3-11-03

The Upper Santa Cruz River: History of a Lessening Stream

By
Jack L. August, Jr., Ph.D.

In 1910, in a widely referenced and oft-cited report that pertains to the history of the Santa Cruz River Basin, G.E.P. Smith, the acclaimed University of Arizona hydrologist, described the Santa Cruz River as an "ever a dwindling stream." As Arizona statehood approached, the hydrologist, who was undertaking a major study of water resources in the basin, concluded that the river had diminished to such an extent—he labeled it a "brook"—that its middle basin tributary, Rillito Creek, looked far more promising as a future water source for residents of Tucson and the Santa Cruz Basin. As one recent scholar of the river asserted, at the time of statehood in 1912 the Santa Cruz River, which had provided water for residents, wildlife, and vegetation for thousands of years had ceased to flow, and inhabitants of the river's three basins—upper, middle, and lower--began the nearly century long search beyond the basin to secure water for future growth and development.[1]

According to Barbara Tellman and Richard Yarde, in their narrative, *A Historical Study of the Santa Cruz River,* beginning with the earliest Native American inhabitants, the primary activity in the Santa Cruz River Basin was agriculture. This fundamental activity, moreover, was facilitated by the development of irrigation works to divert the river's flow. From the flood plain techniques of the indigenous inhabitants to the

[1] This search would end, of course, with water from the Central Arizona Project, which began deliveries to Tucson and the middle basin of the Santa Cruz in 1990. See, Michael F. Logan, *The Lessening Stream: An Environmental History of the Santa Cruz River* (Tucson: University of Arizona Press, 2002) 3; G.E.P. Smith, "Groundwater Supply and Irrigation in the Rillito Valley," University of Arizona, University of Arizona Agricultural Experiment Station, Bulletin No. 64, 1910, 118. Note, the author reviewed Logan's manuscript for the University of Arizona Press and recommended publication of this manuscript that was submitted in 2001.

acequias of the Spanish and Mexican settlers, to the increasingly efficient groundwater pumps of the Anglo settlers in the nineteenth and twentieth centuries, the Santa Cruz River has served as the central source of irrigation for the Santa Cruz Basin.[2]

From its headwaters in Arizona's Canelo Hills, the Santa Cruz River crosses southward into Mexico for thirty-two miles, the only river to originate in the United States, flow out of the country, and then return to continue its course within the United States. For perhaps a half-million years the river had crept and oozed some 205 miles from its headwaters to its terminus in the Gila River Valley. It drains a watershed of 8,581 square miles and has helped sustain a variety of natural and human societies. Countless forces and variables affecting the diminutive river's history, like thousands of cattle grazing in the hills trampling the banks, climatic change, periods of flood and drought, and the impact of thousands of years of prehistoric cultures, Native American, Spanish, Mexican, and Anglo American inhabitants, all of which affected and in most cases, depleted the rivers resources.[3]

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[2] Prior to the arrival of the first Spanish missionaries in the late seventeenth century, Piman-speaking Indians—often called Sobaipuri by the early Spaniards, had established a series of settlements (rancherias) along the Santa Cruz River. One was located approximately ten miles north of the present-day United-States-Mexican border at a village the Sobaipuri called "gi-vavhia." This name was later corrupted by the Spaniards into "Guevavi." Another was located fifteen miles north of the first village and was located in the present-day area of Tumacacori. In both areas the Indians supplemented their hunting and gathering of wild foods by practicing flood plain agriculture. The beans, corn, and squash that they grew were watered from the Santa Cruz and during rainy seasons from nearby arroyos. Irrigation techniques were crude, yet effective. By damming the river with brush and debris at designated areas, the level of the water would be raised sufficiently to permit it to overflow into the fields. In, fact, a few irrigation canals were used for channeling and these ditches have been excavated. Canals B and C of the Upper Pima of San Cayatano, for example, were used prior to the first European contact to irrigate fields in the Palo Parado area of what was later to become the Baca Float Number Three. See, John L. Kessell, *Friars, Soldiers, and Reformers: Hispanic Arizona and the Spanish Mission Frontier, 1767-1856* (Tucson: University of Arizona Press, 1976) passim; John L. Kessell, *Mission of Sorrows: Jesuit Guevavi and the Pimas, 1691-1767* (Tucson: University of Arizona Press, 1970) 13, 21, 22; Michael C. Meyer, *Water in the Hispanic Southwest: A Social and Legal History, 1550-1850* (Tucson: University of Arizona Press, 1984) 11-12; Michael C. Meyer, "Agricultural History of Baca Float Number Three," unpublished manuscript, (July 1985) 4.

[3] Barbara Tellman and Richard Yarde, *A Historical Study of the Santa Cruz River: Background Information for Determination of Navigability of the River at the Time of Statehood, 1912* (Tucson: Water Resources Research Center, University of Arizona, 1996) 1-5.

The first recorded water rivalry in the upper basin emerged when the new presidio at Tubac opened in 1752. The soldiers at Tubac appropriated the best land for irrigation from the Santa Cruz River. These developments worked to the disadvantage of the Indians and created no small amount of tension. A map of the presidio, crafted in 1776, shows extensive cultivated fields using an irrigation ditch that tapped the Santa Cruz (the river is labeled the Rio de Tubac on the map). Spanish law provided that conservation of the water was crucial and irrigation canals were to empty back into the same stream from which they took the water. As University of Arizona professor Michael C. Meyer asserted in a 1985 study of the upper basin of the Santa Cruz, "The law was not always obeyed in the Hispanic Southwest, but in the case of Tubac, as the map clearly shows, it was." For the second half of the eighteenth century, competition for water from the Santa Cruz was pronounced among soldiers, missionaries, and Indians and ultimately, given the river's meager and intermittent flow, a compromise was reached. Tubac commander Juan Bautista de Anza instituted a water rotation system, whereby the mission at Tumacacori received water for one week and the presidio secured it for the next.[4]

In fact, one hundred fifty-one years before Arizona statehood, in what Tellman and Yarde designate the "Spanish/Mexican Period"[5] of the river's history, an intrepid priest penned the first recorded account that the Santa Cruz River had insufficient flow for the demands placed upon it. In 1761, the priest at San Xavier del Bac, Father Manuel de Aguirre, wrote the governor of New Mexico that there was "plenty of land for

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[4] Meyer and Kessell, in separate accounts, assert that if the Tubac-Tumacacori complex were typical, in times of scarcity, the presidio would receive preference based upon the primary need for "national defense." Meyer, "Agricultural History of The Baca Float Number Three," 7; Kessell, *Friars, Soldiers and Reformers,* 132.

[5] Tellman and Yard, *Historical Study of the Santa Cruz River*, 22-29. The portion of the report covers the exploration and settlement of the area, Jesuit introduction of new crop species to the upper basin, and the nature of Spanish exploitation of the river and its attendant resources.

everyone, but not enough water to sustain the existing Spanish and Indian population." [6] This assertion, in the context of a drought that lasted through most of the 1760s, typified the "inevitable times of below-average precipitation," causing the river's flow to be inadequate. Significantly, this particular drought took place in the context of the Jesuit expulsion of 1767—the result of a political struggle between King Charles IV and the Pope—and the arrival of their Franciscan replacements. The Franciscans discovered quickly that most Hispanic colonists in the region had converged on Tubac in the upper basin, which had been established fifteen years prior as a military garrison to defend Spanish interests against hostile Apaches. The presidio's population, according to historian John Kessell, whose account, *Friars Soldiers and Reformers: Hispanic Arizona and the Spanish Mission Frontier, 1767-1856,* provides stark insight into life and society in the upper basin during that period, numbered around five hundred and the garrison was comprised of "fifty one men, including three officers and interim chaplain, their dependents and assorted hangers-on." The civilian population included several dozen settlers from abandoned ranches upriver. Another scholar of northern colonial New Spain, James Officer, noted that Tubac's population in the1760s and early 1770s was probably "the largest it would ever be during the Spanish and Mexican periods." But as the 1770s progressed, the overall population in the upper basin began to decline as another dry-cycle combined with persistent Apache raids forced the settlers to abandoned the hinterland for the safer environs of Tubac.[7]

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[6] Michael C. Meyer, *Water in the Hispanic Southwest: A Social and Legal History, 1550-1880* (Tucson: University of Arizona Press, 1984) 56, 61; Logan, *Lessening Stream*, 50. Summer rains came late in 1768 resulting in a disruption of agriculture in the middle basin, thus making the Indians much more amenable to proselytizing by the Spanish priests.

[7] Kessell, *Friars Soldiers and Reformers*, 39; Meyer, *Water in the Hispanic Southwest*, 64; James Officer, *Hispanic Arizona, 1536-1856* (Tucson: University of Arizona Press, 1987) 47. According to Philip and

In 1775 the environmental pressures on the river were relieved temporarily when the Spanish crown made the decision to move the Tubac presidio north to Tucson and for a short period the valley of the upper basin thrived. In effect, the move shifted demands on the river from the upper basin to the middle basin. The new Tucson commander, Don Pedro Allande y Saabedra, quickly began making land grants to the civilian arrivals, who, in turn, created competition with the Pima villages across the river, for what one scholar called, "a dwindling stream supply." Moreover, as the Spanish presence in the middle basin increased, livestock herds expanded, and the then-predictable Spanish-Indian dispute arose as cattle trampled Indian crops.[8]

As suggested above, in the depopulating upper basin, the situation altered the amount of water available for irrigation at Tubac and Tumacacori. Agricultural production increased to around 900 bushels of wheat and corn annually in the late 1770s. Without the garrison at the presidio in Tubac the Hispanic population gradually abandoned the area, yet the Santa Cruz remained an intermittent source of water. By the next decade the river in the upper basin supported around two hundred Spanish and Mexican families. A census in 1783 reported that Tubac was abandoned: "its 158 persons having left for the Colorado River settlements or the presidio of Tucson because of water shortages and Apaches." It appeared that Tumacacori still had 125 residents and Calabasas numbered 84.[9] Drought conditions reminiscent of the 1760s, combined with the advent of declining water supplies, increasing environmental stress, and the incessant Apache threat, helped to further depopulate the upper basin. While the river's pattern of

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Halpenny, Tubac and its environs has had irrigated agriculture continuously for over 400 years and San Xavier, in the middle basin has been almost continuously farmed from prehistoric times to the present.

[8] Logan, *Lessening Stream,* 52; Kessell, *Friars, Soldiers, and Reformers,* 18; Officer, *Hispanic Arizona,* 51, 58.

[9] Logan, *Lessening Stream,* 258.

ebb and flow and decline and rise characterized the late eighteenth century, the unrelenting influence of increasing agricultural activity and proliferating livestock imposed, as one scholar put it, "powerful influences on the river."[10]

The Spanish colonial government, in the 1780s, instituted a new Indian policy, the "Establacimientos de Paz," (Establishments of Peace) which held significant consequences for the river. In short, Spanish administrators sought to entice the recalcitrant Apaches, with gifts, food, and support, to settle in villages rather than raid Spanish settlements. It was an effort to "buy off" the tribe. While successful in some parts of New Mexico, raiding nevertheless continued. In the upper basin, the Spaniards reestablished the presidio at Tubac and within a short time Apaches seeking peace began showing up at the newly reconstituted presidio. They headed toward Tucson as well. In the latter community, for example, the commander welcomed one group with a gift of raw sugar and fifty head of cattle. Soon, the numbers of Apaches living outside the presidio walls swelled to over one hundred. The result was that the Apaches lived on rations provided by the presidios. They appear never to have engaged in agriculture. As a consequence, the presence of what one historian called, "an increasing, unproductive population ...added to the necessity for surplus production" of agricultural products. This impacted the level and type of agriculture and, as a consequence, added further stress on the river.[11]

Human and livestock populations increased through the 1790s. When Franciscan Father Bringas traversed the region in the 1795 on his task to report on conditions in the

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[10] Logan, *Lessening Stream,* 53.
[11] Logan, *Lessening Stream,* 54; Jack L. August, Jr., "Balance of Power Diplomacy in New Mexico: Governor Fernando de la Concha and the Indian Policy of Conciliation," *New Mexico Historical Review* (Spring 1981).

Pimeria Alta (northern Sonora and southern Arizona), he often referred to the conflict between settlers and Indians over land and water. In 1796 a lingering drought forced 134 Papagos from northwest of the presidio of Tucson to resettle at the Pima village of El Pueblito at the foot of Sentinal Peak. The increased population combined with unrelenting drought conditions meant that there was insufficient water to satisfy all needs. The Spaniards would not share the water with the newly arrived Papagos. As drought conditions worsened presidio soldiers helped themselves to the water, leaving the Indians "hardly a trickle." Conflict over water allocations, rules, traditions and law carried over into the Mexican period with little hope for resolution.[12]

Indeed, continuity marked the river's status as sovereignty transferred from Spain to Mexico in the upper basin. The river supported life but, for the most part, cattle, sheep, and horses replaced humans. By 1800, according to one recent study, Spanish and native population had fallen to less than 2000 people. A resurgence of Apache raiding, epidemics,[13] and the destabilizing influence of the Mexican Revolution of 1810-1821, contributed further to declining conditions on the frontier and continued to influence upper basin water supplies and use into the Mexican period. With the coming of the Anglos and another change in sovereignty, agricultural production sprung to life anew

[12] Meyer places the dispossessed Papago group at San Xavier del Bac rather than El Pueblito, where Kessell suggests they moved. Kessell, *Friars, Soldiers, and Reformers*, 197; Meyer, *Water in the Hispanic Southwest* in the Hispanic Southwest, 61. Meyer described the growing controversy in the area in vivid terms. There were four competing entities utilizing the river's resources in the Tucson Basin during the late colonial period; the Pima village known as El Pueblito near the presidio, the presidio community, the communal mission lands of San Xavier del Bac, and the individual farms of the Pimas and Papagos. The competition resulted in an accord. The local priests were sympathetic to Indian claims and convinced provincial officials that they should receive three fourths and the Spaniards one-fourth of the waters. Given the dwindling resource in the face of increased demand, the accord achieved little.

[13] According to Meyer, the mission of Tumacacori experienced difficult times during the period of the struggle for independence. A severe smallpox epidemic added pain to meager harvests. Meyer, *Agricultural History of The Baca Float Number Three*, 15-16.

and the Santa Cruz commenced the last phase of its inevitable descent from intermittent stream to underground resource.

Tellman and Yarde asserted that the Santa Cruz River in the early and middle nineteenth century remained much as it was before the Spanish arrived. It maintained perennial reaches from its headwaters to just north of Tubac, where it sunk into the sand and rose again near Martinez Hill at San Xavier del Bac. The waters again disappeared and rose to the surface around the marshes at the base of Sentinel Hill ("A" Mountain). Finally, it disappeared again north of Tucson, near the Pima/Pinal County line and became, "virtually indistinguishable from the desert all the way to its confluence at the Gila."[14]

Historians of American expansionism are unanimous in their interpretation of the primary objective in the War with Mexico (1846-1848): the acquisition of California. The Santa Cruz River Valley, in contrast, was not viewed as attractive or desirable, and when the war ended it remained part of Mexico. Yet, the river valley served—as it had for centuries—as an overland transportation route. For the Mormon Battalion in 1846, and shortly thereafter for thousands of gold seekers, it worked well as a thoroughfare to California as the westward tilt of American civilization commenced in earnest. The critical ten-year period 1846-56, moreover, introduced another chapter in the river's history and ushered in a half century of inexorable decline of surface flows.

Notably, of the five hundred men who comprised the Mormon Battalion, several kept journals of the expedition, and rendered descriptions of the valley's fertility, or lack of it; accounts vary. Still others provided accounts, some fanciful, about the Santa Cruz and its uneven and undependable surface flow. As these first Mormon

[14] Tellman and Yard, *History of the Santa Cruz River*, 29

soldiers/sojourners entered the region from the east, at San Bernardino Ranch, in late 1846, they encountered "numerous herds of wild cattle," that could be hunted like buffalo. One soldier, Henry Bigler, claimed the meat was "the sweetest I ever eat [sic]." Another chronicler of the expedition wrote, "The best judges think 10,000 cattle come for water."[15]

On the eve of the forty-niner migration, Mexican officials reported severe water shortages in the valley and settlers on the edge of starvation. The influx of travelers, however, created markets and an impetus for surplus production beyond subsistence requirements. As a result, the river was called upon to respond to these changing needs. Another series of Apache raids and disruptions marked late 1849 and 1850, creating another wave of population shifts from the upper basin to more populous Tucson. In 1851, three years preceding the Gadsden Purchase, Mexican officials welcomed a group of Mormons into the upper basin and this development illustrated the vexatious nature of the river.

In that same year Tubac had once again been reoccupied as a military colony following a particularly brutal Apache raid at Calabasas. The group of Latter Day Saints had been heading for San Bernardino, California, but Mexican administrators, seeking to develop the area, convinced them to stay in the upper basin. The weather was agreeable, even salubrious, and the promise of free land provided further inducement. Although the Mormons eventually left, the new military colony at Tubac signaled another cycle of growth in the upper basin. In 1853, also, a group of peaceful Apaches living near Tucson

[15] Robert Bliss added, "we kill all we want and more than we need...their meat is tender." Much to the amazement of the soldiers, the numbers of cattle, antelope, and wild horses, increased as the battalion traveled downstream—northward—through the valley. See Henry W. Bigler, "Extracts from the Journal of Henry W. Bigler," *Utah Historical Quarterly* (April 1932) 35-64; Robert S. Bliss, "The Journal of Robert S. Bliss," *Utah Historical Quarterly* (July 1931) 67-96.

resettled in Tubac thus adding to this unlikely rebirth of population growth and economic activity in the area.

The next series of early Anglo observations of the upper basin came in the guise of boundary and railroad surveys from 1851 to 1855. Perhaps John Russell Bartlett, who toured the area as part of the U.S. Boundary Commission in 1851 and 1852 and, among other things, commented upon the Mormon experiment at Tubac, reflected most accurately river flow conditions at this juncture. He remarked upon the "uncertainty of the streams within this country," and upon his arrival at Tubac, he complained about the poor and dilapidated condition of the presidio, which, as noted above, had been reoccupied the preceding year. He attributed the poor conditions to unreliable water resources as well as Apache depredations. The Mormons, he noted, who had been convinced to stay because of the free, alluvial fields already serviced by acequias, had nevertheless struggled. The Mexican commander, he explained, had assured the Mormons that they would find ready markets for corn, wheat, and vegetables from troops and passing emigrants. Indeed, the Mormons commenced work, plowing fields and planting crops, but, according to Bartlett, "the spring and summer came without rain; their fields could not be irrigated; time and money were lost." Doubting that laziness or inefficiency contributed to their problems, Bartlett surmised that the Mormons experienced the fitfulness of rain and limited surface river flow in a semiarid environment. The intermittent stream, in the end, doomed the effort."[16]

The upper basin's transition to American sovereignty presaged even further change in the river's circumstances. Mining, farming, and ranching activity increased

[16] See John Russell Bartlett, *Personal Narrative of Explorations and Incidents in Texas, New* Mexico, *California, Sonora and Chihuahua,* 2 vols. (New York: D. Appleton Company, 1854) 119-120, 300-308; Bernard Fontana, "Calabasas of the Rio Rico," *Smoke Signal,* 24; Logan, *Lessening Stream,* 104-105.

over the next two decades and the era of diminished demand on the river came to an end. As one recent scholar assessed the Americanization of the upper basin in the period 1853-1856, "The Santa Cruz's aboveground days were numbered."[17] By the end of the 1870s, the change was more pronounced. The upper and middle basin, especially, began attracting engineers and developers who fostered steady increases in utilization and manipulation of the river. More humans placed more demands on the river and it began to disappear.[18]

These historic impacts, however, paled in significance compared to the pressures brought to bear directly upon the river with the introduction of industrial society to the Santa Cruz River Basin in the early 1880s. Steel rails and steam pumps, or, specifically, the Southern Pacific Railroad, which commenced service in Tucson in 1880, along with the development and widespread us of new groundwater pumping technologies during that critical decade, further diminished surface and groundwater resources. And, the human cultures whose historic view of the river was restricted, for the most part, to an aboveground river were forced to alter their collective perspectives. The river, which from most historic accounts disappeared just north of Tubac, took on an entirely different role for upper basin and middle basin residents in the 1880s and 1890s. With certainty, by the turn of the twentieth century, upper basin residents and inhabitants of the growing city of Tucson in the middle basin, looked underground for the river's life-giving sustenance. Indeed, three decades before statehood, the view of the river had commenced to shift from above ground to below. Professor Smith's musings about the "brook" that was the Santa Cruz River, reflected accurately public perception of the meandering

[17] Officer, *Hispanic Arizona*, 283-288; Thomas Sheridan, *Los Tucsonenses: The Mexican Community in Tucson, 1854-1941*(Tucson: University of Arizona Press, 1986) 30-31.
[18] Logan, *Lessening Stream*, 131.

stream at the time of statehood.[19] The notion that the upper or middle reaches of the Santa Cruz River could sustain navigation or commerce at statehood never occurred to Smith as a plausible consideration.

This new era, the modern era, was marked, of course, by faith in science and technology. Engineers represented the trend toward rationalism that required the compilation of information about the river. As the river began to disappear in the late nineteenth and early twentieth centuries, scientists and engineers tracked the process of decline. In the upper basin, the railroad arrived in 1882 with a circuitous route to Mexico through Sonoita Creek. This coincided with a diminishing Apache raids and the return of large-scale ranching in the area. The new spur also stimulated the resettlement of Calabasas and the development of the border communities of Nogales, Arizona and Nogales, Sonora. The border towns, and their rapid growth, altered settlement patterns in the upper basin and in the 1890s, through a private company, it began tapping groundwater supplies appurtenant to the river. In time, the rapidly growing border towns that lay in a canyon tributary to the mainstream of the Santa Cruz, nevertheless, sought water from the river.[20] As the twentieth century dawned, the river became an object for further schemes and plans to exact more water even as it disappeared. But as Arizona strived for statehood, farmers, miners, ranchers, and engineers looked more at the river's aquifer as a resource to be exploited rather than its meager surface flow. The

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[19] Logan, *Lessening Stream*, 5-7. According to Logan, three general perceptions have defined residents of the river valley; archaic, modern, and post-modern. By archaic, he suggests a view of the river that goes no farther than the surface flow. This, in fact, defines the human perception of the river through most of its history, from the first human presence in the valley to roughly the late nineteenth century. In effect, Native American, Spanish, Mexican, and Anglo-American inhabitants viewed the river as providing sustenance from its meager flow. By the modern perception of the river, he means the view of the river that looks beyond, through, and beneath the surface flow of the river to the aquifer underground.

[20] Logan, *Lessening Stream*, 141. As the two Nogaleses grew they needed water systems and one of the earliest pioneers in the area, Leopold Ephraim, developed a private water company in 1896. He controlled wells on both sides of the border and provided water to both communities.

underground aquifer became the subject of sophisticated extraction techniques. The surface flow had not only lessened, it virtually disappeared. In a telling comment echoing the sentiments of University of Arizona's G.E.P. Smith, government scientists C.R. Olberg and F.R. Schrank, derisively referred to the Santa Cruz River as "the so-called Santa Cruz River." This statement, written in the context of a federal government survey, was drafted in 1912.[21]

Post statehood in the upper basin of the Santa Cruz has seen the development of an international water treatment plant that has created an artificial flow of effluent, and, as a result, increased riparian habitat. Even with the plant's discharge, the river does not flow past Tubac.

Thus, the "so-called" Santa Cruz River, according to these scientists, had changed dramatically during the last two decades of the nineteenth century. Drought and overgrazing denuded the San Rafael Valley's terrain, eroding the landscape. The railroad had spurred growth, creating new communities and reinvigorating old ones. The stream that emanated from Nogales Wash was compromised as domestic and other uses in the twin Nogaleses increased in the early decades of the twentieth century. Similarly, agricultural and domestic use of water at Calabasas and Tubac—reborn once again—reached unprecedented levels. All these developments placed new peaks of demand on the river.[22]

Thus, whether in agriculture or incremental urban and industrial development, the upper basin, during the first two decades of the twentieth century, witnessed profound changes in the river and its circumstances. The draw of waters from farms and ranches,

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[21] C.R.Olberg and F.R. Schrank, *Irrigation and Flood Protection, Papago Indian Reservation, Arizona,* 62 Cong. 3 Sess., Document No. 973 (1913) 5.
[22] See Meyer, *Agricultural History of The Baca Float Number Three,* 35-51.

coupled with the new urban centers growing at the border, wrought permanent change. Pumps began taking water directly from the river. The uses of the Santa Cruz River in the upper basin had been modified not only agriculture but also new urban uses.

Since the period of earliest recording, the use of the Santa Cruz River for irrigation has been significant and well documented. With annual rainfall of less than fifteen inches, cultivation of most crops in the basin required extensive irrigation. As early as the 1750s, conflict over meager supplies required water-sharing arrangements. Much later, in 1903, as territorial Arizona struggled for statehood, a governor echoed the claims of his constituents in the Santa Cruz Valley and reported that during the dry season the supply of water for irrigation was far from adequate. Furthermore, the United States Census reported a four-fold increase in the number of acres under irrigation between 1889 and 1909, an increase which prompted the same territorial governor to advocate pumping ground water in order to expand agricultural production. Agriculture dominated the history of the Santa Cruz River Basin and irrigation, during the intermittent periods of flow, sustained the population. By the late nineteenth century, a modern view of the river had emerged, and that view centered on groundwater pumping.

Virtually no evidence exists to suggest the river was at any time navigable. Indeed, the river's most recent biographer, Michael Logan, entitled his eloquent and scholarly volume published in 2002, *The Lessening Stream: An Environmental History of the Santa Cruz River*. It never mentions navigation. This persuasive interdisciplinary synthesis, supported by sound primary research, skillfully weaves history with geology, archaeology, and anthropology and concludes that the history of the upper Santa Cruz River centered on irrigation and agriculture, not navigation or commerce. Similarly,

Tellman and Yarde dutifully attempt to report navigation possibilities in their account. However, compelling primary source information that suggests that the Santa Cruz River as a navigable stream does not exist. Put another way, the long and tempestuous history of conflicts over a chronically intermittent stream and the high premium given to its irrigation capabilities--the great demands placed upon the documented limits of the surface waters—further indicates that navigational use was highly unlikely. The preponderance of scientific evidence, moreover, especially the studies of Smith, Olberg, and Schrank, conducted at the time of statehood, attests to the fact that surface flows at that time were virtually non-existent. The waters of the Santa Cruz River fueled the basin's economy but they were not used for their navigability and transportation value. Instead, this "lessening stream's" intermittent supply served agricultural and domestic needs. Beginning in the late nineteenth and early twentieth centuries, groundwater pumping dominated the river's and the region's history until Central Arizona Project water arrived in 1990 to alter the culture of pumping the underground river. On February 14, 1912, one would have had to fantasize that the river was navigable, not only because no evidence exists to support that notion, but also contemporary accounts suggest the river flowed little, if at all.[23]

[23] See Jack L. August, Jr., *Vision in the Desert: Carl Hayden and Hydropolitics in the American Southwest* (Ft. Worth: Texas Christian University Press, 1999) chapter 9-10.

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Education

1985 Ph.D. in History with distinction from University of New Mexico
1979 M.A. in History from University of Arizona
1975 B.A. in American Studies from Yale University

Current Activities and Brief Biography

A historian in Northern Arizona University's Statewide Programs, Dr. Jack L. August, Jr. has recently taught courses in Western Water Policy and the New American West for the Master's in Liberal Studies Program and undergraduate history courses about the American Environment, American West, Far Southwest, and Arizona, via interactive instructional television and satellite cable for NAU. He is a former Fulbright Scholar, National Endowment for the Humanities Research Fellow, and Pulitzer Prize nominee in the history category in 2000. Also, he has served as historian and expert witness in the Natural Resources Section of the Arizona Attorney General's Office where his work focused on Indian versus non-Indian water issues and state trust lands. Additionally, he has served as expert witness for the City of Tucson and for private law firms representing clients with water rights claims. Recently, he has served as water resources consultant to the City of Page and historical consultant to the Hopi Tribe, where he secured a Department of Interior grant for $50,000 for an oral history project on Hopi elders.

Dr. August has appeared on numerous television and radio programs, including "Horizon," the KAET/PBS Documentary "Arizona Memories from the 1960s," and National Public Radio features. He is currently at work in the production of documentary films on former Arizona Senators Carl Hayden and Ernest McFarland. He is a frequent contributor to magazines and historical journals including *Arizona Highways, Journal of Arizona History, Pacific Historical Review, Western Historical Quarterly,* and many others. His recent book, *Vision in the Desert: Carl Hayden and Hydropolitics in the American Southwest* (Ft. Worth: Texas Christian University Press, 1999) was considered by distinguished historian Howard Roberts Lamar, former president of Yale University, a groundbreaking analysis that filled a major gap in the history of the Southwest. His current scholarly endeavors include biographical accounts of former Arizona governor Evan Mecham and former U.S. Senator Dennis DeConcini, who named Dr. August his official biographer.

Professional Experience

2002-present, Expert Witness, City of Tucson, *Qwest v City of Tucson.*

2002-present, Arizona Humanities Council Lecture Series Speaker on *Moving Waters* National Endowment for the Humanities Grant and *Parched Arizona* Lecture Series.

2000-present, Water Resources Consultant, City of Page, Arizona.

2000-present, Historical Consultant, Hopi Tribe, Cultural Preservation Office.

1999-2002, Expert Witness and Historian, Natural Resources Section, Office of the Attorney General, State of Arizona.

1993-present, Historian, Northern Arizona University-Yavapai, teaching courses statewide through interactive instructional television and other distance learning technologies.

1994-1996, Historian, Graduate Advisor, and Grants Coordinator, Prescott College.

1994-1995, Historian and Writer for *Arizona Highways* Book Division; soft-cover book, *We Call it Preskit: A Guide to Prescott and the Central Arizona High Country*.

1994, National Endowment for the Humanities Faculty Research Fellow, Oregon Humanities Center, University of Oregon, Eugene, Oregon, Summer Fellowship.

1993-1994, U.S. Fulbright Scholar and Fulbright Professor of History and Environmental Studies to Canada. Teaching and research areas: Comparative Frontier History, the American Wes and the Canadian West, Environmental History.

1992-1993, on leave with Presidential Research Fund Grant, Assistant Professor of History and Associate Director of Public History Institute, University of Houston.

1992-1993, Editor and Chief Analyst, *Arizona Career Ladder Program: A Critical Analysis* (15 vols.) Arizona Department of Education, Phoenix, Arizona.

1987-1988, IPA Fellowship Program Officer and Academic Administrator, Division of Research Programs, National Endowment for the Humanities (NEH), Washington, D.C.

1986-1987, Assistant Director, Southwest Center, Adjunct Assistant Professor of History, Department of History, University of Arizona.

1986-1987, Project Director, *History of Forest Management: Fort Apache Reservation*, U.S. Department of Interior, Bureau of Indian Affairs Contract History.

1985-1986, Visiting Assistant Professor of History, University of Arizona, Tucson, Arizona.

1985-1986, Visiting Assistant Professor of History, University of New Mexico, Albuquerque, New Mexico. (summer sessions).

1983-1986, Department Head and Field Historian, Hayden Library, Arizona State University, Tempe, Arizona.

1983-1984, Chief Editor, Carl Hayden Family Letters Project, Hayden Library, Arizona State University, Tempe, Arizona.

1981-1984, Project Director and Author, *From Horseback to Helicopter: A History of Forest Management on the San Carlos Apache Indian Reservation*, U.S. Department of Interior, Bureau of Indian Affairs Contract History.

1981, Historian, U.S. Department of Interior, National Park Service, Santa Fe, New Mexico.

Teaching

1993-present, Northern Arizona University, Department of History, Office of Statewide Programs. Undergraduate Courses: The Making of the American West, 1500-1850, The American West Transformed, 1850-present, History of the Far Southwest, Recent America, 1919-present. Graduate Courses: Public History, History of Western Water Policy, New American West.

1994-present, Prescott College, Graduate Professor of History in Humanities Program. Courses: The American West: Historical Perspectives on Environmentalism, History of the American West, Public History, Historic Preservation.

1993-1994, University of Northern British Columbia, Fulbright Professor of History and Environmental Studies, Faculty of Graduate Studies. Courses: Environmental History of the Western Hemisphere, Environmental History of the American West, Comparative Frontiers: The American West and the Canadian West.

1988-1993, University of Houston, Assistant Professor. Undergraduate Courses: U.S. History to 1877, U.S. History 1877-present, History of the Trans-Mississippi West to 1900, The American West in the Twentieth Century, American Indian History. Graduate Courses: Public History, History of the American West.

1985-1987, Visiting and Adjunct Assistant Professor, University of Arizona. Courses: History of the Hispanic Borderlands, 1503-1848, History of Arizona, History of the Southwest, American West in the Twentieth Century.

1985-1986, Visiting Assistant Professor, University of New Mexico. Course: American West in the Twentieth Century.

Publications: Books

Vision in the Desert: Carl Hayden and Hydropolitics in the American Southwest (Ft. Worth: Texas Christian University Press, 1999), with a foreward by former U.S. Secretary of Interior, Bruce Babbitt. Nominated for Pulitzer Prize in history category (2000).

We Call it Preskit: A Guide to Prescott and the High Country of Central Arizona (Phoenix: Arizona Highways Books, 1996).

Editor, *Arizona's Career Ladder Program: A Critical Analysis,* 15 vols. (Phoenix, Arizona Department of Education, 1993).

From Horseback to Helicoptor: A History of Forest Management on the San Carlos Apache Reservation, (Mesa, Arizona: American Indian Resource Organization, 1985).

Publications: Scholarly Chapters/Articles

"The Colorado River and the Grand Canyon," *Moving Waters* (Flagstaff: Grand Canyon Institute, 2003).

"Carl Hayden and the Legislative Quest for the Central Arizona Project, 1952-1968," *Bureau of Reclamation Centennial* (Washington, D.C., 2003).

"Arizona's Legislative Watermaster: Carl Hayden and the Central Arizona Project," *Arizona Insight,* (Phoenix: Arizona Humanities Council, 2002).

"Old Arizona and the New Conservative Agenda: The Hayden versus Mecham Senate Campaign of 1962," *Journal of Arizona History* (Winter 2001).

"Diamond Valley Lake and the East Side Reservoir: A Short History," Metropolitan Water District of Southern California (April 8, 2000).

"Water, Politics and the Arizona Dream: Carl Hayden and the Modern Origins of the Central Arizona Project, 1922-1963," *Journal of Arizona History* (Winter 1999).

"Desert Bloom or Desert Doom? Carl Hayden and the Modern Origins of the Central Arizona Project, 1922-1952," *Cactus and Pine*, Vol. 8 (Summer 1996).

"A Vision in the Desert: Charles Trumbull Hayden, Salt River Pioneer, *Journal of Arizona History* (Summer 1995).

"Carl Hayden," *Encyclopedia of the American West* (New York: MacMillan Publishing Company, 1995).

"Carl Hayden and Arizona," *Encyclopedia of the United States Congress*, edited by Roger Bacon, Morton Keller, and Roger Davison (New York: Simon and Schuster, 1995).

"The Navajos and the Great Society: The Strange Case of Ted Mitchell and DNA," *Canon: The Journal of the Rocky Mountains American Studies Association* (Winter 1994).

"Carl Hayden's 'Indian Card': Environmental Politics and the San Carlos Reclamation Project," *Journal of Arizona History* (Winter 1993).

"Carl Hayden, Arizona, and the Politics of Water Development in the Southwest," *Pacific Historical Review* (May 1989).

"A Sterling Young Democrat: Carl Hayden's Road to Congress, 1900-1912," *Journal of Arizona History* (Autumn 1987).

"Law Enforcement on the Arizona-Sonora Border," *Arizona Town Hall* (Tucson: University of Arizona Press, 1987).

"The Future of Western History: The Third Wave," *Journal of Arizona History* (Spring 1986).

"The Formation of the Bar: Americanization and Cultural Accommodation in New Mexico," *Journal of the New Mexico Bar Association* (November 1985).

"The Future of Western History: The Third Wave," *Journal of Arizona History* (Spring 1986).

"Phoenix: Desert Metropolis," in *Arizona: Its Land and Resources* (Tucson: University of Arizona Press, 1986).

"Carl Hayden: Born a Politician," *Journal of Arizona History* (Summer 1985).

"Balance of Power Diplomacy in New Mexico: Governor Fernando de la Concha and the Indian Policy of Conciliation," *New Mexico Historical Review* (Spring 1981).

"The Anti-Japanese Movement in Arizona's Salt River Valley," *Arizona and the West* (Summer 1979).

Publications: Selected Book Reviews

Wayne Aspinall and the Shaping of the American West, by Stephen Schulte for *Western Historical Quarterly* (forthcoming).

Acequia Culture: Water, Land, and Community in the Southwest by Jose A. River for *New Mexico Historical Review* (Winter 1999).

Barry Goldwater: Native Arizonan by Peter Iverson for *Journal of Arizona History* (Winter 1999).

Reclaiming the Arid West: TheCareer of Francis G. Newlands by William Rowley for *Journal of Arizona History* (Winter 1997).

Politics in the Postwar American West, edited by Richard Lowitt for *Journal of Arizona History* (Winter 1996).

The Last Water Hole in the West: The Colorado-Big Thompson Project by Dan Tyler for *Canon: the Journal of the Rocky Mountains American Studies Association* (Winter 1996).

Carl Hayden: Builder of the American West, by Ross Rice for *Pacific Historical Review* (February 1996).

Turning on Water with a Shovel: The Life of Elwood Mead by James Kluger for *Pacific Historical Review* (January 1996).

The Legacy and the Challenge: A Century of Forest History at Cowichan Lake by Richard Rajala for *Forest and Conservation History* (October 1995).

Flooding the Courtrooms: Law and Water in the Far West by M. Catherine Miller for *Canon: The Journal of the Rocky Mountains American Studies Association* (Winter 1995).

To Reclaim a Divided West: Water, Law, and Public Policy by Donald Pisani for *Journal of Arizona History* (Summer 1995).

Cadillac Desert: The American West and its Disappearing Water by Marc Reisner for *Prince George Citizen*, Prince George, B.C., Canada, (December 17, 1994).

Phoenix: The History of a Southwestern Metropolis by Bradford Luckingham for *Southwestern Historical Quarterly* (Summer 1991).

New Courses for the Colorado River: Major Issues for the Next Century by Gary Weatherford and F. Lee Brown for *Journal of the Southwest* (Fall 1988).

Rayburn: A Biography by D.B. Hardeman and Donald Bacon for *Western Historical Quarterly* (Summer 1985).

The Politics and Economics of Racial Accommodation: The Japanese of Los Angeles, 1900-1942 by Thomas Modell for *Arizona and the West* (Spring 1979).

Selected Awards: Fellowships

2002, Margaret T. Morris Foundation and Kiekhefer Foundation Grant for Study of Arizona Cattle Industry.

2002, Hopi Oral History Grant, U.S. Department of the Interior, wrote and secured $50,000 grant for Hopi Tribe.

2001, University of Arizona College of Law, Dennis DeConcini Education Grant for research into the public career of former Arizona Senator Dennis DeConcini.

2000, Nominee for the Pulitzer Prize in the History Category.

1998, Far West Foundation Grant for study into the business and public career of former governor Evan Mecham.

1996, nominee to the Center for Advanced Study in the Behavioral Sciences at Stanford University, funded by the MacArthur, Guggenheim, and Ford Foundations.

1994, National Endowment for the Humanities Summer Research Fellowship to Oregon Humanities Center.

1993, U.S. Fulbright Scholar Award to Canada in Comparative Frontiers and Environmental History, University of Northern British Columbia, Prince George, B.C.

1992, Presidential Research Scholarship Fund Grant (PRSF), University of Houston.

1992, Limited Grant-in-Aid (LGIA) Award, University of Houston.

1989, Research Initiation Grant (RIG), University of Houston.

1987, Intergovernmental Personnel Act (IPA) Grant to serve at National Endowment for the Humanities.

1986, New Mexico Legal History Grant, New Mexico Bar Association.

1984, New Mexico Humanities Council Grant, "Urban Growth and Economic Development in Northern New Mexico."

1983, Lyndon Baines Johnson Presidential Library, Moody Grant for research into the public career of U.S. Senator Carl Hayden of Arizona.

1982, University of New Mexico, Dorothy Woodward Memorial Fellowship in Hispanic Borderlands/U.S. Southwestern History, University of New Mexico Foundation.

Selected Scholarly Papers Presented

2002-2003, Arizona Humanities Council Lectures: "Parched Arizona: The Colorado River and the Future of the Southwest," papers presented in Tucson, Casa Grande, Tempe, Peoria, Prescott.

2001-2002, National Endowment for the Humanities Lectures: "Carl Hayden and the Central Arizona Project," papers presented in Tucson, Tempe, Grand Canyon.

2002, "Carl Hayden and the Legislative Quest for the Central Arizona Project, 1963-1968," Centennial Celebration Conference for the U.S. Bureau of Reclamation, Las Vegas, Nevada.

2000, "The American Southwest: Hydraulic Society at the Crossroads of History," Nineteenth Annual Maricopa Community College Honors Forum Lecture Series, Phoenix, Arizona.

2000, "The Hayden versus Mecham U.S. Senate Election of 1962: Old Arizona and the New Conservative Agenda," Arizona Historical Convention, Yuma, Arizona.

1995, "Alcan: Mission to the North," British Columbia Studies Conference, Okanagan, B.C., Canada.

1994, "Carl Hayden and the Origins of the Central Arizona Project," Arizona Historical Convention, Casa Grande, Arizona.

1991, "A Comment: The Third Great Age of Discsovery," Johnson Space Center, NASA, Houston, Texas.
1986, "The Formation of the Bar: Americanization and Cultural Accommodation in New Mexico," Annual Meeting of the New Mexico Bar Assocation, Ruidoso, New Mexico.

1985, "Carl Hayden, Regionalism, and the Politics of Water in the Southwest, 1920-1928," Western History Association Conference, Sacramento, California.

1983, "Recent Interpretations of the Twentieth Century American West," Western History Association Conference, Salt Lake City, Utah.

1983, "The Progressive Impulse and the Navajo Soil Conservation Program," Arizona Historical Convention, Prescott, Arizona.

Other Professional Activity: Selected

2002, Keynote Speaker and Presenter, Biltmore International Water Conference, sponsored by the Arizona Philosophical Society and Salt River Project, Phoenix, Arizona.

2000, Keynote Speaker, Maricopa County Community College Honors Program, "Water and the West in the New Millennium," Phoenix Arizona.

2000, Historical Consultant for Metropolitan Water District of Southern California for Dedication of East Side Reservoir at Diamond Valley Lake, Riverside, California.

1999, Chair of Distinguished Arizonans Panel consisting of U.S. Secretary Bruce Babbitt, Grady Gammage, Arizona Water History Celebration, Tempe, Arizona.

1999, Featured Speaker at Valley Citizens League Luncheon, "Hydropolitics in the American Southwest," Phoenix, Arizona.

1999, Featured Speaker at Library of Congress Affiliate, Arizona Center for the Book, Lake Havasu and Prescott, Arizona.

1999, Keynote Speaker for Annual Legal Counsel Meeting for the Metropolitan Water District of Southern California, Los Angeles, California.

1999, Keynote Speaker for Phi Theta Kappa Awards hosted by Northern Arizona University, Bullhead City Campus, Bullhead City, Arizona.

1993-present, Contributing author to *Arizona Highways*.

1990-present, editorial referee/reader for several scholarly presses, including University of Arizona Press, University Press of Kansas and *Journal of Arizona History, Western Historical Quarterly, New Mexico Historical Review, Pacific Historical Review*, among others.

1989, Evaluator of Senator Ernest McFarland editing project, Florence, Arizona.

1983-present, Commentator and Speaker at various scholarly and historical conferences.

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Other references available upon request.