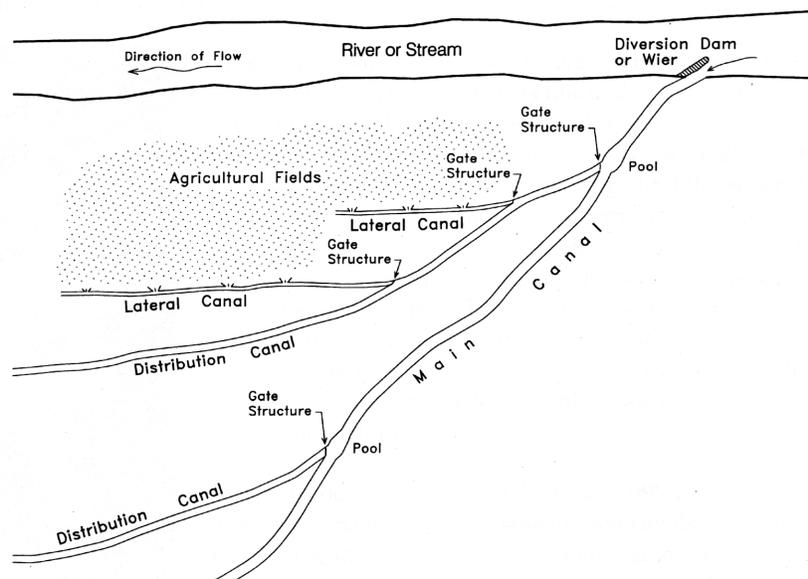


This remarkable achievement by the hardy pioneers of the Gila Valley, accomplished initially without the aid of motorized construction equipment, eventually transformed more than 30,000 acres of mesquite-covered desert into a source of grain to feed the new settlers and the soldiers protecting them, hay to fuel the horses and mules that provided their transportation, and, in later years, cotton to sell to the rest of the world.

But these irrigation canals have not been trouble-free. Major problems have risen over the years to threaten their usefulness and their very existence. The purpose of this paper is to record and explain some of those problems: the failure of an attempt by local entrepreneurs to expand dramatically the scope of the canal system in the 1890s; a quagmire of lawsuits involving disputes as to the quality and allocation of the water in the canals that began almost as soon as the canals were dug and continues to this day; and repeated natural disasters in the form of floods that have destroyed large parts of the canal system over the years, requiring substantial rebuilding.

Before proceeding to a discussion of these “calamities on the canals,” however, it is helpful to review briefly two things: first, the way the canals work; and second, the status of the canal system in Graham County as it existed around 1895.

Gravity powers the canals. They are designed to take water out of the Gila River at a higher elevation upstream and then let it flow downhill in the canals at a consistent grade, roughly parallel to the river but at an elevation somewhat above that of the river. The canals then irrigate fields between them and the river by allowing the canal water to run out of the canals through the fields and back toward the lower river level, as shown by the following diagram:

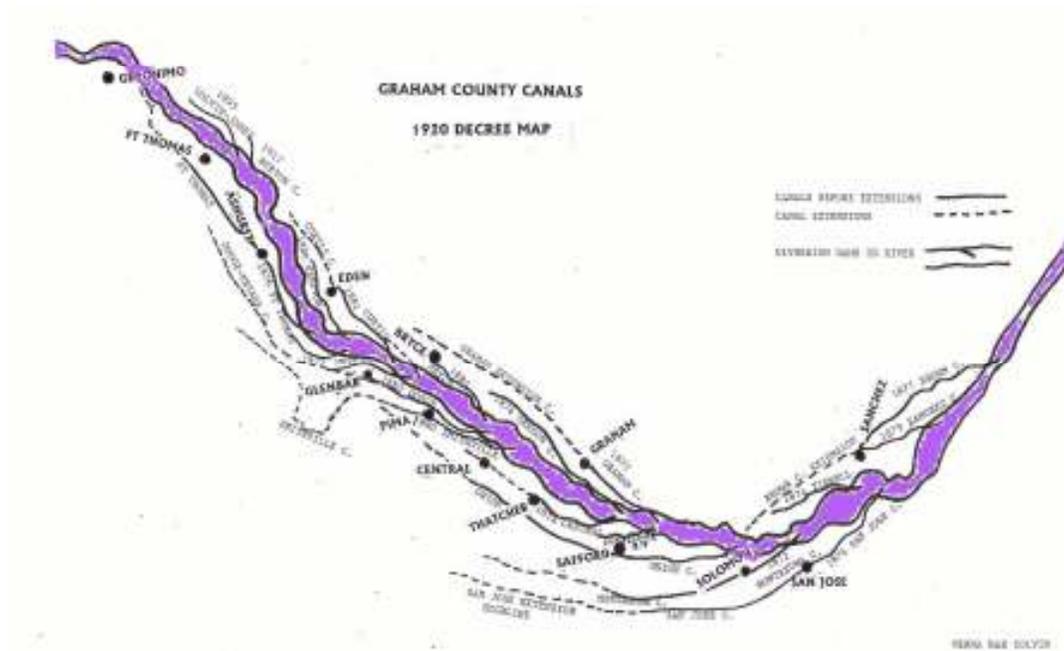


The Upper Gila Valley between Sanchez and Bylas is well situated for this process because there is gently sloping land for as much as a mile or more along one or both sides of much of that stretch of the river. The water is taken out of the river by the use of diversion dams which extend into the river from the head of the canal and divert a portion of the river flow into the canal. (During the 20th century the river water in the canals has been supplemented by water from wells drilled near the canals, which in some years has exceeded the amount of river water.) The following photograph shows one of the rock and brush diversion dams that were built along the Upper Gila River in the late 19th and early 20th centuries:



Irrigation canals along the Upper Gila existed long before the late 1800s. There is evidence that the prehistoric San Simon Mogollon and Hohokam built similar canals as much as 2000 years ago, but they had long been abandoned when farmers of European descent arrived to settle in the Valley after the land there became part of the United States in the wake of the Mexican-American War of 1847-1848. The prehistoric canals in some cases served as a blueprint (and perhaps the inspiration) for those constructed by European settlers. (Prehistoric “hanging” canals apparently were also built to obtain water from the north side of Mt. Graham, but these were not duplicated by European farmers.) Farmers from Mexico may have started digging new canals in the San Jose area as early as 1853, and in 1866 the Hooker-Hines canal was built near Fort Thomas to irrigate farms that grew crops to feed the soldiers at what was then Fort Goodwin. (These Fort Thomas farms, however, which included one owned by the Clanton family who later obtained notoriety in a shootout with Wyatt Earp in Tombstone, were illegal because they were on what was then San Carlos Reservation property, and they and the canal were later abandoned).

Large scale canal building in the Upper Gila Valley did not begin until the Mormon settlers arrived in the 1870s. Starting with the Montezuma Canal in 1872 with its head end on the Gila River near what is now Solomon, by 1895 they had built a total of more than 20 canals, some following the paths of old Indian canals and some not, on both the north and the south side of the river, irrigating well over 20,000 acres of farmland, as shown on the following map:



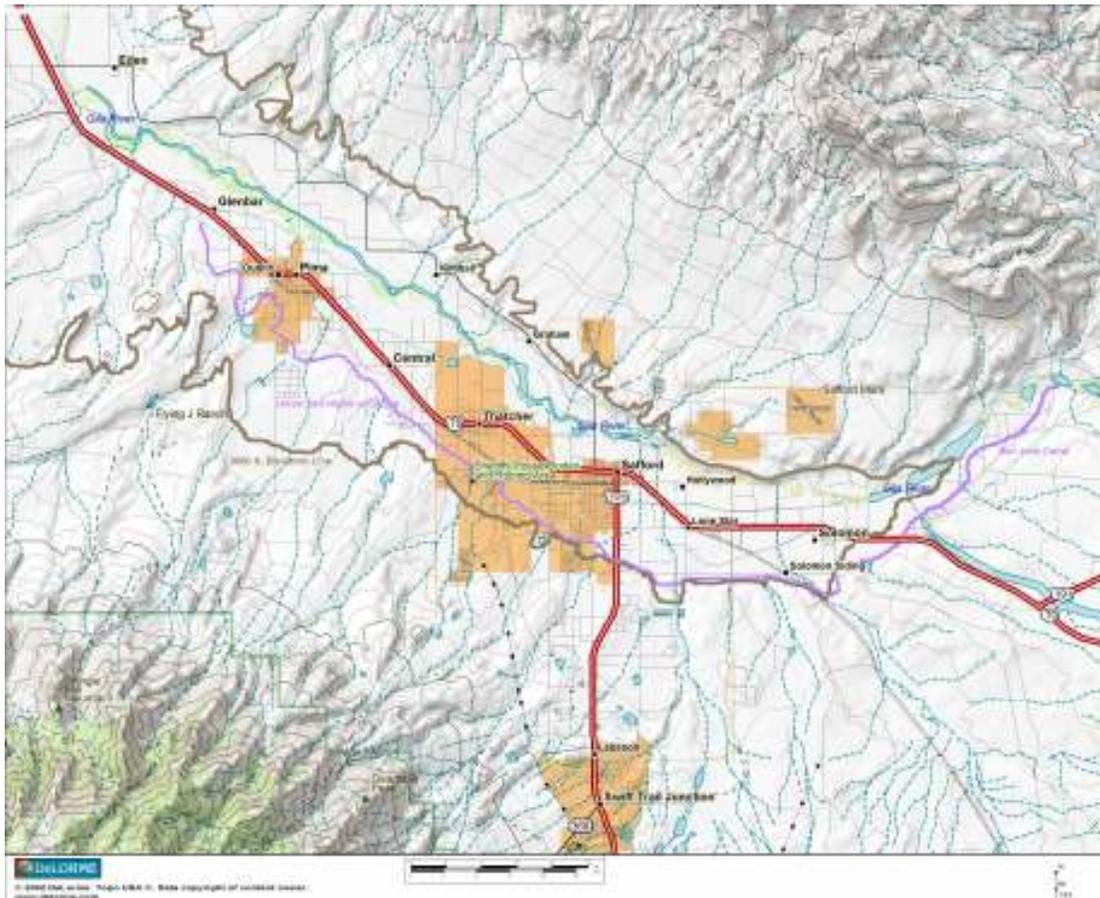
The calamities that are the subject of this paper began around this time.

1. The Failure of the Enterprise Canal

Around 1894 a group of entrepreneurs considered the somewhat random patchwork of canals that had developed over the years along the south side of the Upper Gila River and studied the overall terrain of the valley. They concluded that a new canal that took river water from above the existing canals, at a point about nine miles up the river from Solomon, could run above and to the south of those existing canals for 30 miles or more, to near Pima, and still have a drop of at least three feet per mile, which they considered sufficient to keep the water moving without silting up. They also calculated that this new canal could increase the amount of irrigated land in the valley to some 60,000 acres, which is more than twice as much as is irrigated even today. They called their new canal the Enterprise Canal (not be confused with another canal built in 1885 with its head end at the Gillespie Dam on the Gila River southeast of Phoenix, which is also called the Enterprise Canal) and

they incorporated a new company to build this canal in 1894. They also proposed that the owners of all the existing canals on the south side of the river should join their company, which would then coordinate the allocation of irrigation water among all users south of the river.

No map of this proposed canal has been found and it appears that its projected path was revised over time, but its general location can be approximated by examining the topography of the area it was to serve in the following map:



The light blue line on this map shows the course of the highest existing canals south of the Gila River in the Safford Valley and the dark gray line shows the 3000 foot level of the terrain in the area. The elevation of the River at the head of the existing canals is under 3100 feet and the canals remain above or close to the 3000 foot mark for about half their length, then drop off between Safford and Thatcher.

This suggests that a new canal with a higher head end remaining closer to the 3000 foot elevation all the way to Pima could have been built that would irrigate substantially more land than the existing canals, particularly west of Safford.

A prime mover of the Enterprise Canal at its outset was a rancher named Nelson P. Beebe, and he was joined by other prominent Graham County residents. The president of the company in its early years was a man named William B. Fonda, a rancher and Safford businessman. Beebe and Fonda had actually begun plans for such a canal about ten years earlier. They hired a German engineer from Colorado named C. K. Betz to do the preliminary surveys for the canal in 1885, and it was Betz who determined that the canal was feasible and outlined its route.

But Engineer Betz didn't stay around very long. In early August of 1885 he was with Fonda at Fonda's ranch when reports came that several other ranchers who lived nearby had been ambushed by rustlers they were chasing who turned out to be a band of Apaches led by Geronimo. Two of the ranchers were killed, and the U.S. Army was summoned from Fort Thomas, but by the time the soldiers got there three days later Geronimo was long gone. Betz at that point decided to return to Colorado and was quoted as saying that he would return to complete his work "in about 50 years or when the damned soldiers get orders from Washington to shoot instead of holding councils of war over a poker table." He never returned, and this may have had unfortunate consequences years later.

Work on the Enterprise Canal started in August of 1895, the year after the canal corporation was formed and ten years after Betz's survey, but progress at that time was slow and sporadic and eventually stalled. Most of the people in the Valley had little interest in the project, and there was strong opposition from owners of the other canals, who feared that it would affect their water rights.

The canal developers weren't ready to give up. They did two things to get their project back on track. They enlisted the support of the Arizona Territorial Government, most notably Governor McCord and Senator Ives, and they also obtained the support of the Mormon Church.

Governor McCord, who held office from 1897-1898, and Senator Ives believed that the Enterprise Canal project was feasible, authorized the use of convict labor to help build it, proposed the creation of a storage reservoir to control the water flow in the canal, and even offered to take stock in the Enterprise Canal corporation. But as soon as opponents of the canal, including those who owned a controlling interest in the Montezuma and San Jose canals, learned of this they sent a delegation to Phoenix to do everything they could to slow down or stop any support for the canal from the Territorial Government.

The canal developers achieved more success in appealing to the local authorities in the Mormon Church. At this time Andrew Kimball (the son of an Apostle in the Church and the father of Spencer Kimball, who many years later became the head of the Church) had just succeeded Christopher Layton as the head of the St. Joseph Stake, which included all of the Upper Gila Valley. Andrew Kimball became a firm believer in the Enterprise Canal project and offered his services in moving it forward. In 1897 some construction work on the canal was resumed, and in May 1898 William Fonda resigned as president of the canal corporation in favor of Kimball, who got full authority to appoint his own directors. Kimball obtained the strong support of the Mormon farmers in the Valley and increased the pace of the work on the canal. He also publicized the canal and advertised its benefits.

Kimball's promotional materials proposed a 300 foot long dam and a spillway at the head of the canal that "will operate wheels sufficient to generate electricity

enough to light the Gila valley and turn the wheels of all its machinery.” The materials further stated that “the canal will be four feet deep and twenty-five feet wide. Its water supply will cover a continuous series of valleys and table land from its head waters at the narrows of the Gila river, to its terminus below Pima, a distance of thirty-five miles.” The materials went on to note that “the Gila river is the source of the water supply; other canals have priority claim, but there is sufficient water for all.”

By June of 1898 fifteen miles of the canal had been “laid out.” On July 15, 1898, the final survey was completed. Throughout the fall and winter of 1898-1899 more than one hundred men and teams were employed to work on the canal. On March 24, 1899, it was announced that the head and one mile of the canal were completed. Shortly thereafter the construction work stopped for the rest of the spring and summer because most of the workers were farmers who needed to tend to their farm work.

After this promising start and the overcoming of so much opposition, in the spring of 1899 the developers were more optimistic than ever. Unfortunately, disappointment was just around the corner, and work on the canal was never resumed in the fall of 1899 as planned. All the other canal companies had refused to consolidate with the Enterprise. In 1897 the Union Canal had been extended to Pima, providing some of the irrigation that was to be provided by the Enterprise. Moreover, the expected cost of the Enterprise canal was \$100,000, a very large sum in those days. And after some \$10,000 had been expended on the construction, it was discovered that there was a mistake in the survey and that the canal did not have the grade the developers thought it did. It is not clear whether this mistake was made by engineer Betz back in 1885 and might have been corrected had he not been scared off

by Geronimo and returned to Colorado. Nor is it clear that the mistake in the survey was a fatal one. Apparently some work on the canal continued for a time after the mistake was discovered. But the survey mistake, together with the unabated opposition of the other canal owners, eventually caused the work on the canal to stop. We can only wonder how the Valley would be different today if this promising project had not been abandoned after so much effort by so many people, although the following section of this paper does cast some doubt on the ultimate viability of the project.

2. The Litigation Quagmire

Water flow in the Upper Gila River is very erratic. Spring thawing in the upstream mountains and monsoon rains in the late summer normally feed the river but drought can occur at any time of year and can last for long periods. Very soon after the canals were built low water levels led to the first of many lawsuits (and to Graham County's only lynching) over water allocations to the canals and among canal owners. Also, the waste disposal practices of upstream miners and the introduction of well water into the canals led to other litigation over water quality that began shortly after the canals were built and has continued to recent times.

Water Allocation Disputes

Disputes over rights to canal water have been around since the first canals were built in Graham County, and as early as 1877 led to two deaths. In August of that year a homeowner named Jenkins Lewis, who lived near what is now the intersection of 8th Avenue and 1st Street in Safford, got into a dispute with a man named Oliver McCoy, who worked for a nearby farmer, about the right to take water

from the Sunflower Canal. McCoy wound up killing Jenkins with a shotgun. McCoy was arrested and committed for trial to be held in Tucson. Early the next morning a vigilance committee of local citizens who were outraged by the killing took McCoy from the jail in Safford and hung him, in the only recorded lynching to have ever taken place in Graham County.

Fortunately most other water allocation disputes in Graham County have been fought out in the courts rather than with shotguns. Courts in the Western states of our country, where water supplies can often be scarce, have had to deal with these disputes and have developed fairly well established general principles for resolving them. The Arizona courts have followed the doctrine that the first users of a waterway have a priority over later users, to the extent of that use, regardless of whether the later users are upstream or downstream. But determining who is the prior user, and the amount of water allowed because of that priority, is sometimes very difficult and in many cases requires the courts to weigh conflicting evidence, often no more than personal recollections.

One of the first lawsuits involving water rights of the Graham County canals was decided in 1894. The Smithville and Central Canal companies, whose canals take irrigation water from the south side of the Gila near Safford and Thatcher, had tried to reduce the amount of water taken by the upstream Montezuma and San Jose canals, whose canals take water from the south side of the Gila near San Jose and Solomon, but the court ruled against the downstream canals. Another dispute between the Montezuma Canal and its upstream neighbor the San Jose Canal was resolved by a judgment favoring the Montezuma in 1897.

It soon became apparent that piecemeal litigation involving a few canals at a time was not enough to solve the Graham County irrigation water allocation problem,

and in the early 1900s a lawsuit between the Smithville Canal and the upstream Oregon Canal on the north side of the river was expanded to join all 24 Graham County canal companies. This litigation resulted in a decree entered in 1905 by Judge Doan, known as the Doan Decree, which decided how much water each of these 24 companies could take from the Gila River. The decree also provided for the appointment of a water commissioner who would supervise the administration of the decree and required the canal companies to pay him. The Doan decree was appealed by the Montezuma Canal Company all the way up to the United States Supreme Court, which in 1910 upheld the appointment of the water commissioner but did grant Montezuma some relief from the decree based upon its prior judgment against the San Jose Canal company. The 24 canals whose water rights were determined by the Doan Decree, almost all of which had their own separate diversion dams, and the number of acres irrigated by each in 1905, were as follows:

Brown, 100 acres; Sanchez, 400 acres; Mejia, 320 acres; Fourness, 260 acres; San Jose, 3,000 acres; Michelena, 450 acres; Montezuma, 3,750 acres; Union, 2,900 acres; Sunflower, 400 acres; Graham, 962 acres; Central, 2,675 acres; Oregon, 1,100 acres; Smithville, 1,760 acres; Bryce, 515 acres; Dodge, 450 acres; Nevada, 800 acres; Curtis, 800 acres; Kempton, 850 acres; Reid, 100 acres; Ft. Thomas, 960 acres; Thompson, 240 acres; Military, 400 acres; Saline, 46 acres; Zeckendorf, 50 acres.

Although it was later modified in some respects, the Doan Decree might well have settled once and for all the matter of water allocation to the Graham County canal companies, except for two small facts. First, the Gila River is not confined to Graham County. It begins in New Mexico and flows through the Duncan Valley in Arizona before it reaches Graham County, and then flows all the way across Arizona to the Colorado River after it leaves Graham County. And second, the part of the river that is in Graham County serves other agricultural users who were not joined in the Doan Decree litigation—the Apaches of the San Carlos Reservation.

Thus in 1925 the next round of Gila River water allocation litigation was begun when the United States, acting on behalf of the Apaches as well as other Indian tribes on the Gila River downstream from Graham County, filed a new lawsuit in a Federal District Court in Phoenix joining all the river users in Arizona for the purpose of adjudicating all their water rights. The lawsuit was filed in large part because of the construction on the river of the Coolidge Dam, completed in 1928, and the San Carlos Reservoir behind it. The Dam and Reservoir were intended to secure an irrigation water supply for the Pima-Maricopa Indian Communities downstream from Graham County, whose centuries-old farms had been affected by the diversion of upstream river water by the Graham County canals and others. In this lawsuit the interests of the Graham County irrigation canals were jointly represented by the Gila Valley Irrigation District, which the canal companies had formed in 1923.

The 1925 lawsuit went on for ten years and in 1935 finally resulted in a decree agreed to by all parties known as the Globe Equity Decree, which did in fact purport to resolve all the claims to Gila River water from the New Mexico border to the confluence of the Gila and Salt Rivers south of Phoenix. The following table shows the priority dates and number of acres of farmland allowed by the Decree to be irrigated with water from the Gila River above the San Carlos Reservoir by certain of the parties:

<u>Priority Date</u>	<u>Party</u>	<u>Acres Decreed</u>
Immemorial	Pima-Maricopa Indian Communities	35,000
1864	San Carlos Indian Community	1,000
1872-1917	Graham County Canals	32,500

The Graham County canals were also limited to the use of a maximum of 120,000 acre feet of such water per year and the San Carlos Apaches to 6,000 acre feet. But anyone who thought that a single document such as the Globe Equity Decree could

put to rest all the controversy regarding Gila River water rights would have been sadly mistaken. The interpretation and scope and even the underlying validity of the Globe Equity Decree have been the subject of seemingly endless litigation since 1935 that continues to this day.

For example, in 1996 the United States District Court for the District of Arizona issued a decision in what it called the “fourth phase” of the “most recent round of litigation” concerning the enforcement of the Globe Equity Decree. The court identified the issues that were before it in this “fourth phase” as the following (the “UVDs” referred to by the court include the Graham County irrigation canals and “GRIC” refers to the downstream Pima-Maricopa Gila River Indian Communities):

- (1) whether the Apache Tribe's rights to the natural flow of the Gila River are compromised by farming activities in the upper valleys;
- (2) whether apportionments to the Upper Valley Defendants (hereafter "UVDs") are subject to prior calls of both the San Carlos Apaches and the GRIC;
- (3) whether Article VIII(4) requires that there be sufficient water stored for the proper irrigation of 80,000 acres of San Carlos Project lands before any apportionment may be made to UVDs;
- (4) whether the Decree prohibits the diversion of the entire flow of the Gila River by defendants in the Duncan-Virden Valley pursuant to the "Cospers Crossing condition";
- (5) whether, under Article VIII(5), UVDs are prohibited from diverting an available apportionment unless there is water presently stored and available for release in the San Carlos Reservoir;
- (6) what method the Water Commissioner should employ in deducting transit and seepage losses;
- (7) whether the Decree endows the lands in the Gila Crossing District with priority rights that may be enforced as against all upstream parties to the Decree;
- (8) what reporting scheme the Water Commissioner should adopt for ensuring that water is not diverted for use on lands not "then being irrigated," and whether the "then being irrigated" clause and the reporting scheme apply equally in the lower valleys;
- (9) whether the Decree prohibits the use of the waters of the Gila River for purposes other than irrigating "crops of value";
- (10) whether the call system being implemented for managing the Gila River complies with the legal requirements of the Decree; and
- (11) whether the Court should order the permanent removal from the Decree those lands that have been determined to be urbanized by the Arizona Department of Water Resources.

It is far beyond the scope of this paper to discuss how the court resolved these issues, but the court’s decision may be found on the internet by searching on the following case citation: United States v. Gila Valley Irrigation District, 920 F. Supp. 1444

(1996). The District Court's decision was affirmed by the U.S. Court of Appeals for the 9th Circuit in 1997.

More recently, the scope of the 1935 Globe Equity Decree has been litigated in the Arizona state courts pursuant to state legislation authorizing the Arizona courts to conduct what is called "general stream adjudication" to determine water rights in a river. The general stream adjudication proceeding for the Gila River was started in 1981 and is still continuing (with about 24,000 parties). Despite the pendency of the new general stream adjudication in the state courts, The San Carlos Apache Tribe sought more water from the Gila upstream from the San Carlos Reservoir by filing a separate federal court lawsuit, but the United States Supreme Court in an opinion handed down in 1983 ordered the Tribe's federal court suit to be stopped pending the general stream adjudication proceeding. Forced to argue its claims in the state court, the Tribe contended, among other things, that the Globe Equity Decree decided only the Tribe's right to Gila River water based upon the Tribe's prior use of the water but not its right under federal water law to water necessary to effectuate the purposes of the reservation. The Arizona Supreme Court ruled in 2006, however, as part of the general stream adjudication, that the Globe Equity Decree decided all claims of the Apaches to mainstream Gila water and that the Tribe could not now claim additional water rights. Interestingly, after this decision the San Carlos Apache Tribe filed a lawsuit against the United States, claiming that the United States did not adequately represent the Tribe in the Globe Equity case. This claim of inadequate representation was denied by the United States Court of Appeals for the Federal Circuit in April 2011, by a vote of 2 to 1. The Tribe sought to appeal that decision to the U.S. Supreme Court but filed its appeal papers too late.

Not only are Gila River water rights subject to ongoing interpretation of the 1935 Globe Decree in the federal court and to the General Stream Adjudication in the Arizona courts, but they are also subject to the provisions of the Arizona Water Settlements Act enacted by Congress and signed into law in 2004, which primarily settles the water rights of the Gila River Indian Community downstream from Graham County but also imposes certain obligations on the Graham County canals. While that Act and the General Stream Adjudication may resolve some issues, it would be premature to conclude that 120 years of litigation over the rights of the Graham County irrigation canals are near an end. Among many issues yet unresolved, for example, are (1) whether ground water near the Gila that is being pumped into the canals is part of the Gila River and should be counted against the canals' allotments from the river, and (2) the extent to which water rights of farmland that has been washed away by floods or sold to developers may be transferred to other farmland (of the 32,500 acres in Graham County allowed to be irrigated by the canal companies under the Globe Equity Decree, only 26,000 are presently being irrigated). Both these matters are currently being litigated vigorously, and more than 400 transfer applications have been pending in the courts for years. It is entirely possible that at some point the cumulative water rights litigation expenses of the Indian tribes (most of which are paid by the United States government) and the canal companies will exceed the value of all the Graham County farmland owning those rights.

Water Quality Disputes

Water quality litigation involving the Graham County canals has not been as pervasive as water allocation litigation but has been significant nonetheless and has been around for a long time. In the 1890s farmers in Graham County began finding a

white mineral substance in their fields coming from the Gila River irrigation canals that was damaging their crops. They traced the substance to mine tailings being deposited in the San Francisco River, a tributary of the Gila River in what is now Greenlee County, by the copper mines there, which had recently begun expanding their smelting operations. At first the complaints of individual farmers were ignored by the copper companies, but around 1898 Andrew Kimble, the new St. Joseph Stake president who was instrumental in the Enterprise Canal project discussed above, organized the canal users and began negotiating with the mines. When negotiations failed, the canal users filed a lawsuit against the Arizona Copper Company of Clifton and other mining companies on the San Francisco River. The lawsuit, entitled *Gillespie v. Arizona Copper Company*, resulted in a ruling handed down in November 1907 prohibiting the copper mines from depositing smelter tailings in the river. The Arizona Copper Company appealed this ruling all the way to the U.S. Supreme Court, which affirmed the lower court ruling in an opinion rendered in 1913.

Much more recently, the Graham County farmers who were complaining about pollution in the Gila River in the 1890s have been themselves accused of causing the River to be unsuitable for agriculture by users downstream from them. One of the major issues in the 1996 Federal District Court case discussed above involving the Globe Equity Decree (*United States v. Gila Valley Irrigation District, et al.*) was whether the Graham County canal users were depriving the San Carlos Apache Tribe of its right under the Decree to the “natural flow” of the Gila by causing the river water to become too salty to support the Tribe’s traditional agriculture. The Tribe alleged that the canal users were doing this by pumping ground water containing salt into the canals to supplement river water, which then remained in the water returned to the river from the canals. The court, after weighing the conflicting

evidence, found that the Graham County canal users were “responsible to a significant degree for the degradation of the water reaching the reservation boundary.” The court ordered the parties to negotiate with each other and with the Water Commissioner to come up with a plan to reduce the salinity of the Gila River water reaching the reservation, which might include capping the wells producing the most saline water.

3. Natural Disasters On The Canals

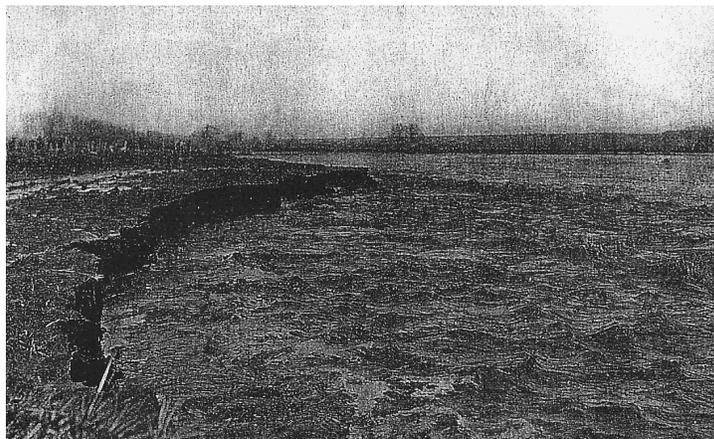
The erratic water flow in the Gila River that has led to litigation over water allocation in times of drought has also led to other, and more serious, problems in times of heavy water flow. When European settlers arrived in the Upper Gila Valley in the late 1800s the river was lined on both sides with a heavy growth of trees and was no more than 100 to 150 feet wide. It had likely been that way for many hundreds of years, as the tree growth anchored the soil on both sides of the river. But the cutting of the trees and other practices by early farmers that lessened the natural containment of river water in its channel have had disastrous results. Damaging floods have occurred at least 17 times since 1890, and major floods have occurred at least eight times in that period. These floods have broadened the river channel by thousands of feet, wiped away hundreds of acres of farmland, and destroyed the canals built to irrigate the remaining land.

Although some floods occurred in the late 1800s, they do not appear to have had a major impact on the canals, probably because the narrow stream course, the well-defined banks and the substantial vegetation along the river slowed the force of the flood water. The eight major floods affecting the canals all occurred in the 20th century. They are listed in the following table:

<u>Year</u>	<u>Peak water flow on Gila in Graham County in cubic ft./second</u>
1905	?
1906	70,000 (at Clifton on San Francisco R.)
1914	?
1916	108,000
1972	80,000
1978	100,000
1983	150,000
1993	92,000

The floods of 1905 and 1906 washed out the diversion dams of most of the canals, which had to be rebuilt, and also swept away farmland. But perhaps the most significant effect was that these floods finally changed the shape of the Gila River in Graham County forever, completely destroying the narrow channel and leaving a stream bed more than a thousand feet wide.

The floods of 1914 and 1916 were as damaging as those of 1905 and 1906 and washed out nearly 1,600 acres of land owned by farmers in the Valley and almost 1,000 acres on the San Carlos Reservation, increasing even further the width of the river bed. The following picture taken after the 1916 flood illustrates the extent of the erosion and how wide the river channel had become:



After the 1916 flood a study requested by the U.S. Congress was made of possibly building rock levees to stop any future flooding for about 35 miles along both sides of the Gila in Graham County, but it was concluded that the cost of building such a levee would exceed the value of all the Graham County farmland, and the project was dropped. Other less costly proposals were made in the study but not acted upon.

Surprisingly, after the 1916 floods nature seemed to have decided to control the floods itself, and there were no more major floods for more than 50 years. (A minor flood in 1941 (with a peak river flow of 32,000 c.p.s.) did damage some of the rock and log diversion dams and caused the canal companies to replace them with concrete.) The San Carlos Reservoir behind the Coolidge Dam, which was expected to fill within a few years of its construction in 1928, did not reach that goal until the 1970s, and the first uncontrolled flow over the Dam did not occur until 1993.

The next major flood finally occurred in October of 1972. It came before the cotton had been harvested and resulted in crop losses alone of some \$8 million, as well as damage to the canals. Some farmers reported water 10 to 12 feet deep in their fields. In one weekend 150,000 acre feet of water flowed into the San Carlos Reservoir, which was more than an entire year's water allocation to both the Graham County canals and the San Carlos Apaches under the Globe Equity Decree. Because it had been so long since the last major flood, the 1972 flood came to be known as the "Fifty Year Flood."

Two years before this 1972 flood the Army Corps of Engineers had started work on a flood control dam upstream from the Graham County canals at a site called Camelback Mountain, but work on the dam was stayed by a court order in a lawsuit filed by the Sierra Club and other environmental groups complaining that a required environmental impact statement not been prepared. Many people believed that if the

project had not been stopped by the court the flood damage would have been substantially less. However, once the environmental impact statement had been prepared and the stay lifted the project was not resumed because of the cost. It was estimated that the dam alone would cost \$28.4 million and that substantial additional costs would be incurred in clearing the river channel of trees and brush and keeping it clear. Congress was not willing to appropriate funds to pay the entire cost of the project and state and local governments were unwilling to make a substantial contribution to it.

Unfortunately, the farmers of Graham County did not have the luxury of waiting another fifty years for the next major flood. In December of 1978 flood waters from the Gila River that were seven feet deep in Duncan in Greenlee County also inundated much of the Safford Valley. This flood took out 100 year old trees and all the diversion dams in Graham County as well as the five bridges over the Gila in Graham County. Total damage to irrigation structures in Graham County was estimated at \$10 million. With a peak flow rate 25% greater than the “Fifty Year Flood” of 1972, it came to be known as the “Hundred Year Flood.” Graham County was declared a disaster area, and the canal companies were able to obtain state and federal funds to rebuild the diversion dams, but only on the condition that they consolidated their operations so as to require only six diversion dams for the whole County, whereas earlier there had been more than twenty. (This consolidation of the diversion dams was, incidentally, something that Judge Doan had strongly recommended in issuing his allocation decree back in 1905, but the recommendation had not been followed.)

Less than five years later, in late September and early October of 1983, yet another major flood washed through the Safford Valley. Seven to nine inches of rain

fell in the Safford Valley over a period of six days (and some fifteen inches fell on the south side of Mt. Graham, causing runoff that reached and closed Interstate 10). This flood, with a peak river flow of 150,000 c.f.s., 50% higher than the 1978 flood, was called the “Five Hundred Year Flood,” and damaged the six new diversion dams but did not destroy them. Damage to irrigation structures was estimated at \$5 million to \$7 million and crop and farmland losses at \$10 million. Disaster relief money became available for repairs but not replacement. The farmers in the Valley were devastated, and it was reported that 40% of them stopped farming as a result of this flood, either losing or selling their farmland or deciding to rent it out to others. The following photograph shows the 1983 flood waters even reaching buildings near the river.

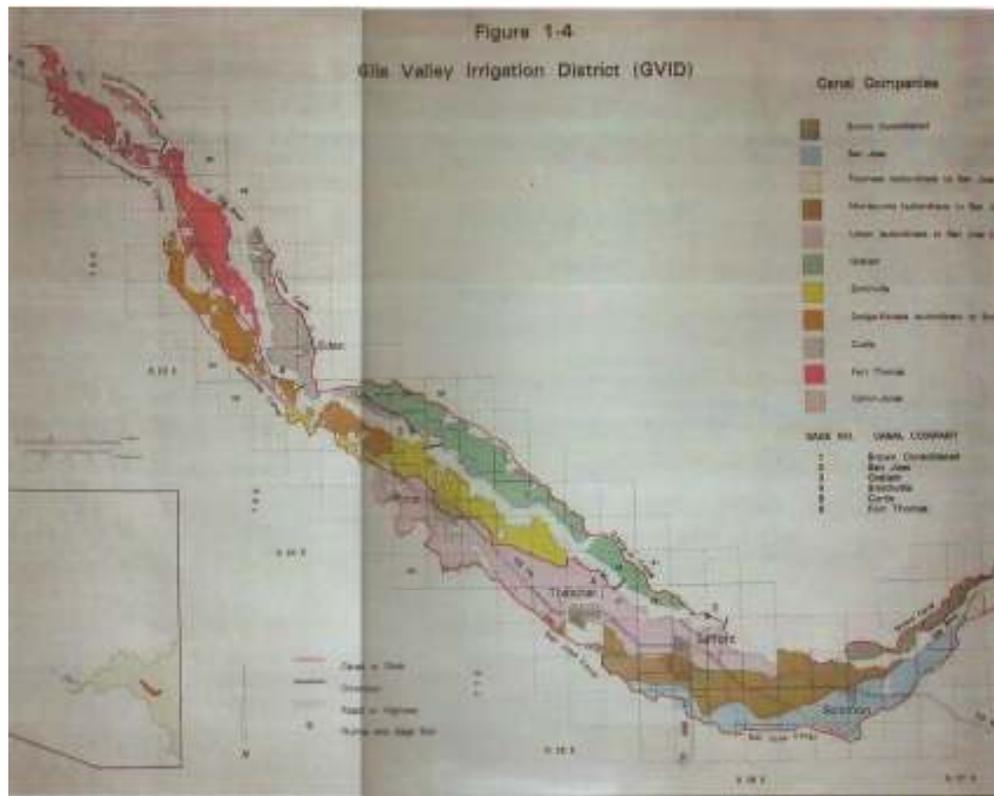


Finally, the last major flood (to date) struck in 1993 after two weeks of steady rain. At a peak rate of 92,000 c.f.s. it wasn't as strong as the Five Hundred Year flood of 1983 or the Hundred Year Flood of 1978, but it exceeded the Fifty Year Flood of 1972. Damage to the new diversion dams and other irrigation structures was “only” about \$2 million, but 6,000 acres of farmland were damaged to some extent, with one farmer losing a forty acre field overnight.

As a result of the consolidation of canals required after the 1978 flood in order to obtain government funds for replacement and repair, only the following ten canal companies and six diversion dams remain in Graham County:

<u>Canal Company</u>	<u>Diversion Dam</u>
Brown	Yes
Curtis	Yes
Dodge-Nevada	shares Smithville
Fort Thomas	Yes
Graham	Yes
Highline	shares San Jose
Montezuma	shares San Jose
San Jose	Yes
Smithville	Yes
Union	shares San Jose

Following is a map obtained from the Gila Valley Irrigation District showing the current canals (as of 2012):



The following satellite image from Google Earth shows one of the present day diversion dams that serves the San Jose, Montezuma, Union and Highline canals:



And the following photograph shows this dam from ground level:



No major floods have occurred in the past 18 years. Hopefully the improvements and repairs made after the 1972, 1978, 1983 and 1993 floods such as are shown in the above pictures will continue to hold up when the next big flood comes.

ACKNOWLEDGEMENTS

This paper relies heavily on two sources: *History of Water in Graham County* by Verna Rae Colvin (1998), and *Graham County History Vol. 2: Mt. Graham Profiles*, a collection of articles written by Ryder Ridgway from 1974 to 1985, both of which are available from the Graham County Historical Society. A third important source regarding pre-1900 canal development in Graham County is a thesis paper entitled *Settlement and Growth of the Gila Valley as a Mormon Colony* by Oran A. Williams (1937), available from the University of Arizona Library. Other sources too numerous to list include court decisions and court filings, statutes and legislative reports, historical weather records, research papers on prehistoric water management in the Safford Valley, publications of various government agencies such as the Arizona Department of Water Resources, and articles published in the *Graham Guardian* newspaper during the period 1895-1916 and in the *Eastern Arizona Courier* in the flood years of 1972, 1978, 1983 and 1993. Also of great assistance has been information supplied by Neal Montierth, Executive Secretary of the Gila Valley Irrigation District and Hal Herbert, Director of the Graham County Historical Society.