Friends of the San Pedro River Roundup

Summer/Fall 2019

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President's Report

By Robert Weissler

After years of scoping, analysis, and public input, the Bureau of Land Management issued its Record of Decision (ROD) for the San Pedro RNCA Resource Management Plan (RMP). The final plan mostly reflects the Proposed RMP that was released in late April, with some tweaks made after BLM responded to a few of the various complaints submitted during the protest period. This plan will increase areas open to hunting, despite comments from FSPR regarding safety concerns. Nevertheless, hunting is not allowed at any time in the vicinity of San Pedro House down to Kingfisher Pond, nor in the vicinity of the Fairbank or Terrenate structures. The plan continues grazing on existing allotments—roughly 7,000 acres—but does not increase grazing anywhere else in SPRNCA. There is still some concern that BLM is considering the use of targeted grazing for fuels treatments, which could open the door to otherwise undesirable livestock grazing in SPRNCA. Likewise, there is concern that BLM might consider widespread use of herbicides for landscape management to achieve natural resource objectives, instead of relying on hand application in limited, targeted areas.

With the ROD signed and the final RMP approved, BLM is moving ahead with implementing the plan. FSPR will be engaged with BLM in this process, to ensure good stewardship and River protection remain the focus of SPRNCA management actions. The Transportation Management Plan is a particularly important implementation plan, as it will nail down designated trails that can be maintained on a regular basis through mowing. Until recently, the lack of clarity on what trails are approved by BLM has contributed to confusion among volunteers and BLM staff, not to mention trail maintenance lapses that impact the visitor experience. We look forward to working with BLM to define and maintain an approved trail network.

BLM Tucson Field Office staff held an annual meeting at San Pedro House in July that included FSPR Board members and a couple of representatives of the Community Watershed Alliance in Benson. At that meeting, BLM expressed a desire to conclude a Memorandum of Understanding (MOU) between BLM and FSPR by the end of the year. But progress toward that goal remains elusive. Meanwhile, trail maintenance issues were discussed and an informal interim agreement appears to get everyone on the same page with regard to mowing for the time being.

This past June at the Arizona Historic Preservation Conference, Chris Schrager was honored with the Governor's Heritage Preservation Honor Award for 2019. His efforts over the past 30 years have been crucial to the preservation of historic structures on U.S. Forest Service and BLM lands in southern Arizona. Chris combines his talents as an archaeologist, brick mason, and former schoolteacher to

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Chris Schrager and his award.

develop public education and outreach programs to meet and complement Arizona educational standards in math and science, while wrapping them into historic preservation projects that are not only educational but also fun for participants. In SPRNCA, Chris is instrumental in the preservation of Fairbank, Terrenate, Charleston, and other sites. Chris certainly deserves this honor and our sincere appreciation!

A recent development of concern to the Friends are plans for further barrier construction along the international border with Mexico, particularly across the San Pedro River. The federal government has not sought to engage with the public in a meaningful way during this process, so what we know about these plans is very limited. BLM Gila District Manager Scott Feldhausen has sent a letter to Customs and Border Protection leadership citing concerns about erosion and reduced passage of sediment and debris during seasonal floods from the construction of steel bollard fences or similar barriers across the River.

As fall approaches, we look forward to the annual meeting on October 26, along with our regular interpretive walks through the end of 2019. We hope for a good turnout of members in late October. See you then!

Bailey Is Recovering!

By Ron Stewart

The issue of what to do to about Bailey and Plaza, the two huge cottonwood trees that flank San Pedro House, gained a lot of attention two years ago. The immediate problem was how to reduce the safety risk of falling branches striking people or property. A huge branch had recently fallen on San Pedro House, damaging the roof. After discussion, petitions, letters, meetings, official public input, official consideration, and budget magic the BLM hired an arborist to supervise trimming the trees.

But there was another goal. Cottonwoods are fast-growing trees that die young. If you walk along the San Pedro River, you will notice that many of the mature trees have major structural problems that often cause them to split and die. That was the case with Plaza, the tree west of the house. Huge lateral branches were placing stress on the central trunk, causing a fissure to form. Left unchecked, the result would be the tree splitting down the middle. The BLM tasked the arborist to reduce the stress on the trunk so as to prevent or at least reduce the probability of this happening.

Let's take a look at the result. Here is a collage of three photos of Plaza. First is a picture from 2017, before it was trimmed. Notice all of the dead branches. If you look at the trunk, you can see the cracks forming. Notice the dead areas. Next, look at the picture taken in November 2017, just after the trimming. You can see the reduced load of branches, as dead limbs were removed, plus underbrush around the tree was cleared.

Finally, look at the photo taken this year, two years later. The tree is obviously healthier. There are several causes at work. First, removal of dead limbs and brush and reduction in the number of branches allowed the tree to concentrate its resources. Second, a new shelter for the site host recently was built near the tree. Water running off of the roof of this structure supplements the rainfall the tree receives. Finally, for two years, human access to the tree has been restricted by a safety fence that prevented soil compaction and resultant loss of water percolating to the roots. Combine these factors, and Plaza is looking good!

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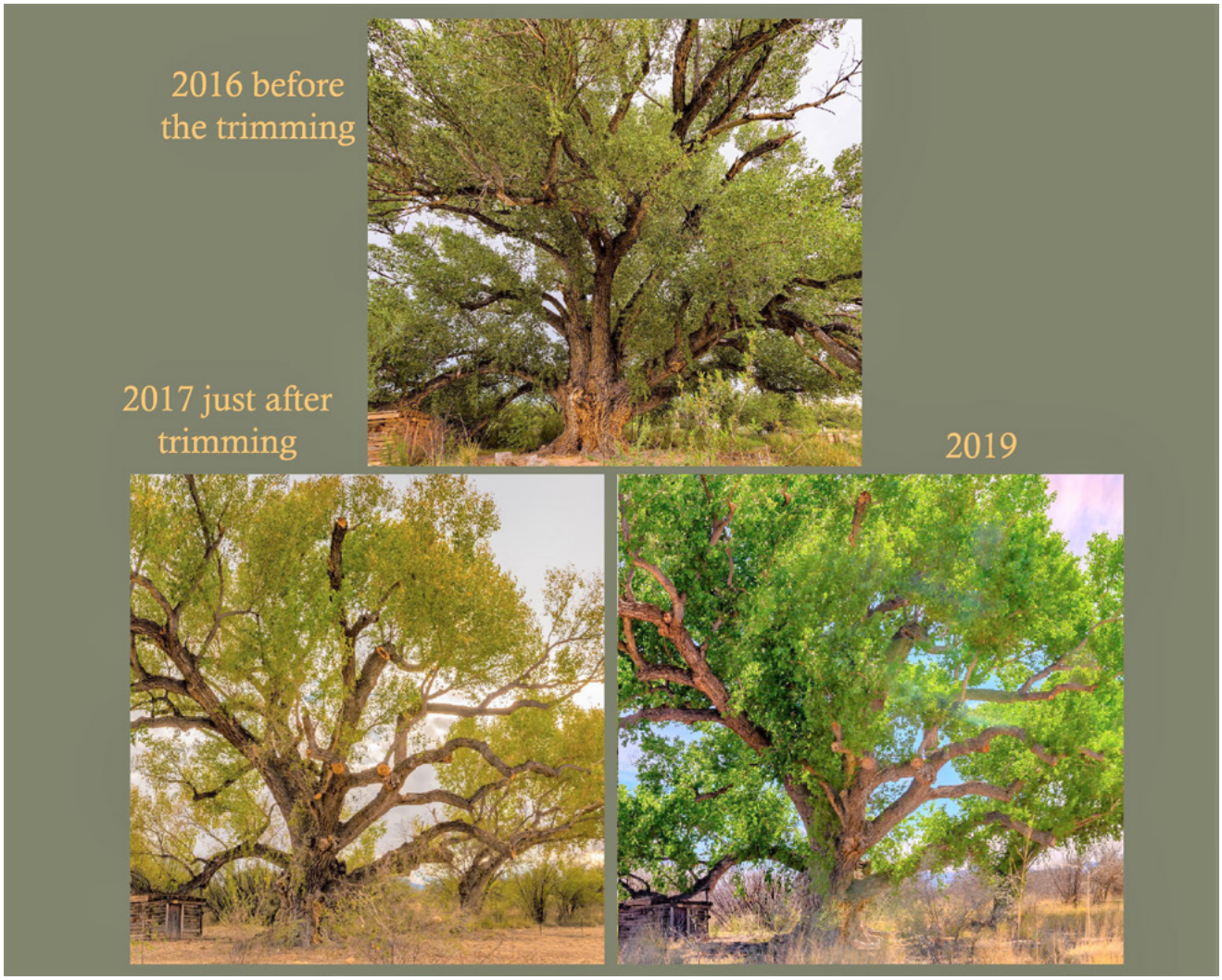

Bailey collage. Photos by Ron Stewart.

The public rallied around saving these trees and if you were among them, you can feel good about the results.

New SPRNCA Bird Checklist Available

By Laura Mackin

Earlier this year it came to our attention that there was no longer a supply of SPRNCA Bird Checklists available. The original bird checklist was last printed in 1996 and was in need of a complete overhaul.

Marcia Radke, a wildlife biologist with the BLM, began the tedious task of updating and revising the list. Marcia reached out to a team of experts to help review the status of every bird found on SPRNCA. The experts included Tice Supplee (Tucson Audubon Society), Troy Corman (Arizona Game and Fish Department and one of the editors of *Arizona Breeding Bird Atlas*), Dave Krueper (BLM-retired avian specialist and compiler of the original SPRNCA bird list), Larry Norris (National Park Service-retired avian specialist), as well as several local bird experts. Friends of the San Pedro River provided input through three of its bird walk docents, Rob Woodward, Richard Bansberg, and Mark Phillips.

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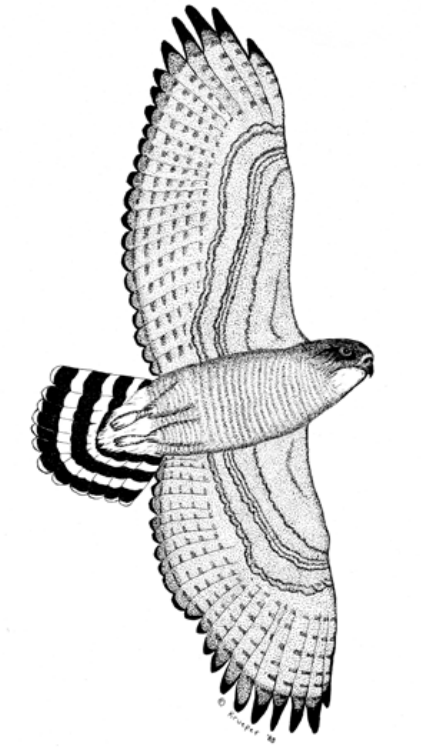
Checklist

Birds

of the San Pedro Riparian National Conservation Area & Upper San Pedro River Valley



Designated by the American Bird Conservancy as the first Globally Important Bird Area in North America in 1995, and re-dedicated in 2013 by the National Audubon Society.

Updated July 2019

The 409 native species recorded on the new checklist have been compiled from current and historical avian records within the Upper San Pedro River Valley and from inventories within SPRNCA. All bird species included in the checklist have been confirmed from the international border north to the City of Benson below the oak zone (approximately 4,500 feet).

"The abundance category for each species was determined using various sources such as AGFD data, Arizona Breeding Bird Atlas, eBird, and observations from the avian log at San Pedro House. Seasonal status was also verified using the same sources," explains Radke. Here are the current abundance categories and seasonal status:

Abundance

» Common. Normally seen in appropriate habitat.

» Uncommon. Occurs in small numbers or locally.

» Rare. Annual, but very local or in very small numbers.

» Casual. Fewer than 10 records, or not of annual occurrence.

» Irregular. Erratic or irruptive pattern of occurrence.

» Extraordinary. One or two records, or historical occurrence.

» Introduced/released/escaped exotic. May or may not be breeding.

Seasonal Status

» Permanent

» Summer

» Winter

» Transient or migrant

» Breeds locally

Some last-minute changes had to be made when the American Ornithological Society released its 60th Supplement to the Checklist of North American Birds this summer, which affected some of the birds on SPRNCA. We are very grateful to everyone who worked on this project and thank you for your time and effort to make this the most accurate and up-to-date checklist possible at this time.

Funding for printing the checklist came from a grant from the Ft. Huachuca Community Thrift Shop and other donations.

The new SPRNCA Bird Checklist is available at the San Pedro House, Fairbank Schoolhouse, and the BLM office in Hereford. If you would like a hard copy mailed to you, please email your request to sanpedrohouse@sanpedroriver.org.

Two deadlines for FSPR members and/or volunteers fall on Wednesday, September 25. One is for members to vote to fill two open slots on the Friends' Board of Directors. The other is for volunteers to complete and return their Volunteer Service Agreement for FY 2019-20. Please don't forget to follow through on these two requests!

Local Birder Compiles "Missing" SE AZ Bird Vocalizations

A new digital audio collection, **SEAZ Birds: The Missing Tracks**, is available to the birding community as a free download. The project was created by Diana Doyle, who recently moved to Southeastern Arizona's unique birding region of the Madrean Sky Islands. Logging hours in the field, she noticed that many of the region's unique borderland calls were missing in the popular national birding apps, whether it was a common species like Bewick's Wren with its very different Mexican song, or a hoped-for rarity such as Eared Quetzal. **SEAZ Birds: The Missing Tracks** ultimately became a 117-track, 75-species, five-disc digital collection. It includes regular species with missing calls, regional specialties and subspecies, rare birds, and long-expected state firsts not yet on the Arizona checklist. It is designed to complement the Sibley eGuide to Birds app. The album is Cloud-based with offline options, linked via Dropbox.

For additional info, including access to one or more of the discs, email **diana@birdingaboard.org**.

Former Defense Sites in SPRNCA

The U.S. Army Corps of Engineers (COE) has been investigating an area of the San Pedro Riparian National Conservation Area that was used during World War II by Fort Huachuca for military training. This area is identified as the Fort Huachuca Formerly Used Defense Site (FUDS). The COE is implementing a community education program that informs visitors about the history of the area, the potential to encounter old military munitions, and the "3Rs of Explosives Safety" visitors can follow to protect themselves and the land.

As part of the education program, the COE has placed informational fact sheets or brochures at San Pedro House and the Fairbank Schoolhouse. The Corps also has provided Friends of San Pedro River with information that is available on the FSPR website, including the **updated fact sheet**, **brochure on the 3Rs of Explosives Safety** and the **3Rs logo** and a link to the Fort Huachuca FUDS website (https://www.spl.usace.army.mil/Missions/Formerly-Used-Defense-Sites/Former-Fort-Huachuca/).

Earth Day 2019

By Pam Corrado

What a glorious day! Earth Day 2019: the 49th anniversary of the environmental holiday initiated in 1970. This year's Earth Day was dedicated to protecting millions of plant and animal species from extinction, as stated by the Earth Day Network. And, it was certainly a day well spent celebrating!

The folks at Kartchner Caverns State Park, located on Highway 90, hosted the event, held April 20-21. The Friends of the San Pedro River were invited to participate in the festivities and had a table set up to spread the word about protecting and preserving the San Pedro River, enjoying your public lands, and keeping the planet healthy. We met and chatted with over 85 people, nearly half of them children. Everyone that stopped by took away information about the San Pedro. Some enjoyed sharing their experiences on the River and the wildlife they encountered there. We got to spend Easter Sunday with quite a few folks from around the state and beyond, including Colorado, South Dakota, and New Mexico. They all came out to pay homage to our wonderful planet and take in the sights of Arizona and what it has to offer.

We were joined by other nonprofit groups such as Tucson Audubon Society, The Nature Conservancy, Borderlands Restoration Network, and Sky Island Alliance. Geology for Kids, Huachuca Area Herpetological Association, and Fallen Feathers allowed folks to get close and learn about rocks, snakes of all kinds, and some very cool rescued birds of the wild.

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Some visitors to the FSPR Earth Day table. Photo by Pam Corrado.

A group of Girl Scouts—Troop 7000 from Yuma—was very excited about our River Ranger booklets. They were eager to complete certain sections to earn badges that can be sewn onto their vests or jackets! It's always so rewarding to see our future generations interested and curious about their planet, the environment, and learning about the San Pedro River. They represent our future at its best!

We look forward to next year's Earth Day and hope to see many more people taking an active interest in their planet and environment.

Talking Up the River

By Bob Luce

I recently gave two public presentations about the San Pedro River and San Pedro Riparian National Conservation Area. The good attendance shows there is a great interest in learning about and conserving the River. Hopefully, more knowledge will lead to greater local interest and participation in conservation.

One of the things I emphasized at the end of each talk was that public oversight of state and federal agencies that manage the River and adjacent lands is extremely important. Many local residents are largely unaware of how much danger there is to the River and that public opinion does matter. I used the example of how strong public opinion saved the two trees near San Pedro House from being cut down.

On April 2, 75 people attended my presentation, "Experiencing the San Pedro River - A Fragile Oasis in the Desert," a few from as far away as Tucson. The lecture, accompanied by photographic images of the River in four seasons, was given at the Sierra Vista Public Library as part of a series of seven lectures featuring water and water issues in Arizona. The event was sponsored by the Henry Hauser Museum in conjunction with the Smithsonian Water Ways-Changing Landscapes exhibit. The Henry Hauser Museum staff created some incredible photographic exhibits featuring my images of San Pedro River landscapes and wildlife to go with the show. The Museum has generously agreed to lend out those exhibits for public venues, so any ideas on where and how to use the displays would be greatly appreciated.

As a result of the success of the Henry Hauser program, I was invited to the Carr House in beautiful Carr Canyon to give a similar presentation on August 11. Over 40 people attended and once again, I observed a great interest in preserving the River and its wildlife. As a result of presentation of a short video of a beaver feasting on a willow branch, several questions about beaver reintroduction and conservation were brought up and discussed.

A man who owns land downriver from my property on the San Pedro attended the Carr House program and later asked me to inform him of upcoming actions and meetings that might impact the River so he can become involved. I am very pleased that he did.

Monitoring implementation of the recently completed BLM Resource Management Plan and addressing continuing new threats to the River from the proposed border wall, subdivisions, and overuse of water in general require all of us to stay focused on our long-term goal. We face an enormous challenge if we are to save the River.

Wet/Dry Mapping the River

By Pam Corrado

Some wet/dry mappping volunteers gather behind San Pedro House. Photo by Charlie Corrado.

The 2019 annual wet/dry mapping of the San Pedro River kicked off June 14 with a training session for some 40 volunteers at San Pedro House. The Friends provided a picnic-style dinner with sandwiches, salads, drinks, and dessert. This annual event is coordinated by the Nature Conservancy, with support from the BLM and FSPR.

The actual mapping was performed the following day. Volunteers—many of whom have been participating for two decades—dedicate their time with hands-on mapping of the River within SPRNCA. Volunteers are assigned to one of 14 teams and supplied with GPS equipment to work various sections of the River, collecting data on flora and fauna and wildlife habitat. The purpose of this worthwhile project has many important objectives but the primary one is to measure the flow of the San Pedro and monitor its overall health.

For more information on wet/dry mapping along the San Pedro through the years, the Nature Conservancy has maps you can view here. To view the changes in the River over time, visit the interesting animation view.

We are very fortunate to have such enthusiastic volunteers who share the passion of protecting and preserving the River, as well as the knowledgeable leadership of the Nature Conservancy and the BLM as partners.

The Monitoring Avian Productivity and Survivorship (MAPS) Program

By Ron Stewart

The San Pedro Riparian National Conservation Area (SPRNCA) is home to an incredible diversity of bird species. Sitting at the junction of the Rocky Mountains to the north, the Sierra Madre to the south, the Chihuahuan Desert to the east, and the Sonoran Desert to the west, there are 100 species of birds residing here. Each year, these resident birds are joined by millions of migrating birds in 250 species during the spring and fall migrations. The San Pedro and Santa Cruz Rivers are vital corridors for north-south migration across the arid Southwest.

The Bureau of Land Management must take the needs of these species of animals into account when setting policy for SPRNCA to ensure their current and future health. Good decision making requires careful study and the ongoing collection of accurate data. This is where MAPS comes in.

The basic MAPS process is to use fine mesh nets to capture birds during the summer nesting season. Station operators examine the birds for age, sex, body condition, and reproductive status. Captured birds are given a light-weight, numbered aluminum leg band and released unharmed. Subsequent recapture of banded birds provides valuable insight into survival, reproductive rates, and movement patterns.

Since 1989, information has been collected at over 2,000 MAPS stations located throughout the U.S. and Canada. Capture stations are run by independent parties, state or federal agencies, and by contractors working for the Institute for Bird Populations (IBP). Studies based on MAPS data have highlighted the importance of the survival of first-year birds, which is linked to wintering grounds and migration routes. This, in turn, points to the importance of weather, the timing and extent of precipitation, and its impact on habitat as a key factor in the survival of avian populations.

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Summer Tanager. Photo by Ron Stewart.

The key issues that MAPS is designed to examine are: What factors drive avian population declines? Where are problems most acute, on the breeding or non-breeding grounds? What drives differences in trends between particular regions or habitats? What is the relationship between population change and weather, climate, or habitat loss? What can we do to reverse declines in population?

MAPS data have recently been used to look at the impact of urbanization, the effects of climate change, survival rates of birds in different areas, and the use of riparian areas. Another MAPS initiative is to map migrations. Banding data, coupled with genetic analysis of feathers, allow the mapping of populations of migratory birds during their annual migration cycle.

An example of a project that makes heavy use of MAPS data is the Lower Colorado River Multi-Species Conservation Program. This Bureau of Reclamation project is seeking to restore wildlife habitat in the lower Colorado River area of Arizona and California, an area that was once a major migratory route and habitat. Data on bird species and their use of restored wetlands have been critical to efforts to recreate historic habitat. Species at the center of the study include the yellow warbler, Bell's vireo, Gila woodpecker, and summer tanager.

A MAPS banding station operated by the BLM near San Pedro House captures, examines, bands and releases birds unharmed. The information collected is vital to an understanding of what species use the riparian area along the San Pedro River at what times. The aggregate of data collected over a period of years provides a picture of the health of the population of resident and migratory species. Continuation of this activity is of vital importance to the conservation of bird species in this area. Data about nesting activities of select species recently helped guide decision making about when to suspend trail maintenance so as not to disturb nesting pairs.

The Southern Arizona Bird Observatory (SABO), in coordination with the BLM and the Friends of the San Pedro River, also operates a banding station in SPRNCA. Located in the ramada behind the San Pedro House, this banding station focuses on hummingbirds: their health, population size, and migration patterns. Banding sessions are open to the public. They are held from 4 to 6 pm each Saturday during the summer; the last session is October 5. Visit the FSPR website for more information about these popular events.

Recently, the BLM MAPS station in SPRNCA has suffered from vandalism. This could have severe consequences for the health of bird species that live in and traverse our area. The detailed, long-term view of bird populations is key to understanding the impact of climate change, weather, urbanization, weather fluctuations, disease, and other factors that impact avian species. The data collected are directly used to make sound decisions about how to manage SPRNCA. No harm is done to the birds and if the motive of the vandalism is the desire to protect birds, it is badly misplaced.

Friends of the San Pedro River & the San Pedro National Riparian Conservation Area

By Dutch Nagle

What is known today as the San Pedro Riparian National Conservation Area (SPRNCA) encompasses two Mexican land grants dating back to 1827. These two grants were eventually purchased and consolidated into the Boquillas Land and Cattle Co., which sold its holdings to Tenneco. Tenneco planned to develop housing along the River but instead was convinced to trade with the Bureau of Land Management (BLM)

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for acreage of equal value in the Phoenix area. This allowed the BLM to take possession of the property in 1986. Some additional land has been acquired since that time through donations and purchases.

This property, which now consists of approximately 56,000 acres, stretches from the border with Mexico to St. David (about 40 miles) and extends roughly 1 mile on either side of the San Pedro River. It contains the oldest evidence of the pre-historic Clovis Culture at two "mammoth kill sites"; the ruins of old stamp mills and the town-sites that supported them; ranch buildings that are still useable today; Indian rock-art sites; and the ruins of a Spanish presidio.

In 1987, a group of concerned citizens founded the Friends of the San Pedro River (FSPR). The sole purpose of this nonprofit and nonpolitical organization was, and still is, to support the BLM in its preservation and enhancement of this special area and to advocate for preservation of the natural and cultural resources within SPRNCA

In 1988, the U.S. Congress recognized the value of this parcel and declared it the San Pedro Riparian National Conservation Area. This was the first "Riparian" NCA in the U.S. SPRNCA was identified by The Nature Conservancy as the premier remaining riparian habitat in the Southwest and, in 1996, the American Bird Conservancy designated it as the first Globally Important Bird Area (GIBA) in the United States. The San Pedro River is one of the last free-flowing rivers between Texas and California.

In 1989, the BLM and FSPR volunteers restored an old ranch house, located on Hwy 90 at the River, which was previously the home of ranch superintendents. In 2007, BLM restored the old schoolhouse at Fairbank. These two structures were turned into bookstore/gift shops and also serve as information centers. All profits from the bookstores and other fundraising activities of FSPR are used to help BLM make SPRNCA a better place for public visitation.

Today, people can enjoy seeing protected prehistoric sites dating back more than 13,000 years; restored historic buildings; preserved silver mill foundations; rock art sites; and signage giving informative data. Maintained trails allow easy access for hiking, walking, horseback riding, and bicycling. Many trails are handicapped accessible. Benches are located along some trails. Picnic tables are located near San Pedro House (some covered) and a large covered shelter is also located there. Picnic facilities are also provided at Fairbank. Pit toilets are available at most trailhead sites. All these amenities are available for public use at no charge.

SPRNCA is home to the endangered water umbel plant and is good territory for the endangered Southwestern willow flycatcher and the Western yellow-billed cuckoo. It is also a necessary rest area for several million migrating birds each year.

In addition to its many other activities, BLM has re-introduced beaver to SPRNCA and is supporting a continuing effort to replace non-native plants with native vegetation.

Trash pick-up and fence mending take a lot of time and energy, as does monitoring of wildlife and plant communities. As you can see, the BLM is kept very busy and could not support all these activities and still stay within its budget. This is where the Friends are able to step in and assist with volunteer activities. FSPR volunteers offer walks for birders and nature lovers, hikes to historic locations within SPRNCA, operate two bookstores, offer a great education program for local schools, and help with general maintenance and landscaping activities.

Come on down to SPRNCA and see what we have done for you. For those interested in learning more about FSPR, please contact us at Friends of the San Pedro River, 9800 E Hwy 90, Sierra Vista, AZ 85635, phone 520-508-4445; email fspr@sanpedroriver.org. You may also visit our website www.sanpedroriver.org.

From Fuelwood to Fossil Fuels. The Search for Energy Sources

By Gerald R. Noonan PhD 2019 (Text Copyrighted 2019)

Before the arrival of the railroads, the burning of wood was the main source of energy. It generated energy for powering the many steam engines used by mining companies, initially fueled steam engines and trains, and provided energy for domestic cooking and heating requirements (Bahre, 1995).

Mesquite Fuelwood

Many mining companies and settlers in the San Pedro River Valley and adjacent areas such as Bisbee and Tombstone initially looked to mesquite for fuelwood. Numerous authors extolled its virtues as domestic fuelwood during and after the territorial years (AS, 1878; Barnes, 1870, p. 463, 527 abs.; Brainard, 1889, p. 153-156, 170-173 abs.; Dobyns, 1981, p. 62, 72, 145; Elliott, 1884, p. 159-160, 175-176 abs.; Forbes, 1894; Hinton, 1878, p. 346, 391 abs.; Hughes, 1893, p. 31, 370 abs.; Hughes, 1895, p. 30, 505 abs.; Munk, 1905, p. 117-118, 125-126 abs.; Murphy, 1891, p. 23, 268 abs.; Murphy, 1892, p. 17, 314 abs.; Rusling, 1874, p. 365, 381 abs.; Wolfley, 1891, p. 23, 268 abs.). Its heating ability was equal, cord for cord, to that of hickory or white oak and it could be converted into an excellent compact charcoal.

People prized mesquite roots as fuelwood even more than above-ground branches and often threw away branches and concentrated on obtaining roots (Standley, 1912, p. 461, 530 abs.). The roots of a small mesquite bush yielded an astonishing amount of firewood because the mass of roots was much greater than that of branches (Munk, 1905, p. 117, 128 abs.). While roots were very difficult to cut or split, once finally prepared for the stove or grate, they were excellent fuelwood. The roots could be burned while still green but formed a better fuelwood after drying. Mexicans often earned a considerable part of their livelihood in the Southwest by harvesting mesquite roots. John Gray, a cowboy in the Tombstone area during the 1880s and 1890s, wrote (Gray and Rogers, 1998, p. 46) in his memoirs:

"Go out on the treeless valley and look closely on the ground in the neighborhood of a sparse growth of mesquite bushes and you will soon discover long, black-looking roots uncovered in spots. Put your pick under these and pry them up, and it is surprising how soon you can load your wagon with the best stove wood of any land. It is hardwood, but brittle, and will hold the heat like coal."

Mesquite near Tombstone and along the San Pedro and Babocomari rivers provided fuelwood until approximately 1880-81, when woodcutters exhausted nearby supplies (AWC, 1881a; Bahre and Hutchinson, 1985, p. 179; Sheridan, 2012, p. 161).

Riparian Trees Did Not Provide Notable Amounts of Fuelwood

People looking for fuelwood after the local mesquite was exhausted found that the Upper San Pedro River had few trees. Freemont cottonwood and Goodding's willows occurred in only a few places as isolated trees or groves (Noonan, 2013) such as at Lewis Springs (https://scihistory.info/lewis-springs.html).

Early travelers to the Upper San Pedro River recorded information about the river: 1855 approximately three miles south of the current International Border, cattleman Major Michael H. Erskine (Sanderlin and Erskine, 1964, p. 406) "camped without wood, used cow chips for fuel"; 1854 slightly south of current International Border, Judge Henry Maney and cattleman Major Michael Erskine, (Sowell, 1900 p. 687-690, 727-730 abs.) description of battle with Apaches stated that some Indians hid in "thick bushes" along the river but did not mention trees; 1854-55 at and near International border, US Border Commissioner Major William Emory (Emory, 1857, p. 100) River bed was "marked by trees and bushes." He did not indicate that there was a riparian forest. Dr. Charles C. Parry (Parry, 1857, p. 18) river was "sparsely wooded by occasional cotton-wood or walnut trees."; 1846 junction of Greenbush Draw and river, Colonel Philip St. George Cooke (1849, p. 35, 56 abs.) "no other appearance of the stream than a few ash trees in the midst"; 1846 at junction of Greenbush Draw and river, Mormon Battalion officers (Standage and Golder, 1928, p. 191) "Wood scarce principally Hackberry."; 1880s and 1890s Hereford area before arroyo formation (Haury et al., 1959, p. 4) early settlers characterized river as no more than a series of grassy swales, and there were seeps along the valley floor; 1889 court testimony about Hereford area, (Rose, 2013, p. 168) many springs along the riverbank that flowed into a cienega; 1846

from junction of Greenbush Draw to place approximately 6 miles north along the river, Sergeant Daniel Tyler (Tyler, 1881, p. 218, 227 abs.) "we saw but little timber"; 1879 northward to current day Benson area from turnoff to Tombstone from a road that paralleled river, Arizona Sentinel (AS, 1879) "The river is a queer stream, nearly destitute of timber and giving no sign of its presence till one nearly stumbles into it."; 1846 region of current day Charleston, Colonel Philip St. George Cooke, (Cooke, 1849, p. 37) one side of the river had "walnut timber"; 1854 in region of current day St. David, Chief US Border Commissioner John R. Bartlett (Bartlett, 1854, p. 377, 422 abs.) "We looked in vain for a line of trees or of luxuriant vegetation to mark the course of the San Pedro…."; 1858 at or near Upper Crossing by junction of Dragoon Wash and river northward to region of current-day Benson, newspaper reporter Waterman L. Ormsby (Ormsby, 1942, p. 84-85) river had, "not, that we could see, a respectably sized tree"; 1878 at Upper Crossing by junction with Dragoon Wash, Hinton (Hinton, 1878, p. 236, 275 abs.) "a sandy barren and destitute of timber. The river banks have not a shrub growing upon them, and you come right upon the deep, swift, muddy little stream without being aware of your approach."; 1854 in Benson region, Lieutenant John G. Parke (Parke, 1855, p. 8-9, 645-646 abs.) "The banks are devoid of timber, or any sign indicating the course or even the existence of a stream, to an observer but a short distance removed." "[T] reacherous miry soil, rendering it extremely difficult to approach the water…."; 1862 by Overland Mail Station in current day Benson, Lieutenant Colonel Edward E. Eyre (Eyre, 1862, p. 121, 141 abs.) strong bridge over the river; water and grass abundant; wood very scarce."

The reason for the scarcity of trees along the river was that the San Pedro River over geologic time has cycled between different types of riparian habitats. Scientists have identified at least six prehistoric episodes of arroyo downcutting of the San Pedro River and many other Southwestern waterways (p. 8 at https://scihistory.info/uploads/1/2/5/0/125000041/fixed_noonan_alluvial_cycle_paper_2013_plates_fixed.pdf). After such episodes, sediments gradually filled in most or all the arroyos. The last occurrence of filled-in arroyos was what early settlers found along the river. Much of the river was marshy or miry, with a high water table that hindered forest establishment. Cottonwood and Goodding's willow seedlings require moist, bare mineral soil on which to grow (Dixon, et al., 2009; Friedman and Lee, 2002; Friedman et al., 1995; Scott et al., 1996; Stromberg, 1993; Stromberg, 1998; Stromberg, et al., 2009; Webb et al., 2007). Usually, these habitats are generated by floods within arroyos.

Starting in approximately 1860-90, exceptionally large floods cut arroyos. (The start of arroyo cutting differed from one place to another.) When the exceptionally large floods abated, sediments began to be deposited along the edges of the arroyos. These sediments formed low-lying benches called terraces that were subject to scouring by normal-sized floods. When such scouring floods occurred just prior to the dispersal of cottonwood seeds and produced extensive moist mineral areas, riparian forests began to form. (For description of the massive floods, see https://scihistory.info/massive-floods-cut-arroyos.html. For information about arroyos providing habitats for riparian forests, see https://scihistory.info/arroyos-and-riparian-forests.html. For photographs showing the conversion after approximately 1890 of the treeless Fairbank Cienega into a place with arroyos and trees, see Figures 23A-C, p. 87-88 in Noonan, 2013, https://scihistory.info/uploads/1/2/5/0/125000041/fixed_noonan_alluvial_cycle_paper_2013_plates_fixed.pdf; the same work has additional photographs showing the development of arroyos and riparian forests elsewhere. Additional photographs of the development of riparian forest are in Turner et al. (2003, p. 124-160).

Many areas by the river that were not marshy in the 19th century had few large plants. Figure 1 shows the Gird dam, built in 1879 and situated approximately 1.5 miles south of Millville. Trees were absent except for a few small woody plants on the hills east of the dam. The rightmost such plant appeared to have a trunk and may have been an oak, less probably one or more of the other woody plants were oaks. No tree stumps were visible.

Even though the Gird mill started operation in 1879, people had not cut down the few cottonwoods near the mills by the spring of 1880. Figure 2 shows the Gird mill and in the background the San Pedro River, with Charleston situated west of it. A single cottonwood was visible by the narrowly entrenched river. There were no other trees. Figure 3 gives a view of the valley from a terrace above the Contention Mill. The left arrow points to part of the fuelwood supplies for the mill. The right arrow points to a grove of approximately 6 cottonwoods at the river, with an isolated tree visible left of the grove. Figures 4 through 6 display fuelwood supplies at mills and a Tombstone mine.

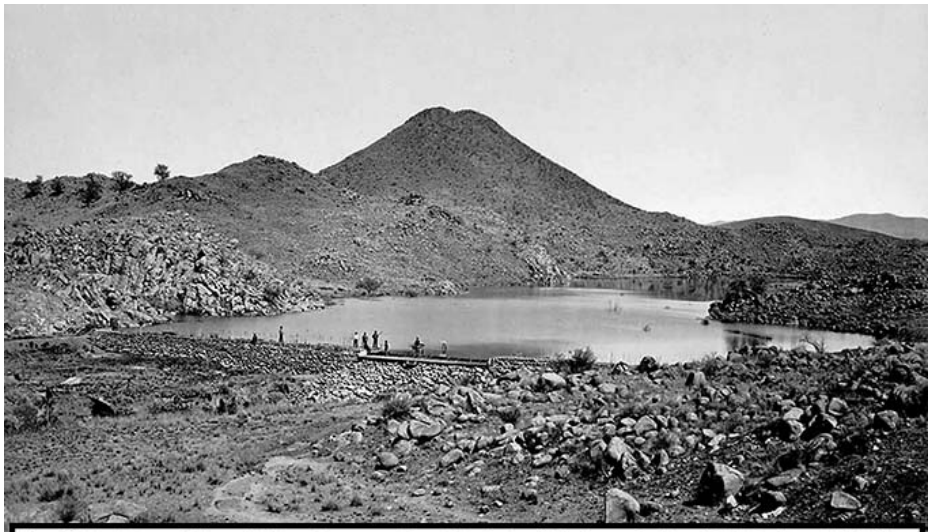


Fig. 1. Tombstone Mill and Mining Company Dam (Gird's Dam), Arizona. Spring 1880. Carleton E. Watkins Collection. Courtesy of the Bancroft Library, University of California, Berkeley.
BANC PIC 1957.028:07--ffALB VAULT https://calisphere.org/item/ark:/28722/bk0003d2v6w/

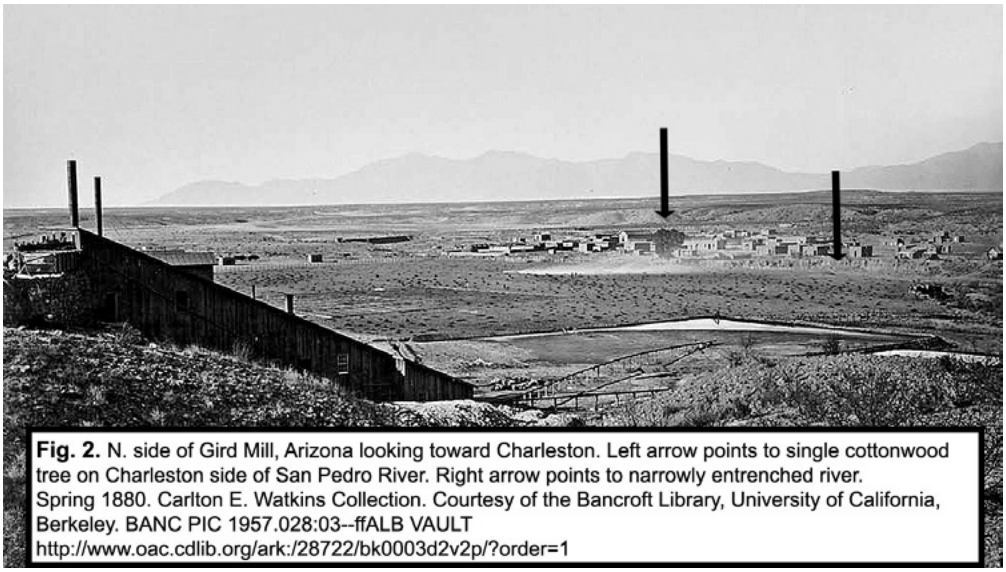


Fig. 2. N. side of Gird Mill, Arizona looking toward Charleston. Left arrow points to single cottonwood tree on Charleston side of San Pedro River. Right arrow points to narrowly entrenched river. Spring 1880. Carlton E. Watkins Collection. Courtesy of the Bancroft Library, University of California, Berkeley. BANC PIC 1957.028:03--ffALB VAULT
http://www.oac.cdlib.org/ark:/28722/bk0003d2v2p/?order=1

Fig. 3. View of San Pedro River Valley looking NW from a terrace above the Contention Mill. Left arrow points to part of the mill's fuelwood supply. Right arrow points to small grove of trees identified as cottonwoods by Bahre,1991, p. 68-69. Spring 1880. Carleton E. Watkins Collection. Courtesy of the Bancroft Library, University of California, Berkeley. BANC PIC 1957.028:20--ffALB VAULT.
https://calisphere.org/item/ark:/28722/bk0003d2w92/. (Cottonwoods darkened to make more visible.)

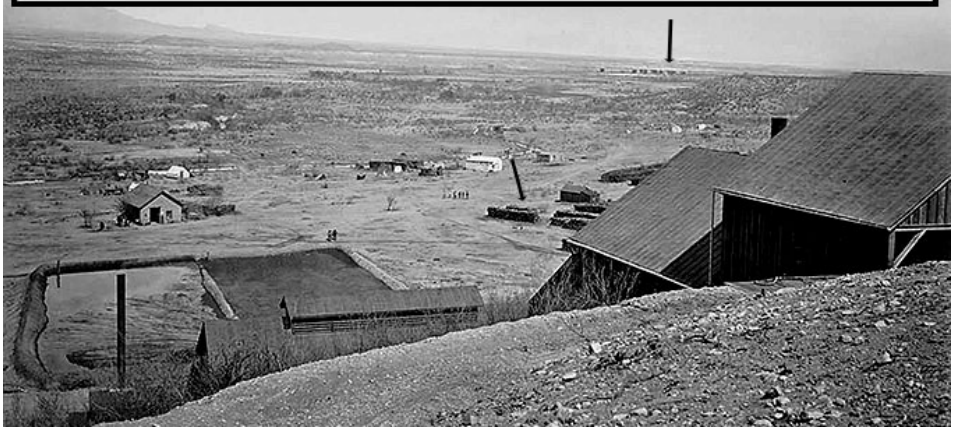


Fig. 4. NE side of Contention Mill showing fuelwood supply. Spring 1880. Carleton E. Watkins Collection. Courtesy of the Bancroft Library, University of California, Berkeley. BANC PIC 1957.028:21--ffALB VAULT. https://calisphere.org/item/ark:/28722/bk0003d2x0m/

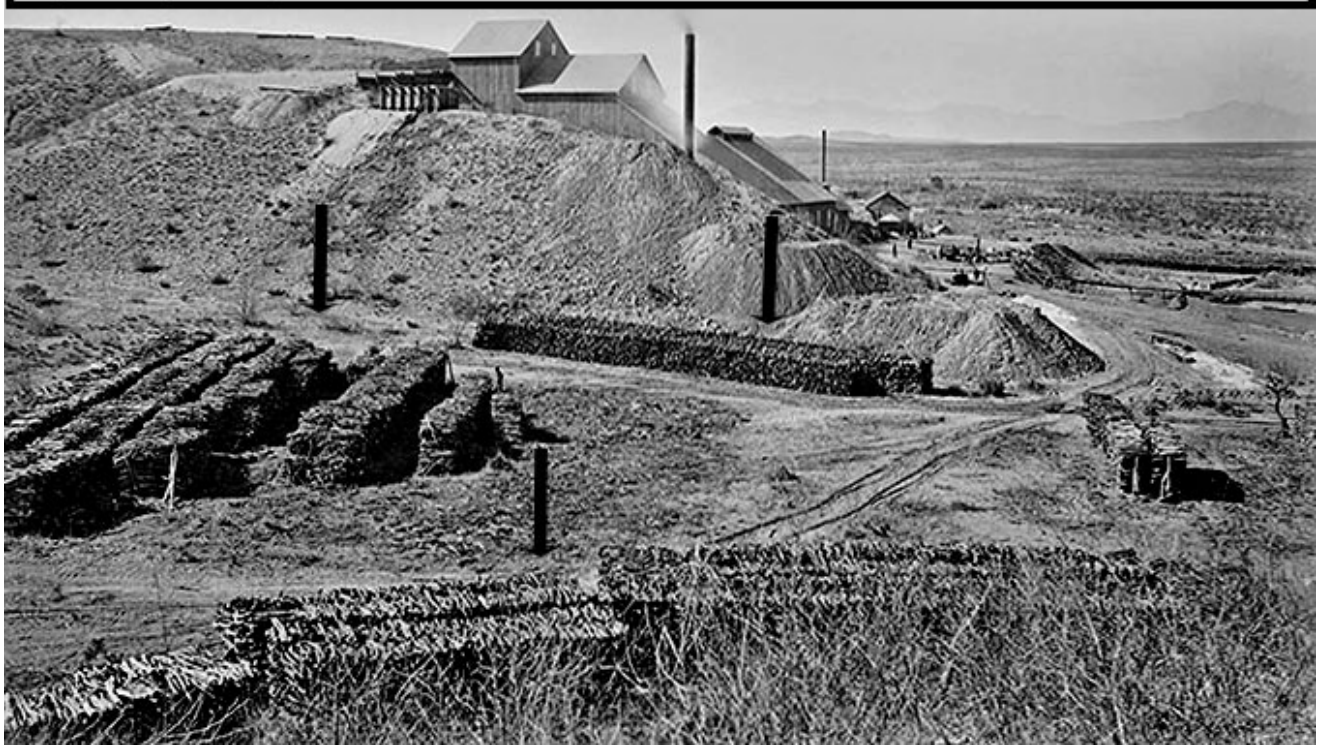


Fig. 5. N side of Corbin Mill with fuelwood supply below arrow. Spring 1880. Carleton E. Watkins Collection. Courtesy of the Bancroft Library, University of California, Berkeley. BANC PIC 1957.028:09--ffALB VAULT. https://calisphere.org/item/ark:/28722/bk0003d2v80/

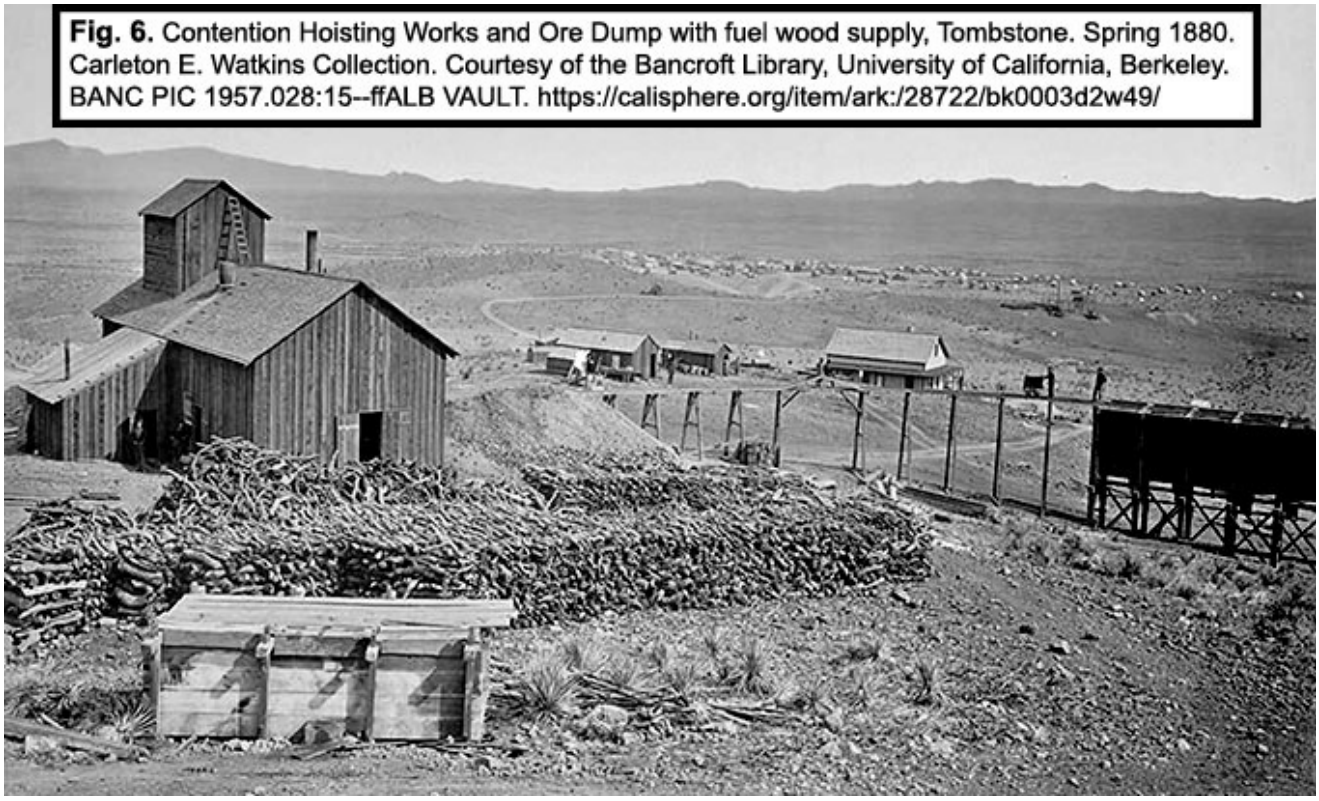


Fig. 6. Contention Hoisting Works and Ore Dump with fuel wood supply, Tombstone. Spring 1880. Carleton E. Watkins Collection. Courtesy of the Bancroft Library, University of California, Berkeley. BANC PIC 1957.028:15--ffALB VAULT. https://calisphere.org/item/ark:/28722/bk0003d2w49/

As will be discussed, fuelwood cutters received very low pay that was based on the amount of fuelwood harvested each day. To earn enough to provide for themselves and their families, they needed to operate in mountains where trees were relatively close together, rather than searching for the few scattered trees along the river.

Social pressure might have hindered the cutting of the very few trees along the Upper San Pedro River. Shade was highly prized in warmer areas of Arizona. There was a reluctance to cut down trees that provided it near homes or in areas with livestock. The increasing scarcity of mesquite wood in areas near Phoenix led in 1899 to many of the large cottonwood trees on the outskirts of the town and throughout the valley being chopped down and converted into cordwood without any provision made for planting substitute trees (AR, 1899). The Arizona Republican on December 21, 1899 editorialized against such cutting, noting that people liked the shade, and cattlemen felt it was important for the well-being of their livestock. Lewis Springs became a very popular regional resort in large part because of the shade provided by a grove of cottonwoods (https://scihistory.info/lewis-springs.html). People initially planted fast-growing cottonwood trees around buildings in towns such as Tombstone to obtain shade. Delight with the prospect of shade turned to dismay when trees began producing large quantities of annoying, fluffy seeds. By the fall of 1897, Tombstone dwellers were cutting down the town trees (TE, 1889 b; TE, 1906a; TP, 1897b), with the intention of replacing them with slower-growing trees that did not produce copious amounts of irksome seeds.

Despite accumulating more than 2900 references about the San Pedro River Valley and nearby areas, I have found no mention of the harvesting of riparian trees along the Upper San Pedro River during the territorial years. However, I found ample references about the cutting of trees elsewhere.

People rapidly turned to oak and juniper as fuelwood and sought such from the evergreen woodlands of the Huachuca and Whetstone Mountains to the west and the Dragoon and Mule mountains to the east (AWC, 1882; AWC, 1883; AWC, 1887; Bahre, 1991, p. 147; Bahre and Hutchinson, 1985, p. 183; DT, 1886c; SJH, 1888;TDE, 1889a; WPH, 1883). Walter Lamb, a Tombstone resident in the late 19th century, wrote in an unpublished manuscript that "There were wood roads fanning out from Tombstone like the veins of a leaf, some were just tracks, others well worn."

Fuelwood for Mining Companies

Tombstone mines had a great need for fuelwood for the boilers of steam engines that ran stamp mills, pumps, hoists, ore crushers, dryers, amalgamation pans, settlers, and converters (Bahre, 1991, p. 144; MSP, 1882). Fuelwood was also used to roast ores and retort amalgam. Until the 1890s, cordwood was the major fuel for powering steam engines of Tombstone mines and mills, except for English and Colorado coke used in blast furnaces and some coal used as fuel in Cornish pumps in the Tombstone area (Bahre, 1998, p. 8-9; Bahre and Hutchinson, 1985, p. 177-178; Church, 1887, p. 611, 746 abs.). In March 1881, fuelwood for the mills at Millville cost $7.50 to $8.00 per cord (AWC, 1881b). By April 1882, the cost of fuelwood for milling purposes had risen to $12 a cord (MSP, 1882) and there was a "scant and fast decreasing source of supply . . .." Fuelwood prices gradually abated somewhat after the boom years of Tombstone.

The total fuelwood consumption for mining purposes peaked during the Tombstone Bonanza years, but the cutting of fuelwood for some mines continued until the turn of the century. However, most fuelwood cutting after 1886 was for domestic heating and cooking.

Data are not available for reliably calculating the total amount of fuelwood cut in southeastern Arizona and used by the Tombstone and Bisbee mines. Bahre and Hutchinson (1985, p. 181) estimated that the amount of fuelwood exploited during the Tombstone Bonanza (June 1879-December 1886) to power just the mills was 47,260 cords. They noted that that figure might be slightly high because some ore after 1882 was sent to custom plants elsewhere for processing and part of the fuelwood consumed by the Tombstone mills was cut in Mexico. An example of fuelwood use is that during the year that ended March 31, 1884 the Gird and Corbin Mills burned approximately 2100 cords (Church, 1887, p. 603).

Bahre and Hutchinson concluded that the amount of fuelwood used by the mine hoists and pumps may have been greater than that used by the mills. The Contention Mine pumps in December 1885 required 14 cords daily or 5110 cords annually (ADS, 1885b). The amount of fuelwood and its type used in the retorts of the mills along the San Pedro River are unknown, but the wood was probably willow, bark, or oak, fuelwoods widely used elsewhere in retorts (Bahre and Hutchinson, 1985, p. 181). (Before the arrival of the railroads in 1880, references to "willow" probably are for desert willow that initially was common along dry washes and riverbanks at elevations below approximately 5000 feet [ASB, 1893; USDA, undated]. This plant grew as a shrub or a small tree and, despite its common name, was not closely related to true willows such as Goodding's willow. Records mentioning simply "willow" after the arrival of the railroads may have been for desert willow or for other types of willows imported from outside Arizona.)

After approximately 1880, most fuelwood for Tombstone mines and mills, except that for the Tombstone Mill and Mining Company, came from eastern slopes of the Dragoon Mountains, located only 8 to 10 miles away across gently rolling countryside (ADS, 1882; ADS, 1886; AR, 1898; AWC, 1882; Bahre and Hutchinson, 1985, p. 179-180; DT, 1886b; TE, 1882; TE, 1892a; TE, 1893a; TE, 1893b). The Dragoon Mountains also supplied fuelwood for five other large mining districts. Smaller amounts of fuelwood for Millville and Tombstone were also harvested in the Mule Mountains, the Chiricahuas, the southeastern slopes of the Whetstone Mountains, and the northern portions of the Huachuca Mountains (DAC, 1885, p. 8; Rodgers, 1965, p. 78, 87 abs.; USDA, 2003, p. 16). The Tombstone Mill and Mining Company in October 1885 was receiving part of its fuelwood from Miller Canyon in the Huachuca Mountains (ADS, 1885a).

Tombstone area mining-related fuelwoods were "wood of the country," mesquite, oak, pinyon, juniper, and shrubs such as mountain mahogany and willow (Bahre and Hutchinson, 1985, p. 178). Photographs taken in 1880 of wood piles near hoisting works, pump houses, and stamp mills depicted a preponderance of mesquite and oak. The Corbin mill at Millville in 1883 consumed about seven cords daily of black oak, white oak, willow, and pine that were used indiscriminately (Austin, 1883, p 102, 153 abs). Mesquite, while unexcelled as firewood, produced so much heat that mining smelters and ore mills along the San Pedro River soon refused to use it because the tremendous heat it generated burnt out boilers much faster than any other wood (Spring and Gustafson, 1966, p. 40). The mills therefore did not import it from places that still had abundant amounts such as the Tucson and Phoenix areas.

In late 1885, mining fuelwood cost $9.00 to $10.00 per cord (DAC, 1885, p. 8). The Tombstone Mill and Mining Company needed a total of about 300 cords of wood per month for its three active mines, the Girard 20-stamp mill in Tombstone, and a 100-ton concentrating mill and a 40-ton furnace at Millville. This wood came from the Huachuca Mountains, mostly hauled by 18-oxen wagon trains. The Grand Central Mining Company's two active mines and a 30-stamp mill in Contention used a total of approximately 600 cords of wood per month, brought from the Dragoon and Chiricahua mountains.

The Copper Queen mine initially used charcoal made from local wood to generate steam (AWC, 1880; Douglas, 1910, p 429, 496 abs.; Newkirk, 1966, p. 36, 59) In the company's early years it used approximately 4000 cords per year. The company hired Mexicans who harvested oak, juniper trees, and pinyon pines from the Mule Mountains and transported them by burro to the mine. The size and shape of the fuelwood did not matter because it was cut into short lengths and converted into charcoal.

Even after the Copper Queen Company switched in the mid-1880s to obtaining construction lumber from the Ross sawmill in the Chiricahua Mountains, it continued for several years to obtain fuelwood from hills around Bisbee (Newkirk, 1966, p. 59-60). However, harvesting this fuelwood became ever costlier as the Mexican workers had to travel greater distances to find it. Moreover, the continued stripping of wood from the hills around Bisbee resulted in floods within Bisbee that cost considerable money to repair.

Woodcutters

Local wood contractors typically hired Mexican woodcutters to harvest fuelwood (Bahre, 1998, p. 15; CS, 1905; Phillips, 1912, p. 13; Rose, 2012b, p. 66). While the fuelwood needs of mining and domestic activities required many woodcutters and wood-cutter camps, most contemporary writers took fuelwood cutting for granted and said little about it. An exception was the Tombstone Daily Nugget, which on February 5, 1882, asked citizens not to forget that the economic survival of Tombstone depended upon the efforts of woodcutters. The territorial government was also aware of the importance of woodcutters. In early February 1882, Governor Tritle received a dispatch from Tombstone requesting protection for woodchoppers and teamsters in the Dragoons because the workers were leaving due to fear of the Apaches (AWC, 1882). The dispatches reported that unless something was done, the Girard Mill might be idle for want of fuel. Because the governor had not yet received his commission, he could only forward copies of the dispatch to Acting Governor Gosper and General Wilcox.

Woodcutting was not a well-paid activity. Depending on the nature of the terrain and the size and spacing of trees, a proficient worker could typically harvest a cord of wood per day in the mesquite and oak-juniper woodlands (Bahre and Hutchinson, 1985, p. 178). The Texas Consolidated Mining Company in December 1880 advertised for 40 woodchoppers to work in the Chiricahua Mountains for $1.25 per cord of harvested wood (ADS, 1880). A daily wage of approximately $1.25 was significantly below that for people in other occupations. Daily pay in Tombstone in 1880 was $6 for carpenters, blacksmiths, masons, and engineers; $4 for miners; and $3 for laborers (AQI, 1880). The very low wages for woodcutters forced them to operate in mountain woodlands where fuelwood sources were relatively close together. If there were larger trees in a stand, it did not pay for woodcutters to take the time to cut down and clean trees smaller than 6 inches in diameter. The leftover slash (coarse and fine debris remaining after harvesting trees) was typically collected for use as domestic fuel.

Mexican workers who cut the cordwood preferred to use an ax rather than a saw, in part because they had difficulty keeping a saw in proper shape for doing the work. Woodcutters commonly pollarded (cut off only the upper branches) larger oaks or those that they thought would be difficult to split. It was easier to trim the upper branches into the required sizes, rather than to cut up and split the oak tree trunks. Even when woodcutters felled a tree, the stumps were often 3 feet high. The woodcutters also typically did not clear-cut an area. The wood was supposed to be cut and stacked into cords for sale, but wily workers used techniques to make a stack of wood look as large as possible with the least amount of wood. The sticks of wood, rather than being the expected 4 feet in length, were often not more than 3.5 feet long, and were even shorter if the buyer was unsuspecting. Because the branches were typically crooked, woodcutters could make impressive-looking wood stacks with plenty of open spaces between branches.

Fuelwood Sources Outside of Southeastern Arizona

Sources of fuel outside of southeastern Arizona did not become plentiful and readily available until the railroad reached Benson in 1880 (Rodgers, 1965, p. 52, 61 abs.). Even afterwards, local fuel, if available, was often cheaper than the cost of imported fuel (Rodgers, 1965, p. 52, 61 abs.). Some fuelwood sold in Bisbee and Tombstone and adjacent areas came from Mexico (BDR, 1903a). Field & Co. in Cananea, Sonora in 1903 was a wholesale dealer selling carloads of stove wood and cordwood consisting of straight juniper or a mixture of juniper and black oak.

Charcoal

Data about the amounts of charcoal used by the mill furnaces of Tombstone based companies are limited (Bahre and Hutchinson, 1985, p. 181-182). Charcoal, made predominantly from mesquite and oak, served a variety of purposes, from supplying heat for smelting furnaces to heating laundering irons (AC, 1880; Bahre, 1998, p. 15; Bahre and Hutchinson, 1968, p. 178). (Literature of the territorial years often referred to charcoal as coal.) True charcoal was commonly used in the old Mexican adobe blast furnaces at Bisbee during the early years of mining there. However, in subsequent water-jacketed blast furnaces of Bisbee and Tombstone, charcoal was used only to ignite coke that, after being freighted from railroad stations, was the major fuel of the blast furnaces.

There were charcoal camps in the Huachuca Mountains such as the Clark camp in 1883 (AWC, 1883; Crook 1883, 161, 170 abs.). Charcoal was still harvested from the Huachuca Mountains in 1903 for purposes such as cooking (BDR, 1903). The Bisbee Daily Review on November 24, 1903 reported that the English Kitchen the night before had received two wagon loads of charcoal from the Huachuca Mountains. The restaurant would soon start its big broiler and people could look forward to broiled chicken, squab, lobster, and other delicacies. The Chiricahua Mountains were also an important source of wood for charcoal (TE, 1892b; TE, 1895).

Domestic Fuelwood

Wood served for all domestic heating and cooking needs until late in the territorial years. The preferred types were mesquite, juniper, oak, and occasionally pine and shrubs (Bahre, 1998, p. 15; Bahre and Hutchinson, 1985, p. 178, 182; Murphy, 1891, p. 23, 268 abs.; TWE, 1882a). Lesser amounts of pine, mountain mahogany, manzanita, sumac, and other low-growing woody shrubs also were burnt. Bahre and Hutchinson (1985, p. 182) estimated that during the Tombstone Bonanza years, the people in Tombstone and its mill towns used a total of approximately 31,000 cords of fuelwood. Although mining operations mostly ceased using fuelwood after 1900, domestic use of wood continued much longer, and 44% of occupied dwellings in Arizona still used fuelwood for heating and cooking as late as 1940 (U. S., 1943).

Woodcutters harvested domestic fuelwood from eight major areas in the Dragoon Mountains and from nearly all major canyons facing Tombstone and Bisbee in the Huachuca and Whetstone Mountains (AWC, 1883; Bahre and Hutchinson, 1985, p. 179).

Cochise County originally used juniper and oak as fuel in its buildings. The Board of Supervisors received bids for fuelwood on October 9, 1886 (DT, 1886a), with the prices per cord being, unspecified wood $800, $8.95 and $9.25; black oak $7.50 and $8.95; and juniper $8.50 and $9.40. The supervisors in June 1888 asked for bids for supplying 75 cords of good merchantable wood, composed half of juniper and half of oak (TE, 1888). In December 1890, the supervisors requested bids for delivering to the wood yard at the courthouse 10 cords of dry black oak and three cords of dry juniper wood (TP, 1890). August 1891 and the fall of 1891 found the supervisors requesting bids for furnishing the courthouse with 14 cords of dry seasoned black oak and three cords of seasoned dry juniper (TE, 1891b; TE, 1891a). Only P.B. Warnekros bid, and the supervisors on October 5, 1891 accepted his price of $8.25 per cord. In September 1897, the supervisors requested bids for supplying 18 cords of seasoned black jack wood (Emory oak), and two cords of juniper wood (TP, 1897a).

Fort Huachuca was a significant user of fuelwood (ADS, 1906). K.T. Eastman advertised in January 1891 for 25 wood choppers to prepare 1250 cords of wood at the fort (TE, 1891c). During the 1880s, soldiers

who had been sent to the guard house were punished by having to cut wood for officers all day long on Sunday (Walker, 1971, p. 14). In June 1906, the army sought bids for supplying to the fort 1700 cords of wood, preferably dead wood cut from the Military Reservation.

Businessmen soon began supplying domestic fuelwood precut to convenient sizes. H.K. Tweed advertised in 1887 that in Tombstone he sold by the cord oak or juniper in four-foot lengths or cut ready for use (DTE, 1887). People hauled fuelwood to Tombstone from mountains 10 miles away and sometimes as far as 20 or 30 miles distant. In 1889 oak, juniper, and mesquite firewood that had to be hauled 10 or 12 miles cost $7.50 to $10 per cord (TDE, 1889a). Most fuelwood used in Tombstone in 1894 was white oak and juniper, costing $8 to $10 per cord, based on its quality (ADS, 1894).

Moore Bros. & Wren in October 1902 advertised fuelwood delivered in Bisbee costing per cord $7.00 for white oak, $8.00 for juniper and oak, and $8.50 for cedar and juniper (BDR, 1902b). By the winter of 1902, prices were $7.50 for white oak, $8.25 for black oak, and $8.50 for cedar and juniper (BDR, 1902a). In January 1903, Nichols advertised juniper and oak delivered to Bisbee homes for $9.00 a cord and listed his telephone number of 143 (BDR, 1903c). Buxton-Smith Co. publicized in February 1909 that its firewood facilities could cut juniper and oak to any desired length at reasonable prices and that the oak chunks it sold for fireplaces were very popular (BDR, 1909).

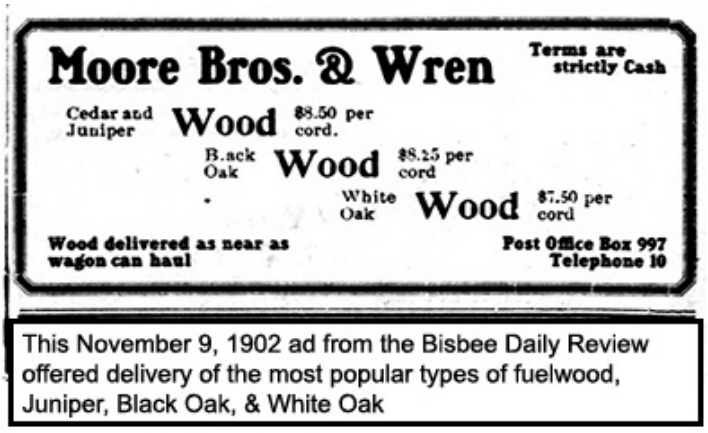
James Lamb in April 1908 offered well-seasoned juniper and oak wood for $10.00 per cord (TE, 1908b). The Buxton-Smith Company stated in April 1908 that it had seasoned juniper and oak wood available in either stove or cordwood lengths (BDR, 1908c; BDR, 1908a). In a sign of the times, the company also advertised that it handled the very best "coal on earth for heating and cooking," from the Gallup mines.

Switch to Fossil Fuels for Mining Purposes

After the Tombstone Mill and Mining Company built a smelter at Millville in 1882, it needed coke to fuel it (EMJ, 1883, p 314, 337 abs.). When coke could not be obtained, the smelter had to shut down, such as happened for three weeks in September 1884 (AWC, 1884).

Once the Copper Queen Company had denuded the Mule Mountains of trees, floods became a problem in Bisbee, which was built in the troughs of two converging valleys (Douglas, 1910, p. 429, 496 abs.). An especially bad flood in 1886 resulted in corporate officials seeking new fuel sources to generate steam. The company had already been using English coke in its smelter (ADS, 1880; Douglas, 1906, p. 11). The coke was imported through San Francisco for approximately $30 per ton. The cost of shipping coal or coke by wagon trains had made such fuels too costly for widespread use. Railroad transportation significantly reduced freight costs, and the Copper Queen Company after the flood began importing coal and coke as a partial substitute for wood from Cardiff, New Mexico and Trinidad, Colorado, the closest developed coalfields then (Newkirk, 1966, p. 61).

In 1887, the company burnt in its furnaces 10,253 tons of coke from Trinidad–the same amount that it used per month in furnaces by 1909 (Douglas, 1899, p. 540; Douglas, 1909, p. 15). However, it still burned 3554 cords of wood that year in its boilers to generate steam. In December 1889, the Copper Queen facilities burned 24 cords of wood daily, or 8760 cords annually, at a cost of $6.00 per cord (AWE, 1889). Most of that came from the Chiricahua Mountains. After the company constructed a railroad from Bisbee to the one already at Fairbank in 1889, it completed the conversion from wood to coke or coal as fuel for general energy needs. Electrically powered machinery became part of the mining related activities of the Copper Queen Company in the 1890s (Douglas, 1909, p. 22).



This November 9, 1902 ad from the Bisbee Daily Review offered delivery of the most popular types of fuelwood, Juniper, Black Oak, & White Oak

Even the powerful Copper Queen Company at times had problems obtaining enough coal or coke. An extra train traveled from Bisbee to Fairbank on the night of February 27, 1896 to obtain coke and coal needed at the Copper Queen smelter (TE, 1896). The mining company contracted with the Colorado Fuel & Iron Co. in late 1901 for coal at $4.00 or $4.05 per ton and coke at $6.75 per ton over a five-year period (Douglas, 1909, p. 33). However, a coal strike and shortages of railroad cars resulted in the company not supplying the promised fuel. The Copper Queen Company several times bought expensive eastern coke to avoid shutting down its furnaces. It then began switching to oil to power its machinery. By 1913, fuel oil from California powered Copper Queen machinery in Bisbee and Douglas (Douglas, 1913, p. 563-564, 648-649 abs.; Legrand, 1913a, b).

Tombstone mines began switching to fossil fuels around 1897 or 1898. The Kansas City-based Weber Gas and Gasoline Engine Co. advertised in the Tombstone Weekly Epitaph in 1897 that its gasoline hoisting engine needed no coal or wood and only very little water and cost only one cent per horsepower per hour (TE, 1897). By January 1898, coal was becoming a major fuel for mining in the area (TE, 1898). It was shipped to Tombstone from Cerillo, New Mexico, in carload lots and cost $10.55 per ton. Each ton was equal to more than 2.5 cords of wood, resulting in considerable savings. Tombstone mines in the summer of 1902 were switching from coal and wood to burning oil (TE, 1902; TE, 1902).

Switch to Domestic Fossil Fuels

Domestic use of fuel gradually switched from wood to coal or other fossil fuels because wood was sometimes in short supply and fossil fuels were cheaper. The Tombstone Daily Epitaph on February 27, 1882 discussed a fuelwood shortage (TE, 1882). Most fuelwood for Tombstone area mines came from the eastern slopes of the Dragoon Mountains and cost $12 per cord. Fuelwood harvested for domestic purposes cost approximately the same, with the expense being a major economic burden for Tombstone-area residents. If wood continued as the energy source for domestic use and was burned at the then-current rate, it "would become an exceedingly dear commodity." Switching to coal would reduce by approximately half cooking and heating expenditures.

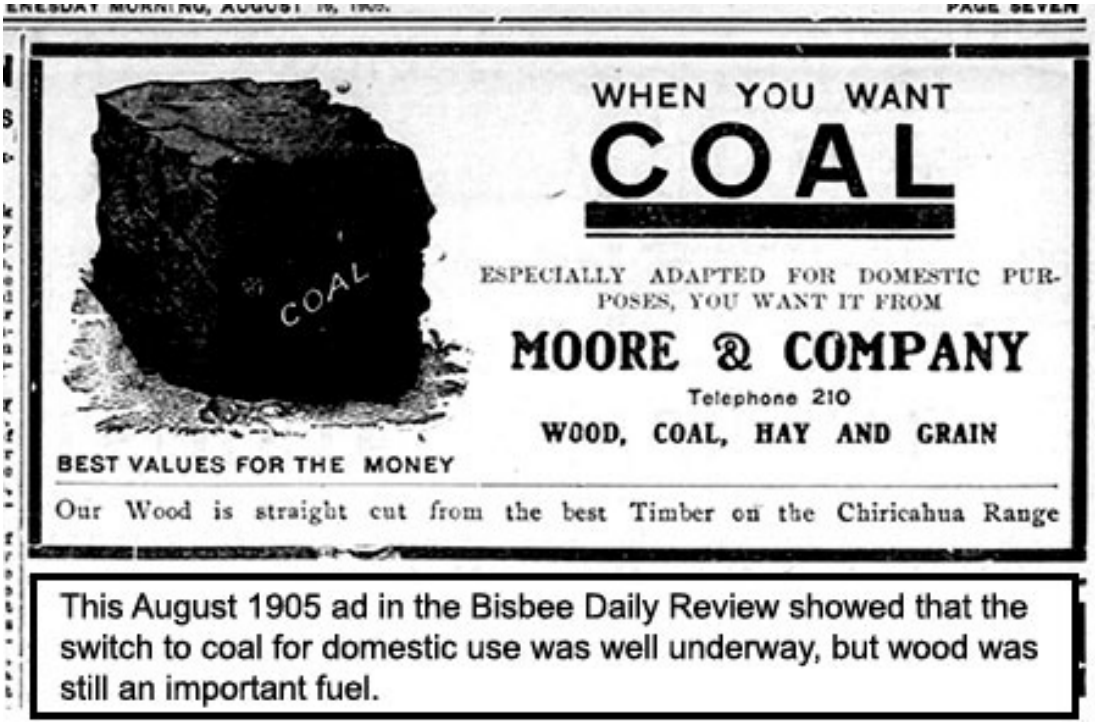
This August 22, 1897 ad in the Tombstone Epitaph offered mining companies a way to save money by switching from fuelwood to fossil fuels.

The Tombstone Weekly Epitaph printed an article on August 2, 1890 about cooking stoves and fuel (TE, 1890). If people burnt wood, at least half should be dry. Soft coal was better than poor wood and produced a cheap and hot fire but was dirty and required a filter attached to the cistern. Hard coal was excellent to cook on in winter if the stove was made to burn it. Gasoline was the best fuel for the summer, but people had to be careful when using it. Two and one-half gallons of gasoline would fuel cooking, washing, and ironing for a week for a family of four.

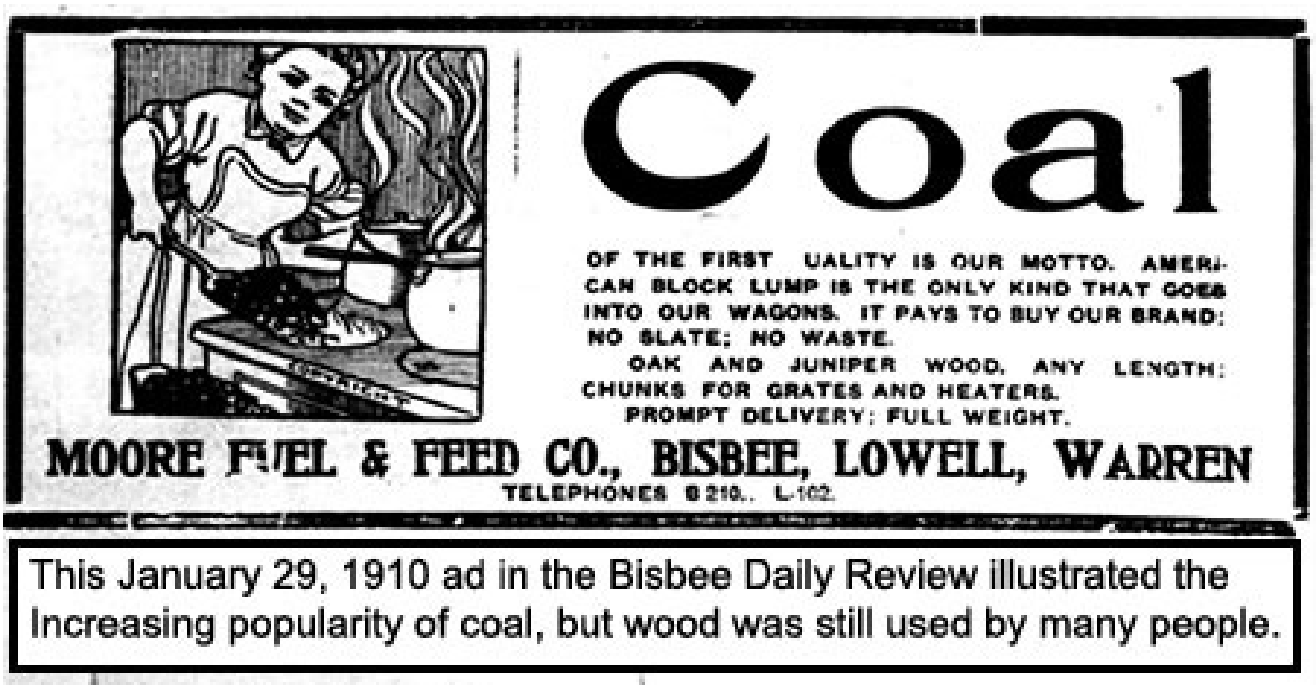
By January 1898, enough people had switched to coal for heat that the Tombstone Weekly Epitaph noted that the Bisbee merchant E.E. Mason had received another carload of coal, and residents could be sure of keeping warm (TE, 1898).

Many Bisbee-based fuel sellers by 1905-1906 prominently mentioned coal in newspaper advertisements. Buxton-Smith Co. in September

1906 offered coal that burnt with as little ash and waste as possible and suggested people write or telephone for service (BDR, 1906b). The company also supplied good dry juniper and oak fuelwood. In October 1906, the same company's advertisement prominently featured coal and had only a single line about juniper and oak (BDR, 1906c). However, wood was still an important domestic fuel, and the company's October 1906 advertisement gave equal billing to fuelwood and coal (BDR, 1906a). The notice explained that juniper and oak were the best woods for domestic use and were available in all lengths for stoves and could be sawed or split by the company into large or small pieces or kindling size. The company also supplied oak chunks for fireplaces and Black Diamond coal. Moore Fuel and Feed Company in 1907 advertised coal in the form of American Block Lump and Anthracite and offered oak and juniper in whatever lengths and sizes desired (BDR, 1907). Buxton-Smith Co. in March 1908 supplied high-



This August 1905 ad in the Bisbee Daily Review showed that the switch to coal for domestic use was well underway, but wood was still an important fuel.



This January 29, 1910 ad in the Bisbee Daily Review illustrated the Increasing popularity of coal, but wood was still used by many people.

quality, correctly cleaned coal and juniper and oak fuelwood cut to desired lengths (BDR, 1908b). As time passed, advertisements increasingly offered coal as domestic fuel.

The Independent Fuel & Feed Co. in July 1910 promised clean and free-burning coal and juniper wood cut to desired lengths (BDR, 1910c). Even with the shift from fuelwood to coal, people in the Arizona territory had to work hard to fuel their furnaces and stoves. A 1910 ad featured a happy man shoveling coal into a furnace and pointed out how far a ton of that substance would go for heating purposes. One might also mention the routine chore of putting smaller amounts of coal or other fuels into stoves.

Despite the growing emphasis on coal in advertisements, many newspaper notices in 1910 still mentioned only fuelwood. The Independent Fuel and Feed Co. placed (BDR, 1910b) several notices in 1910 with the headline of "Juniper Wood All Lengths." Some advertisements mentioned that oak chunks were available for winter use. At the end of the territorial era in 1912, the predominant domestic fuels were coal, and juniper and oak. Domestic fuels other than wood or coal gradually became available. The Standard Oil Company in 1901 advertised in the Tombstone Weekly Epitaph its line of Wickless Blue Flame Oil Stoves (TE, 1901a; TE, 1901b).

Local government eventually began switching to coal. By August 1899, Cochise County was changing from wood to coal (TP, 1899). The supervisors advertised for bids to deliver at the courthouse 20 cords of seasoned black jack wood, 4 cords of seasoned juniper wood, and 14 tons of bituminous coal (TP, 1899). There was only one bid for supplying the wood and one for coal, and the supervisors agreed to pay Joseph McPherson and Company $13 per ton for coal and P.B. Warnekros $8 a cord for seasoned juniper wood (TE, 1899). In July 1909, an outside building for coal storage was added to the Tombstone schoolhouse (TE, 1909).

By 1896, Fort Huachuca was using both coal and wood as fuel (AR, 1896). Contracts awarded for the fiscal year ending June 30, 1897 included Both and Murray for 2000 cords of wood cut on public domain lands at $3.95 per cord, Pablo B. Soto for 4000 pounds of Cumberland coal at $1.00 per pound, and A.C. Willis for 150 bushels of charcoal at $0.25 per bushel.

This July 30, 1910 ad in the Bisbee Daily Review was directed toward men & promised that a ton of the firm's coal "goes farther than ordinary coal."

This May 19, 1901 ad in the Bisbee Daily Review showed one of the new fuel choices available to households during the switch from fuel-wood to fossil fuels.

Fuel Famines

The switch to fossil fuels did not solve all energy issues. Companies that built railroad cars for transporting such fuels had difficulty meeting the needs of railroads. In the winter of 1906-7, a shortage of railroad cars threatened a fuel famine in southeastern Arizona (TE, 1906b; TE, 1907a). Tombstone residents were relieved in October 1906 when the railroad delivered three carloads of wood and two of coal to Borrowdale Brothers (TE, 1906c). The situation in Tombstone in January 1907, while a cause for concern, was not dire. The supply of fuel for domestic use was short, but Borrowdale Brothers received a carload of cordwood in early January and assurances of the arrival of coal shipments within a few days. The McPherson Transfer company also expected to receive coal shipments soon.

Bisbee experienced a fuel famine. The lack of coal interfered with mining operations. Domestic fuel was in short supply. The Bisbee Improvement Company that supplied electrical power for many businesses closed on the night of January 6, and people feared it would be unable to supply power during the day. The belief was that people at home would soon have to burn wood, of which there was only a small reserve available, or go without heat.

By January 27, 1907, the Tombstone Consolidated Company had only a two- or three-day supply of fuel oil (TE, 1907e). Plenty of oil was being shipped by railroad from California oilfields but might not reach Tombstone in time. There was a serious coal shortage.

Another fuel shortage occurred in Tombstone during the winter of 1907-8 (TE, 1907c). In November 1907, the town was "experiencing a coal and wood famine, and it does not seem to be any immediate relief in sight." Local coal dealers had been without inventory for several weeks and could not locate several train cars of coal coming from New Mexico. Wood was difficult to get and the few Mexicans who brought it to town charged high prices. Several residents arranged to have coal shipped to them from Benson or Bisbee in ton lots at a cost of $19 to $24 per ton. The fuel shortage abated on December 2

when three carloads of coal came in for the McPherson Transfer Company (TE, 1907b). That company was kept busy filling local back orders. A few days later, on December 12, Bisbee faced a coal famine (TE, 1907d). In the summer of 1908, C.P. Barrowdale, to prevent future coal shortages, enlarged and improved its wood and coal yard in Tombstone and began stockpiling coal (TE, 1908a).

Railroads eventually obtained enough cars to supply coal to customers. However, shipping rates per ton of coal began rising and in 1911 reached $1.58 for Tombstone residents. The Tombstone Weekly Epitaph in April characterized shipping rates as "soaring speedily skyward at the speed of Wilbur Wright's aeroplane."

Coal eventually replaced wood as a fuel, but the changeover for domestic needs was slow. When Arizona became a state in 1912, most households probably were using fuelwood. In 1940, 40.1% of dwellings in Cochise County used fuelwood for cooking (U. S., 1943).

Future articles

One or more future articles will discuss federal efforts to protect forests in southeastern Arizona and the environmental impact of woodcutting.

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The "THOR" Wonder Working Electric Laundry for the Home

Learn How to Save Money, Time, Toil

The operator is now washing and wringing clothes at the same time. This is only possible with our 3-roll electric wringer.

Come and see the "Thor" in operation—the washer that does the entire laundry work for a family of 6 in 30 minutes at a cost of 6 cents for electricity. It will open your eyes to possibilities of household economy you never dreamed of. The "Thor" solves the servant problem. Saves toil—saves time—saves the clothes.

Guaranteed to wash dainty laces and lace curtains beautifully clean without injury. Some day it will be in every home—put it in yours now.

Operated from an electric light fixture. Made in different sizes—adapted for any house or apartment.

You should have one of these machines in your home.

Phone 197 and our representative will call.

BISBEE IMPROVEMENT CO.

This July 30, 1910 ad in the Bisbee Daily Review illustrated that in the latter part of the territorial years electricity was starting to become an energy source for affluent households. The machine could be plugged into an electric light socket & "solves the servant problem."

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San Pedro House by Ted White.

New Website about the San Pedro River

By Gerald R. Noonan PhD

I have created a new website that has a lot of information about the human and environmental history of the San Pedro River area, its animals and plants and Science Facts about the river and valley. The website is at https://scihistory.info/index.html. Historical articles include: Assassination of Martin Peel; Lewis Springs; Major Riparian Habitat Changes; Massive Floods That Cut Arroyos; Overgrazing; Railroads; Stagecoach Lines; Tombstone Bonanza; Transportation; Woodcutting for Construction; and Former Farming near the San Pedro House. Several articles present photographs and life history information about types of birds commonly found near the San Pedro House. There are several galleries with slideshows of animals, plants, and landscapes; additional slideshows will soon be added. I am in the process of adding satellite photos of the river so that people can see what it looks like from above. Scientific topics include: Arroyos and How Their Formation Provided Habitats for The Current Riparian Forests; and Groundwater Use by Plants. A section on conservation has a copy of the Congressional act that established SPRNCA, a map of the Conservation Area, and a link to information about Friends of the San Pedro River. A section on plants has photographs and life history information about Soaptree Yuccas, Buffalo Gourds, Fingerleaf Gourds, and Melon Loco Gourds. Other material will be added over time.

New & Renewing Members, March through July 2019

Eric & Roberta Allen*; Judith Visty & Peter Allen; Anders Aman; Richard Armstrong*; Eric Aronson; Anne Isbister & Christopher Ballog*; Richard Bauer; Tim Blount*; Cheryl Braun; Lisa Breit; Shirley Campbell; Diane Derouen & Glenn Chambliss; Christi & Ken Charters; Jane Corley*; Pam & Charlie Corrado; Kevin & Helene Cox*; Jack & Candy Culberson*; Lynn Daugherty; Kathy DeKeizer; Tina Eden; Karyn Faust; Linda Feltner; Ted Finkbohner*; George & Sandra Fizell; Mary La Flamme & Tom Fleming*; Megg & Chas Giufurta*; Uda & Charlie Gordon; Leslie & Charlie Goulet*; Bob Groendyke; Gary Hahn; Patsy Hansel*; Robyn Heffelfinger; Lee & Charla Henney; Peter Herstein; Kurt Hilsen; Anna & John Howard; Jack & Marty Jackson; Steve Johnson; Laurie Kagann; Merle Kilpatrick; Denny Kitchen; Menary Kitchen; Daniel & Ingrid Koch*; Mark & Lorena Krenitsky; Theresa & John Lawson*; Tom & Sue Leskiw; Brandon Lloyd; Robert Luce; John Maier; Rick Marsi; David McCargo*; Judith Gale & Jerry McMahon*; Jennifer Monks; Deborah Moyer; Pam Negri; Susan Notorangelo*; Jeroen Oomen; Thaddeus & Catherine Paprocki*; George & Jill Paul*; David & Christine Pearson; Teresa Pepper*; Judy Phillips; Karen Ratte; Matt Reed; Judy Reis; Christine Rhodes*; Jerry & Betty Rietmann; Alexander Russell; Jeffrey Saunders; Cathy Schneider; Tom & Judy Shepherd; Kathleen & Wayne Shilson; David Singleton; Anke & Herbert Staffenski*; Robin Steinberg; Scott & Sarah Sticha; Brenda Taege*; Bob Thomas*; Debbie & Pierre Thoumsin*; Mary & Scott Tillman; Judith & John Ulreich; John Wallin*; Robert & Liza Weissler; Robert White; Stephen & Lauvon White; Rich & Gail Wilder; Robert Woodward.
* = New member

Events, September-December 2019

San Pedro House Open as Visitor Center (Daily), 9:30 am-4:30 pm

Fairbank School House Open as a Visitor Center (Friday-Sunday), 9:30 am-4:30 pm

Understanding the River Interpretive Walks

Every Saturday at SPH

» 8 am—September 7, 14, 21, 28
» 9 am—October 5, 12, 19, 26
» 9 am—November 2, 9, 16, 23, 30
» 9 am—December 7, 14, 21, 28

FSPR Bird Walks

Every Wednesday & 4th Saturday at SPH

» 7 am—September 4, 11, 18, 25, 28
» 8 am—October 2, 9, 16, 23, 26, 30
» 8 am—November 6, 13, 20, 23, 27
» 9 am—December 4, 11, 18, 25, 28

FSPR/SABO Bird Walks

Every Sunday at Sierra Vista Environmental Operations Park (EOP)

» 7 am—September 1, 8, 15, 22, 29
» 7 am—October 6, 13, 20, 27
» 7 am—November 3, 10, 17, 24
» 7 am—December 1, 8, 15, 22, 29

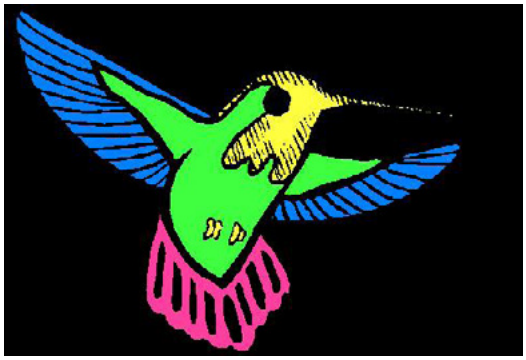
History Hikes

» October 5—Fairbank Historic Townsite, 9 am
» October 12— Presidio Santa Cruz de Terrenate, 9 am
» October 19— Clanton Ranch, 9 am
» October 26—Grand Central Mill, 9 am
» November 2—Murray Springs Clovis Site, 9 am
» November 9— Millville Ruins & Petroglyphs, 9 am
» November 16—Presidio Santa Cruz de Terrenate, 9 am
» November 23—Fairbank Historic Townsite, 10 am
» November 30—Murray Springs Clovis Site, 10 am
» December 7— Clanton Ranch, 10 am
» December 14—Grand Central Mill, 1 pm
» December 21—Millville Ruins & Petroglyphs, 1 pm

SABO Hummingbird Banding

Saturdays, unless otherwise noted; observe from 4-6 pm at SPH

» September 8 (Sunday), 14, 21, 28
» October 5 (last of season)



Contact List

- President—Robert Weissler
- Vice-President—Ron Stewart
- Treasurer—Renell Stewart
- Secretary— Sally Rosén
- Directors—Charles Corrado, Pam Corrado, Tricia Gerrodette, Robert Luce, Steve Ogle, Sally Rosén, Renell Stewart, Ron Stewart, Robert Weissler
- Docent Activities—Ron Stewart
- Education—John Rose
- Membership—Carolyn Santucci
- Newsletter Editor—Sue Leskiw
- Office Manager—Carolyn Santucci
- Bookstore Manager—Laura Mackin

To contact any of the above individuals, please call the office at 520-459-2555 or send us e-mail at fspr@sanpedroriver.org or sanpedrohouse@sanpedroriver.org.
Mailing address: 9800 East Highway 90, Sierra Vista, AZ 85635; Website: www.sanpedroriver.org

Friends of the San Pedro River (FSPR) is a nonprofit, volunteer organization dedicated to the conservation of the River and the health of its ecosystems through advocacy, educational programs, and interpretive events.

Friends of the San Pedro River
9800 East Highway 90
Sierra Vista AZ 85635