DESERT FARMING (2000 B.C. TO PRESENT)

Summary of Theme

Archaeological evidence and historical records show that people have farmed in the Santa Cruz valley for at least 4,000 years, and have constructed canals to irrigate fields in the same locations for the last 3,000 years. This long agrarian history makes the Santa Cruz Valley one of the oldest continuously cultivated areas—and the place with the longest documented history of water control—in North America. Irrigation from surface flows stopped in the late 1800s and early 1900s, as water tables dropped and the river channel incised its floodplain in many places. However, irrigated farming has continued throughout the valley through groundwater pumping. Today, the main valley is still an important producer of cotton, wheat, pecans, and other crops. Native American crops are also being cultivated again with Colorado River water from the Central Arizona Project canal. Vineyards and fruit orchards have been recently developed in areas of the watershed with the right elevations and soils.

Description of Theme

The Riverine Oasis

Until the end of the nineteenth century, five reaches of the main channel of the Santa Cruz River contained water that flowed on the surface year-round. The uppermost perennial reach extended from the headwaters of the river in the San Rafael Valley, to San Lazaro in Sonora, Mexico. Downstream, the next perennial reach flowed from the United States-Mexico border to Canoa, although in summers and dry years, it stopped at Tubac. These upper perennial reaches occurred in areas with thin layers of alluvium overlying bedrock just below the surface, creating shallow aquifers with emergent flows. In these areas, canals could be built to divert the reliable surface flows to floodplain fields. Further downstream, in the middle Santa Cruz Valley, basalt dikes formed by the volcanic hills of Martinez Hill near San Xavier, Sentinel Peak (A-Mountain) near downtown Tucson, and Point of Mountain at the northern end of the Tucson Mountains forced the underground flow of the Santa Cruz River to the surface. This effect created marshes (cienegas) that were ideal for shallow ditches and wells intercepting the high water tables. Springs in the marshes could also be tapped, and downstream of the marshes, where the river flowed on the surface, water could be diverted into canals.

Early Farming and Water Control

The tropical crops maize (corn), beans, squash, and possibly cotton were introduced to the Santa Cruz Valley from Mexico between 2000 and 1000 B.C. Tobacco, probably a native variety, was also cultivated very early. Recent archaeological discoveries near Tucson have shown that, by 1200 B.C., early farmers built canals to divert both floods and perennial flows from the Santa Cruz River to their fields. These canals are the oldest examples yet found in North America and are more than 1,000 years older than any previously found in the Southwest. As early as 800 B.C., wells were dug in the Santa Cruz floodplain to tap high water tables. The logistics of irrigation required the cooperation of groups of farmers, which is probably why the Santa Cruz Valley had some of the earliest village communities in the Southwest.

Hohokam Agriculture

A number of canals built by the Hohokam between about A.D. 500 and 1450, have been discovered in the middle Santa Cruz Valley in recent years. These canals were smaller than the major Hohokam canals in the Phoenix Basin, but rivaled them in their skillful engineering. They were generally larger than those built by earlier farmers in the Santa Cruz Valley. Most of the Hohokam canals in the valley were constructed between roughly A.D. 950 and 1100, coinciding with the peak in Hohokam canal building in the Phoenix Basin. During this period, new varieties of maize, beans, squash, cotton, and tobacco were introduced from Mexico, and native plants such as tepary bean, agave, little barley, panic grass, and devil's claw were locally domesticated. After approximately A.D. 1100, perhaps in response to downcutting of the river channel in several areas, extensive areas on the bajadas above the Santa Cruz floodplain were developed for runoff farming. Archaeological investigations have shown that the rock piles and terraces in these new fields were used primarily for cultivating agave (mescal).

Sobaipuri Ditches and Spanish Acequias

In 1691, Father Kino and Father Juan María de Salvatierra, the first Europeans to explore the Santa Cruz Valley, traveled as far north as the Sobaípuri Pima (O'odham) village of Tumacácori, then south through Guébavi (Guevavi) and Santa María (also the name of the Santa Cruz River at that time). The following year, Kino traveled farther north to the O'odham village of Bac, and it was probably on that trip that he first visited the village of Chuk-shon (from which Tucson derives its name) near the foot of what is now called A-Mountain. In both locations, he saw many irrigation ditches. Between A-Mountain and the Rillito, on the eastern bank of the river, the inhabitants of the village of Oiaur also irrigated crops in the floodplain.

These irrigated areas supported sizeable populations. On 23 November 1697, the Spanish explorer Captain Juan Mateo Manje was traveling with Father Kino and described the scene in his diary: ". . . after going six leagues, we came to the settlement of San Agustin del Oiaur. . .Here the river runs a full flow of water, though the horses forded it without difficulty. There are good pasture and agricultural lands with a canal for irrigation." He counted 750 people in 186 houses, and at San Xavier, another 830 inhabitants were subsisting from irrigated fields. In 1699, Father Kino described the irrigated agriculture at San Xavier (and exaggerated its potential): "The fields and lands for sowing were so extensive and supplied with so many irrigation ditches running along the ground that . . . they were sufficient for another city like Mexico."

Father Kino and other Jesuit missionaries introduced wheat, fruit trees, and many other Old World crops. In contrast to native summer crops, wheat grew in the winter, an otherwise lean season in the annual food supply. Thus, winter wheat filled a gap in the agricultural cycle and allowed the O'odham to farm year-round. Its wide adoption had a major impact on the native agriculture and diet in the valley. Kino also introduced cattle, horses, sheep, and goats, which added livestock ranching to the local economy.

In the late 1730s, a mission farm and ranch was established at the O'odham village of Tchuvaca (later called Tubac), then a visita of the priest at Guevavi. Under Spanish overseers, the O'odham residents of Tubac cultivated both native and introduced crops and raised cattle, sheep, and goats. After a presidio was established there in 1752, Spanish soldiers and colonists

built a more extensive system of irrigated fields. A 1766 map of Tubac shows the main acequia diverting water from the Santa Cruz River to irrigate fields, and then returning the remaining water to the river. Historical documents also show that the O'odham mission at Tumacácori had to share its water with the downstream presidio at Tubac. The presidio's commander, Captain Juan Bautista de Anza, instituted a weekly water rotation in the 1770s.

The mission established at San Cosme (the first Spanish name for Tucson) in the 1750s included irrigated gardens and orchards by the 1770s, and the Sobaipuris and Papagos (now Tohono O'odham) living in the vicinity also irrigated fields on the western side of the river. A 1780 map shows a dam diverting water from the Río Santa Maria (the first Spanish name for the Santa Cruz) into an acequia (canal) through the mission at San Agustín (the mission's name after the 1770s, until it was abandoned in 1831). After the Tucson Presidio was built on the eastern side of the river, where downtown Tucson is today, the eastern floodplain was also irrigated by Spanish settlers. Increasing competition for the water of the river led to a 1776 agreement that guaranteed three-fourths for the Indian villages and one-fourth for the presidio. In the 1790s, however, the Indians' share was reduced to half.

Mexican Irrigation Communities

After Mexico gained independence from Spain in 1821, and new settlers began to arrive from the south, the traditional Sonoran system of irrigated agriculture was established on the banks of the Santa Cruz in Tucson. Mediterranean winter crops of wheat, barley, chickpeas, lentils, onions, and garlic followed native summer crops of maize, beans, squash, pumpkins, chili peppers, tobacco, and cotton. The three acequias madres (mother canals) were maintained as common property by a común de agua (irrigator community), and an elected zanjero (overseer) supervised water distribution.

The irrigation schedule was flexible, with water turns arranged according to varying crop needs, and water shortages were shared proportionally. First use of water was reserved for fields south of what is now St. Mary's Road, while fields to the north were irrigated only during relatively wet years. This northern area grew hay and was used as pasturage for cattle. The canal alignments, field boundaries, and property lines of this traditional irrigation system are recorded on a map surveyed during the Civil War by the United States Army. Below the modern ground surface, archaeologists have recently found some of the canals shown on that 1862 map.

In the Santa Cruz Valley south of Tucson, Mexican ranchers irrigated cattle pastures. In 1849, Jose Maria Martinez, former commander of the Tucson Presidio and a famous Apache fighter, cleared land east of San Xavier, on the western side of the river, and cut a ditch to the spring called Punta de Agua. The Acequia de Punta de Agua irrigated a field west of what became known as Martinez Hill, and the Agua de la Misión acequia irrigated O'odham fields at the mission.

American forty-niners passing through the area on their way to the California gold fields described the farmlands near Tucson and San Xavier as "rich and fertile to the extreme." In 1852, John Russell Bartlett, conducting a survey of the new border after the Mexican-American War, was impressed by the scene that greeted him in Tucson: "irrigating canals in every direction, the lines of which are marked by rows of cottonwoods and willows, presenting an agreeable landscape."

Early Anglo Water Development Schemes

The 1854 Gadsden Purchase opened the territory south of the Gila River to Americans, and newly arriving Anglos impounded the river at several points to provide heads of water to power flour mills. The remains of Solomon Warner's mill, built in the 1870s, can still be seen at the base of A-Mountain at the western end of Mission Lane. Agriculture was the next focus of Anglo attempts to profit from water development (although Hispanic businessmen were also partners). In the early 1880s, Samuel Hughes, W. C. Davis, and Leopoldo Carillo purchased floodplain land upstream of the traditional fields. They cleared them for new fields and excavated new, deeper ditches to increase the water supply to the vegetable gardens of their tenants, mostly Chinese who had arrived in the 1870s.

The impounding of water in reservoirs and the increased water use by the upstream entrepreneurs diminished the supply to downstream Mexican-American farmers, who fought for their water rights in court. However, in an 1884-1885 court ruling, the western United States law of prior appropriation was determined to supercede local customs. This ruling marked the beginning of the end for the traditional system of irrigated agriculture in Tucson.

In place of the irrigation community, corporations competed for the river's water. By 1891, 33 new ditches, comprising a total length of 56 miles, had been constructed in the Santa Cruz floodplain by corporate enterprises. In 1881, Sylvester Watts dug several wells on his property south of town and built a wooden flume in the bed of the river. Several additional wells near Eighteenth Street and Osborne Avenue supplemented this water supply, and an aboveground pipe was built to carry the water into town by gravity flow. The then-private Tucson Water Company began to provide water to homes and businesses on 6 September 1882.

Downcutting of the River through Tucson

During the swirl of land speculation and water development schemes in the late nineteenth century, the current form of the Santa Cruz River, a dry bed up to 20 ft below the top of the banks, was created by a combination of human error and natural disasters. Attempting to increase the water supply to his fields on the western side of the Santa Cruz River north of Saint Mary's Road, Sam Hughes constructed a new, deep ditch in 1887, to intercept the subsurface flow of the river. Large floods over the next four years caused the ditch to downcut to the water table lowered by drought and overgrazing, and caused the headcut to rapidly erode upstream (southward). Steady progression of the headcut and the channel's increasing width were reported with alarm in the newspaper. By 1910, the headcut had coalesced with another downcut segment near San Xavier, resulting in a deeply incised river channel through much of the middle Santa Cruz Valley. The effect on irrigated agriculture was disastrous. The downcutting of the main channel stranded canal intakes above the river, and other flood channels severely damaged canals.

New Waterworks for Tucson

In 1891, Frank and Warren Allison began work to repair the irrigation system on the western side of the river near Tucson. By 1895, they built a new reservoir near the old Warner Dam site and a large ditch that extended north to what is now Congress Street. The project was initially a success, but soon, their 1,160 acres of fields were accumulating crop-damaging salts as a result of intensive, uninterrupted irrigation. In 1895-1896, the Allisons built a new, 12-ft-wide

canal on the eastern side of the river after much of their west side land bcame too salinized for agriculture. From their new 10- to 15-ft-deep artesian wells at the foot of A-Mountain, the brothers built a wooden flume that carried water across the river to the eastern bank. The water in this 5-mile-long East Side Canal also powered a new flour mill just north of what is now Speedway Boulevard. It then irrigated their land to the north, which they called Flowing Wells after a new source of water they located there. The Tucson Canal Company, incorporated in 1896, financed the construction of another canal south of the Allisons', tapping a source near the San Xavier mission.

In 1902, the Allisons sold their property to Levi Manning, a surveyor and businessman who became Tucson's mayor in 1905. He further developed the well field below Sentinel Peak, drilling new wells to tap the now 20-ft-deep subsurface flow of the river. The East Side Canal soon became known as Manning's Ditch. By 1910, four main canals fed by Manning's wells were irrigating the floodplain west of Tucson.

A group of Chicago and British investors bought part of Manning's land in 1911. Upstream of Manning's Ditch they developed the "Crosscut"—a line of 19 new wells across the floodplain, ranging from 45 ft to 150 ft deep and connected underground by a horizontal shaft. Calling themselves the Tucson Farms Company, they also installed electric pumps, replaced the old flume across the river with a 4-ft-diameter concrete siphon below the riverbed, extended Manning's Ditch to a total length of 7 miles, lined some canal segments with cement, and added reinforced concrete headgates, drop structures, and lateral turnouts. The company peddled the land to Midwestern farmers for $200-300 per acre, but it was not a financial success. In 1922, a group of farmers formed the Flowing Wells Irrigation District and assumed control of the Crosscut and distribution system. A large flood in 1940 destroyed most of these waterworks, bringing an end to irrigated agriculture in the middle Santa Cruz Valley near Tucson.

The Plantations of Continental

During World War I, the supply of natural rubber from Asia was interrupted. President Woodrow Wilson asked businessmen Joseph Kennedy, Sr., J. P. Morgan, and Bernard Baruch to help the war effort by growing guayule, a native Southwestern shrub that yields latex, the raw material for rubber. The group purchased 9,700 acres in the northern part of Canoa Ranch, in the middle valley south of Tucson, from Levi Manning in 1916. The new Intercontinental Rubber Company drilled deep wells for irrigation water, constructed processing facilities, and built housing for workers in the new village of Continental. When the war ended, guayule was no longer needed and production ended before rubber was successfully extracted in large quantities.

From 1926 to 1937, Continental Farm was leased to grow long-staple cotton. Itinerant workers were trucked in each fall from Texas, and then returned to Texas after the harvest. During World War II, a prisoner of war camp was built on the farm, and some 40 German POWs worked in the fields. Sometime prior to 1945, Queen Wilhelmina of The Netherlands purchased a controlling interest in the farm from the original trio of businessmen, and continued to cultivate cotton. In 1950, the queen sold her land to the Farmer's Investment Company (FICO), established by Keith Walden and Henry Crown in 1942. FICO doubled the cotton planting to 3,400 acres in 1952, and then rotated cotton with barley and corn, and experimented with Spanish peanuts, vegetables, and wine grapes. Between 1965 and 1969, Continental Farm

planted 400,000 pecan trees on 5,000 acres after a wind-borne fungus damaged the cotton fields. The trees first started to produce pecans in 1970. Today, FICO cultivates some 4,500 acres of pecan trees—the largest irrigated pecan orchard in the United States.

The Rise of Cotton Farming in Marana

Originally a ranching and mining community along the Southern Pacific Railroad, Marana became primarily an agricultural center after World War I. In 1920, newcomer Edwin R. Post drilled a number of wells and constructed an extensive irrigation system. Many families migrated to the area to cultivate cotton between 1920 and 1924, and for a short time, the growing community was called Postvale. Wheat, barley, alfalfa, and pecans have also been cultivated since the 1940s, although the majority of Marana farmland has always been devoted to cotton. Since the 1980s, the amount of farmland has declined as farms have been converted to housing developments, but the area still has about 15 cotton farms. Durum wheat is exported to Italy for making pasta and is increasing in importance.

Agricultural Research and Crop Conservation

Since the Hatch Act of 1887 created the agricultural experiment station program, the University of Arizona (UA) has conducted research on arid land crops, irrigation, and range management in the Santa Cruz Valley. Currently in this region, the UA College of Agriculture operates the 200-acre Marana Agricultural Center, the 185-acre Campus Agricultural Center in Tucson, the 72-acre West Campus Agricultural Center, and the 50,811-acre Santa Rita Experimental Range southeast of Sahuarita.

Since 1983, the nonprofit Native Seeds/SEARCH organization based in Tucson has worked to prevent loss of crop biodiversity by conserving, documenting, and distributing traditional varieties of crops and their wild relatives in the Greater Southwest. They currently maintain a seed bank of 2,000 varieties of arid land-adapted crops and operate a 60-acre conservation farm near Patagonia where seeds are regenerated and crop varieties are evaluated. The organization also promotes traditional desert foods to combat diabetes among Native Americans, and works with federal agencies on conservation research in the 2500-acre Wild Chile Botanical Area within Coronado National Forest west of Tumacácori National Historical Park.

Using part of its water allotment from the Central Arizona Project canal, the San Xavier District of the Tohono O'odham Nation has also begun cultivating tepary beans, squashes, and other traditional crops on its Farming Co-op. The Kino Fruit Trees Project—supported by the National Park Service, the Arizona-Sonora Desert Museum, Desert Survivors Nursery, and Native Seeds/SEARCH—is identifying and collecting fruit trees in southern Arizona and northern Sonora, Mexico, that are descended from stocks introduced during the Spanish Colonial period.

The project will eventually replant the historical orchards at Tumacácori National Historical Park and the gardens of the San Agustín Mission that are being reconstructed by the City of Tucson. A variety of grape introduced to the Southwest during the Spanish period is also being cultivated by wine vineyards near Sonoita and Elgin.

Distinctiveness of Theme

The development of desert farming in the United States is a unique theme among existing National Heritage Areas. With its 4,000-year history of agriculture that continues today, and its many active crop conservation and reintroduction programs, this region is well-suited to interpret this theme through the framework of a National Heritage Area. Such a designation will create new opportunities for preservation of traditional crops and education of residents and visitors about the long agricultural history of this region.

Related Resources

Santa Cruz Valley residents and visitors have many opportunities to experience and learn about the agricultural heritage of this region. A number of farmers markets, pick-your-own farms, and research and conservation farms are open to the public. Grocery stores, delis, and specialty shops sell local foods, including wines, pecans, Mexican spices, cactus fruit products, desert wildflower honey, and others. Annual harvest festivals are held at wineries in Elgin. The Town of Marana is currently planning a Marana Heritage Park to interpret the agricultural history of this region. The Tucson Origins Heritage Park, being developed by the City of Tucson, will also have exhibits and gardens highlighting this theme. Tumacácori National Historical Park is working with local nonprofit groups on a project to replant its historic orchard with fruit trees descended from Spanish period stock. Many local companies sell local foods, including wines, pecans, spices, cactus fruit products, mesquite honey, and others.

Farmers Markets in the Proposed National Heritage Area

- Community Food Bank Farmers' Market, Tucson, Saturdays and Tuesdays 8:00 a.m.-12:00 p.m.
- Downtown Farmers' Market and Arts and Crafts Mercado, Tucson, Wednesdays 8:00 a.m.-1:00 p.m.
- Fresh Fridays, El Con Mall, Tucson, Fridays 1:00 p.m.-5:00 p.m.
- Horse Country Farmers' Market, Tucson, Saturdays and Sundays 10:00 a.m.-4:30 p.m.
- Main Gate Square Sunday Farmers' Market, Tucson, First Sunday of each month, 10:00 a.m.-2:00 p.m.
- Oro Valley Farmers' Market, Oro Valley, Saturdays 8:00 a.m.-12:00 p.m.
- Plaza Palomino Saturday Market, Tucson, Saturdays 9:00 a.m.-1:00 p.m.
- Rincon Valley Farmers' Market, Pima County, Saturdays 8:00 a.m.-1:00 p.m.
- Sonoita Growers Market, Sonoita, Saturdays, 9:00 a.m.-12:00 p.m., May-August
- St. Phillip's Plaza Farmers' Market, Tucson, Sundays 8:00 a.m.-1:00 p.m.

Pick-Your-Own Farms in the Proposed National Heritage Area

- Agua Linda Farm, Amado
- Douglas Apple Orchard, Elgin
- Forever Yong Farm, Amado
- Howard's Orchard, Catalina

Wineries in the Proposed National Heritage Area

- Arizona Vineyards
- Callaghan Vineyards, Sonoita
- Charron Vineyard, Vail
- Dark Mountain Winery, Vail
- Sonoita Vineyards, Sonoita
- Village of Elgin Winery, Elgin

Research and Conservation Farms in the Proposed National Heritage Area

- Campus Agricultural Center, University of Arizona, Tucson
- Marana Agricultural Center, University of Arizona, Marana
- Native Seeds/SEARCH Conservation Farm, Patagonia
- San Xavier District Farmers Co-op
- Santa Rita Experimental Range, University of Arizona, Pima County
- West Campus Agricultural Center, University of Arizona, Tucson

Annual Planting and Harvest Festivals in the Proposed National Heritage Area

- Autumn Harvest Festival, Tucson
- Blessing of the Seeds, Native Seeds/SEARCH Conservation Farm, Patagonia
- Blessing of the Vineyards Festival, Elgin
- Blessing of the Harvest Festival, Elgin

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