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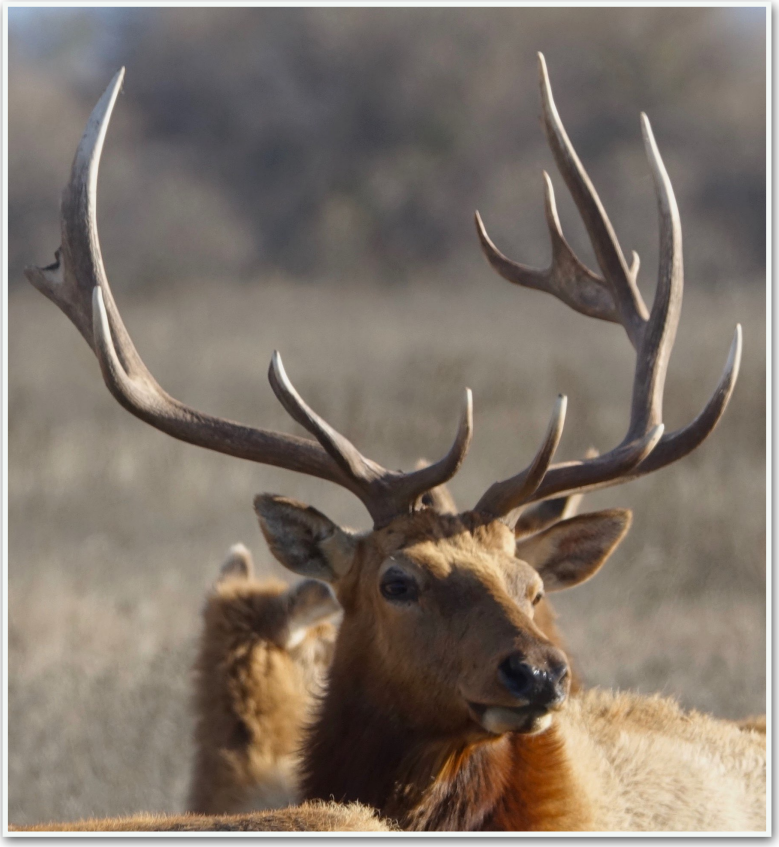
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Where Were Elk in the Black Range?

by Harley Shaw

Because game species are managed for numbers, hunted, and have a voluminous sportsman's press, we tend to leave them out of pure natural history writing. More print has been produced in the sporting press about huntable wildlife than has ever been written about less-known birds, small rodents, reptiles, or invertebrates. But game animals have fascinating stories that make them interesting to those nature devotees who don't eat wild meat or put trophies on the wall. Even for the most popular and heavily-studied game species, misinformation and information gaps still exist. Such is the case with the history of the Black Range's most popular big game – the elk.



When Europeans arrived, elk in New Mexico mainly represented the southerly tips of Rocky Mountain elk populations reaching down from the widely-distributed populations in Colorado, Wyoming, Montana, and Canada. Historically, elk ranged all the way to the east coast of the United States.[1] But in New Mexico, elk were scarce, perhaps absent, in habitats that have become well-populated over the past 100 years. Elk were extirpated in the state by 1900, as the area was settled by miners and ranchers. A pattern of decreasing numbers of elk is apparent as early naturalists explored the mixed conifer, ponderosa pine, and pinyon-juniper forests in west-central New Mexico and central Arizona. A few elk were present as far south as the Mogollon and Sacramento Mountains, but I've so far been unable to find strong evidence of a pre-historic or historic elk population in the Black Range. Yet they are now thriving in all of the above areas. In the Black Range, they occur the full length of the mountain, as well as eastward and westward into the foothills and river valleys. What, if anything, had prevented them from expanding earlier into this apparent excellent habitat?

Truett[2] puzzled over this phenomenon nearly 30 years ago, as it applied to both elk and bison in the greater Southwest. In his exhaustively researched paper, he states:

In the American Southwest during recent years, both bison (Bison bison) and American elk (Cervus elaphus) have prospered in some places where they were unknown historically. Small herds of bison in an essentially wild state have existed for several decades in localities west of the Pecos River valley, which marked the approximate western limit of their early-historic range. Elk currently occupy many parts of this trans-Pecos region where they were not encountered by early Europeans traveling in the region.

Truett did not discuss the Black Range specifically, but concluded for the Southwest in general that:

Water scarcity and human hunting both may have contributed to the scarcity of bison and elk in the late prehistoric and early historic Southwest. Water scarcity almost certainly played a part, but it seems highly unlikely that water scarcity alone could account for the restricted distributions reported. Hunting by aboriginal humans also is implicated.

Truett further concluded:

Logic suggests that bison in the Southwest could have been hunted to extinction while some elk populations survived. Bison are larger than elk and thus probably were preferred prey. Bison habitat needs – open grasslands and substantial supplies of water – would in the Southwest have put them in closer proximity to the larger agricultural villages, which were usually situated in valleys or basins. Elk, in contrast, presumably ranged as they do today into the rougher and more densely forested terrain, which was often relatively distant from major prehistoric agricultural villages. Early historic observations of elk in the

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1. Thomas, J. W. and D. E. Toweill. 1982. *Elk of North America – ecology and management.* Wildlife Management Institute and Stackpole Books. P. 49. (Ed.: Used copies of this book sell for $150.)
2. Truett, J. Bison and elk in the American Southwest: In search of the pristine. *Environmental Management* 20, 195-206 (1996). https://doi.org/10.1007/BF01204004

> ***Southwest were restricted largely to mountain ranges that were extensive and/or remote from large agricultural settlements of humans, e.g., White Mountains in Arizona and Mogollon, Sacramento, and southern Rocky Mountains in New Mexico.***

In viewing available paleontological, archaeological, and historical evidence, I'm not sure that Truett's conclusions hold for the Black Range.

Paleontological evidence

Meiri et al.[3], used carbon dating coupled with analyses of ancient DNA to estimate the time ancestral elk first crossed Beringia into North America. They came up with approximately 15,000 years ago, even though the European ancestor of the species had been present in Siberia for at least 50,000 years. Although the time frame for their proposed crossing of Beringia is much longer than range expansions we have observed in historic times, a pattern of apparent reluctance to expand range followed by sporadic surges is apparent even in these ancient habitats. These authors located only one fossil elk specimen from the southwestern U. S., and it was undatable.

Gelbart[4], in an undated note online, suggests that sporadic intrusions into North America may have occurred earlier than Meiri et al. suggest. If so, were so rare that they would not modify significantly the hypotheses those authors suggested. Gelbart mentioned no early elk in the Southwest.

No records of elk in the Southwest occur in *Packrat Middens – the last 40,000 years of biotic change*[5], even though some discussions are present for deer species, bison, bighorn, and pronghorn. I found no mention of the Black Range in this book. Analysis of packrat middens lends itself better to documenting smaller species, so absence of remains of larger mammals in middens does not necessarily indicate their absence. Late Pleistocene/early Holocene flora and fauna reviewed by Shaw (2018) mentioned no elk in New Mexico.[6]



Archaeologists identify fragments of animal bones from archaeological sites by comparing them with modern specimens, like this collection of small mammal mandibles at the Stanley Olsen Laboratory of Zooarchaeology at the Arizona State Museum. (This image and caption first appeared in "The Archaeology of Animals in Southwest New Mexico, AD 1000 – 1130" by Karen Gust Schollmeyer, Archaeology Southwest, *Black Range Naturalist, Vol 3, Number 1*, January 3, 2020. In that same issue, the graphic at the top of the next page was published (see that article for a larger copy).

Archaeological evidence

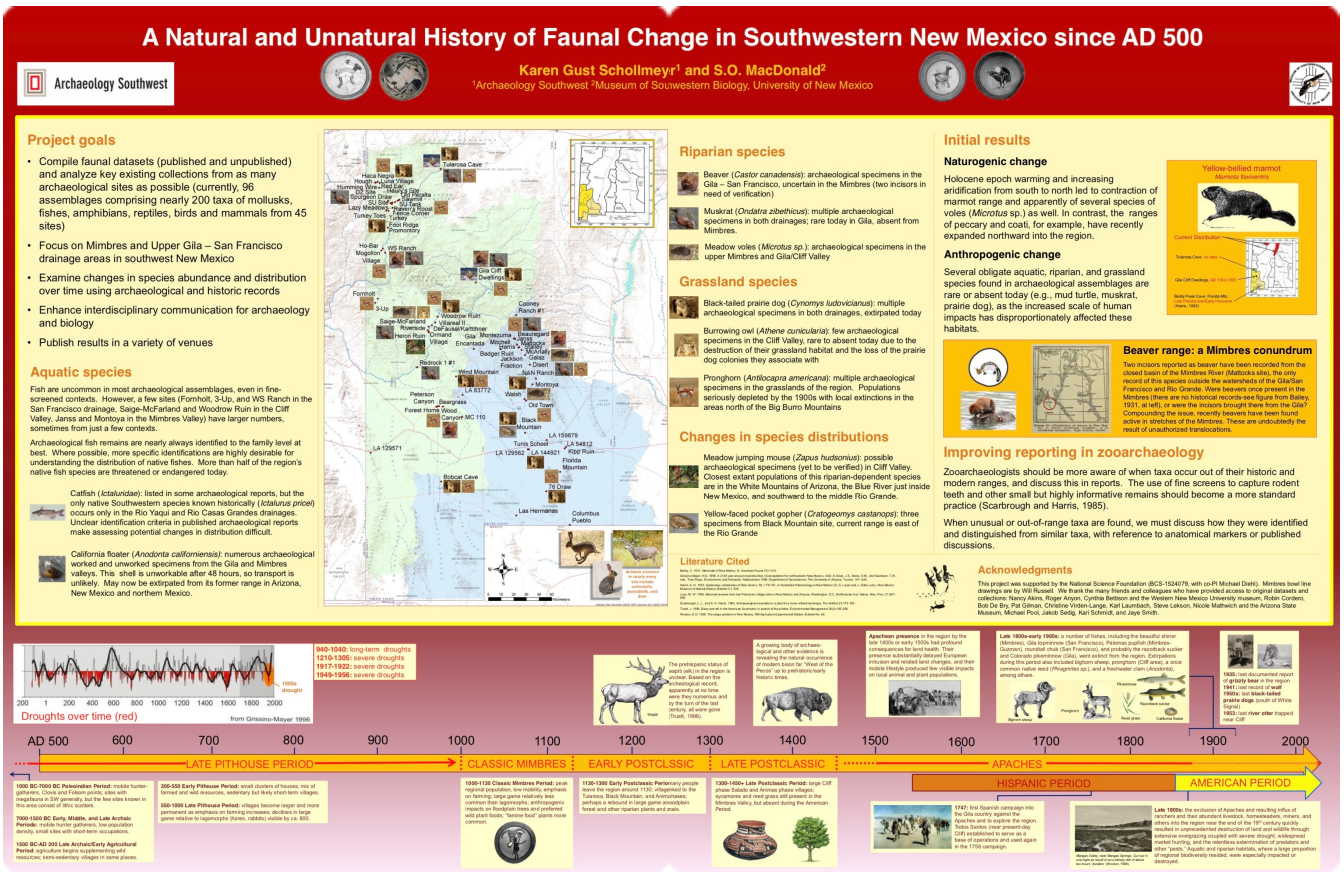
In 2001, Laumbach[7] summarized the status of archaeological records of elk and bighorn in Mimbres sites. For elk, he notes:

> ***Elk and Mountain Sheep are rare but present in the archaeological record. Elk would have been difficult to hunt with a Mimbres period reflex bow. However, so would Mountain Sheep and their remains appear consistently, albeit in small numbers. Elk remains are not commonly found in Mimbres sites (Minnis 1985:104; Nelson 1999:155). A few elk bones were identified at Wind Mountain (Olsen and Olsen 1996:404) and at Swartz Ruin (Cosgrove and Cosgrove 1928:4). It is doubtful whether either elk or sheep populations were significantly impacted by the Mimbres population.***

The consistent presence of bighorn in Mimbres sites suggests that the species might have had a wider distribution prior to arrival of Spanish domestic sheep. The sparsity of elk remains raises serious doubt about the impact of Mimbres cultures on elk.

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3. **Meiri M et al., 2014, "Faunal record identifies Bering isthmus conditions as constraint to end-Pleistocene migration to the New World", *Proc. R. Soc. B* 281: 20132167. http://dx.doi.org/10.1098/rspb.2013.2167.**
4. **GeorgiaBeforePeople website: "Did Elk (Cervus elephus) Live in North America Prior to 15,200 BP?"**
5. **Betancourt, J. L., T. R. Van Devender, and P. S Martin, 1990, *Packrat Middens – the last 40,000 years of biotic change*. University of Arizona Press. Tucson.**
6. **Shaw, H. G. 2018. "A Percha Creek Timeline – the first ten years – a reader", *Guajolotes, Zopilotes, y Paisanos,* Hillsboro Historical Society. Hillsboro, NM.**
7. **Laumbach, Karl W., 2001. *A Mimbres Environmental Impact Statement – A Review Of Mimbres Environment, Land Use, and Impact*. Human Systems Research, Inc. The Ladder Ranch Conference March 3 and 4, 2001.**



"A Natural and Unnatural History of Faunal Change in Southwestern New Mexico since AD 500." K.G. Schollmeyer and S.O. MacDonald. Poster presented at the 2017 Annual Meeting of the Society for American Archaeology, Vancouver, Canada, March 29-April 2.

In a summary of wildlife remains found in 104 archaeological sites in southwestern new Mexico, Schollmeyer and MacDonald documented 15 sites represented by 27 items with possible elk remains. Of these, 9 sites were within or very close to the greater Black Range/ Mimbres Mountain watershed. Four sites were on the east slope of the Black Range. Schollmeyer, in a personal communication (October 15, 2024) commented:

> ***. . .I don't consider any of these really definite IDs. Most of the Eastern Mimbres ones were ID'd by me as 'compares favorably' but we didn't have an elk in the comparative collection at ASU, so there's a possibility that they are just really big mule deer. The others I don't have 100 percent faith in. . . . I would love to see someone actually take a comparative elk specimen around to the repositories that have all of these and check all of them and write a paper about it.***

These sites are in areas where elk are abundant today.

Additional evidence of elk exists from the Cañada Alamosa Project.[8] This prolonged project reviews materials found in sites representing 11 periods ranging from Late Archaic (c. 4,000 B.P. and 2150 B.P.) through Apache (1873-1878). Wylde, quoting Laumbach[9] notes:

> ***The Alamosa drainage system encompasses approximately 725 square miles and ranges in elevation from 4,400 to 10,334 feet above sea level. The Alamosa system is unique in that all tributary drainages south to the Rio Grande emanate from the Black Range, and those to the north drain the east face of the San Mateo range. The Rio Alamosa is the only Rio Grande tributary that drains the southeastern corner of the Plains of San Augustin and the west slope of the San Mateo Mountains.***

Of the few possible elk elements associated with the Cañada Alamosa project, the earliest found was in the Late Pithouse period (AD 850-950). Wylde acknowledges some un-certainty in the identification of this element. Another element identified tentatively as elk occurred in the Socorro Phase (A.D. 1130-1200). The largest number of elk elements occurred during the Tularosa Phase (A.D. 1200-1300). These were from three spatially separated features. A single elk element was found in the Early Glaze/Glaze A Phase (A.D. 1300-1400). Interestingly, no elk elements were found in Apache (1873-1878) sites, which overlap in time with, and could be included in, historical records.

It is difficult to assess these prehistoric site records. Conceivably

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8. **Wylde, M. 1914. *Faunal analysis for the Cañada Alamosa project*. Unpubl. MS. University of Florida. 26 pp.**
9. **Ibid.**

some of the elk elements could have been brought in from other areas or taken locally from either the San Mateo or San Augustin watersheds. At best, the archaeological elements suggest a very low and perhaps sporadic presence of elk near the Black Range from 4000 BP to 1878 AD. Laumbach[10] further comments:

> ***Based on the archaeological record (Minnis 1985, Olsen and Olsen 1996), deer and mountain sheep seem to have been the largest common herbivores. Elk may have been present but are not commonly represented in the archaeological record. A few elk remains were found at Wind Mountain Site in the Burro Mountains (Olsen and Olsen 1996:404) and at Swartz Ruin on the lower Mimbres (Cosgrove and Cosgrove 1932:5). Elk do not commonly appear as motifs on Mimbres bowls. One such bowl resides in the collections of the University Museum at the University of Colorado at Boulder. That particular bowl appears to depict a bear trying an elk head on for size. (See upper right.)***



A rare bowl with what is possibly an elk head along with what may be a bear. The antlers shown definitely have elk conformation.

Historical Elk Records

Documentation of historical distribution of elk is perhaps more complete for Arizona than New Mexico. For an overview, see *Man and Wildlife in Arizona – the American Exploration Period 1824-25*, especially the editor's summary for elk on pages 181 and 182.[11] Also see commentary on elk on page 329 in *Bringing Back the Game* by David E. Brown.[12] It is not the purpose of this article to repeat the history of Arizona's elk. Suffice it to say that with only one or two exceptions, observers in Arizona from the early 1800s to the 1940s recorded few and scattered sightings of elk or elk sign. Some early naturalists claimed that densities had been greater early in that century but had been shot out, but no physical evidence exists to back this up. In truth, even the earliest writers recorded few elk in Arizona or in central New Mexico.[13]

James Ohio Pattie. One of the earliest American explorers to record wildlife of the Southwest, including the Black Range, was James Ohio Pattie. Pattie apparently wrote his narrative from memory after returning eastward, and tended to exaggerate his role in the various expeditions, so the narrative isn't a completely reliable resource. Between 1823 and 1827, Pattie covered a lot of country in New Mexico, Arizona, California, and, probably, southern Utah and Colorado. Pattie's comments regarding wildlife are inconsistent and at times not credible. Separating facts from the product of a vivid imagination is impossible, although several historians have tried.[14, 15]

For all of his ramblings in New Mexico and Arizona, Pattie mentioned elk only once. This was during an 1826 trip paralleling the South Rim of the Grand Canyon. Even though I have lived and worked in much of the country Pattie traversed on this trip, I am unable to make sense of his description of the route taken eastward from the Grand Canyon. Somewhere after circumventing the Canyon, Pattie reported, "We likewise killed plenty of elk, and dressed their skins for clothing." Olaus Murie[16] mistakingly placed Pattie's elk observation near the mouth of the Little Colorado, an area that would be unlikely to have had elk, even today. For that matter, it is probably not a place Pattie's party would have explored if they were simply trying to work their way to civilization. Murie apparently wasn't acquainted with

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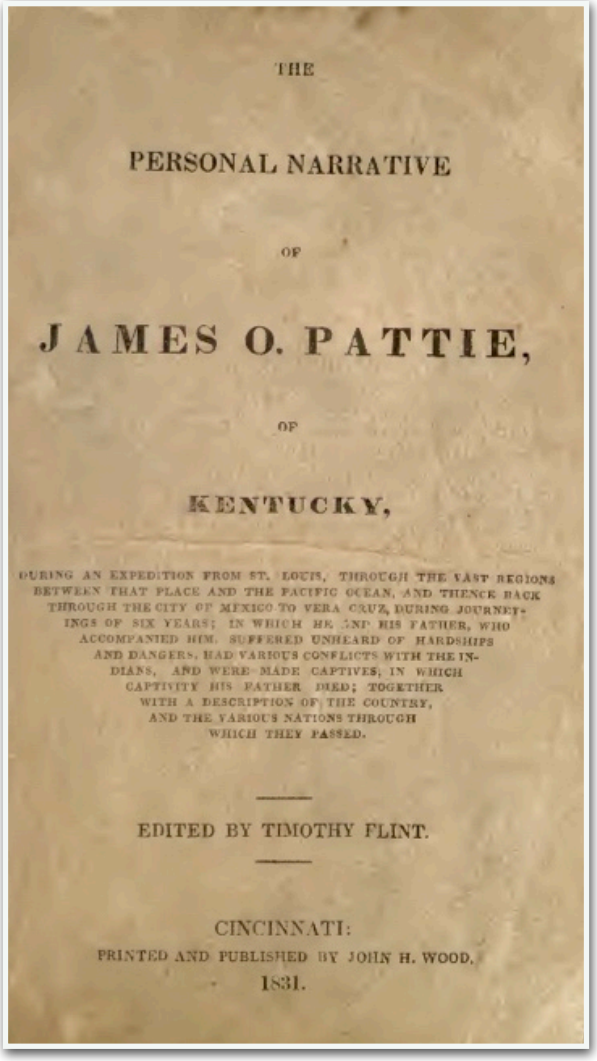
10. Laumbach, K. 2001. A mimbres environmental impact statement. Human Systems Research, Inc. Las Cruces, NM.
11. Davis, Goode P. Davis, Jr. 1982. *Man and Widlife in Arizona*. Arizona Game and Fish Department, Phoenix. Edited by Neil B. Carmony and David E. Brown.
12. Brown, D. E. 2012. "New Approaches to Managing Big and Small Game" in *Bringing Back the Game – Arizona Wildlife Management – 1912-1962*. Arizona Game and Fish Dept. Phoenix. 329.
13. Pattie, J. O. 1962. *The Personal Narrative of James O. Pattie* – The 1831 edition unabridged. Introduction by William H. Goetzmann. J. B. Lippincott Company. Philadelphia and New York.
14. Kroeber, A. L. 1964. "The Route of James O. Pattie on the Colorado in 1826: A Reappraisal by A. L. Kroeber". *Arizona and the West*. 6 (2): 119-136.
15. Batman, R. 1984. *James Pattie's West – the dream and the reality*. University of Oklahoma Press, Norman. P. 179.
16. Murie, O. J. 1951. *The Elk of North America*. Stackpole Company, Harrisburg, and and The Wildlife Management Institute. Washington, D. C.

the terrain and habitats of the United States Southwest.

Timothy Flint, Pattie's publisher, developed a conjectural map accompanying Pattie's travels, which, along with close reading of his manuscript, leads me to suspect that his comment on elk applies to an upper tributary of the San Juan River, perhaps near Ute Mountain, Utah. Pattie's description of their route is vague and confounded by a fantastical report of explorations as far as Yellowstone and the Columbia River, which obviously never happened. I didn't find efforts to identify Pattie's route by Kroeber[17] or Batman[18] very helpful. Neither of these historians acknowledged Pattie's comment on elk, even though presence of that species would have provided an important clue as to habitats Pattie explored. Trying to untangle the route is beyond the purpose of this paper and would not provide any new insights regarding early elk distribution. My best guess, based mainly on Flint's map, is that if the party encountered elk on this journey, that occurred in SE Utah or SW Colorado.

Perhaps most important in Pattie's story is his complete failure to mention elk anywhere else that he traveled during three years of wandering in New Mexico or Arizona, including the the Black Range and the upper Gila regions of New Mexico. Pattie was a teller of tall tales and consistently noted the bigger and more sensational wildlife. Also, according to Pattie, he faced starvation several times, to the point of eating horses and dogs, in country where killing elk and deer by experienced woodsmen would now be entirely feasible. Thus the conclusion that elk were non-existent or extremely rare in the Black Range, the Mimbres, the Gila, and connected forest habitats in the late 1820s.[19]

E. A. Mearns.[20] As far as I can determine, Mearns spent no time in the Black Range. His various letters suggest that elk densities were low in the White Mountains and Mogollon



THE

PERSONAL NARRATIVE

OF

JAMES O. PATTIE,

OF

KENTUCKY,

DURING AN EXPEDITION FROM ST. LOUIS, THROUGH THE VAST REGIONS BETWEEN THAT PLACE AND THE PACIFIC OCEAN, AND THENCE BACK THROUGH THE CITY OF MEXICO TO VERA CRUZ, DURING JOURNEYINGS OF SIX YEARS; IN WHICH HE AND HIS FATHER, WHO ACCOMPANIED HIM, SUFFERED UNHEARD OF HARDSHIPS AND DANGERS, HAD VARIOUS CONFLICTS WITH THE INDIANS, AND WERE MADE CAPTIVES, IN WHICH CAPTIVITY HIS FATHER DIED; TOGETHER WITH A DESCRIPTION OF THE COUNTRY, AND THE VARIOUS NATIONS THROUGH WHICH THEY PASSED.

EDITED BY TIMOTHY FLINT.

CINCINNATI:
PRINTED AND PUBLISHED BY JOHN H. WOOD.
1831.

Rim country. In spite of at least two lengthy trips to the Mogollon Rim and three to Flagstaff, all in Arizona, he saw no sign of elk, with the exception of a possible single track in Oak Creek Canyon, Arizona, in 1885. Mearns never directly observed elk in Arizona or New Mexico. He reported hearsay evidence of elk on the San Francisco Peaks and reported finding fragments of antlers during a hunting trip that he made in that area in 1887. He noted that elk could still be seen in the White Mountains and acquired a single specimen from that area with the help of E. W. Nelson. Many of Mearns' records regarding the status of elk in the Southwest come from correspondence with E. W. Nelson, starting in 1902.[21] By this time, they were referring to elk in this region as the Merriam's elk. The validity of this separate subspecies is tentative at best, a subject I won't address in this article.

According to Nelson, as quoted by Mearns:

. . . the actual extent of its former range will be difficult to determine. My first knowledge of its existence was obtained in the fall of 1882, when some prospectors at Chloride, New Mexico, told me that elk inhabited the Mogollon Mountains near the extreme headwaters of Gila River. Nothing further was heard of it until the early months of 1884, when I spent some time in exploring the Indian ruins about the village now called Frisco [near current Reserve, NM] *on the headwater of the San Francisco River in western Socorro County, New Mexico. During January I made a horseback trip about 10 miles to the eastward into the border of the Mogollon Mountains and saw a doe elk and two young bucks hanging by a hunter's cabin. At this time elk were reported to be not uncommon on the higher parts of the range, but the total number from all accounts, must have been very small compared with those then found in Colorado and farther north.*

Chloride, New Mexico lies on the east side of the Black Range. However Nelson notes only that the elk the prospectors had seen were in the Mogollon Mountains, which lie northwest of the Black Range. Nelson doesn't discuss the amount of time he spent in the Black Range, nor does he mention seeing elk there at all. There are certainly no physical barriers that would have prevented elk from

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17. Kroeber, A. L. 1964
18. Batman, R. 1984.
19. See also: Editor's Note on James Pattie's Narratives. Appendix A in Davis, Goode P. Davis, Jr. 1982. *Man and Widlife in Arizona*. Arizona Game and Fish Department, Phoenix. Edited by Neil B. Carmony and David E. Brown.
20. Mearns, E. A. 1907. *Mammals of the Mexican Boundary of the United States.* U. S. Govt. Printing Office. Washington, D. C.
21. Nelson, E. W. 1902. *Cervus merriami,* Nelson. Bull. Am.Mus. Nat. Hist. 16:7.

expanding their range from the White and Mogollon Mountains into apparently suitable habitat in the Black Range.

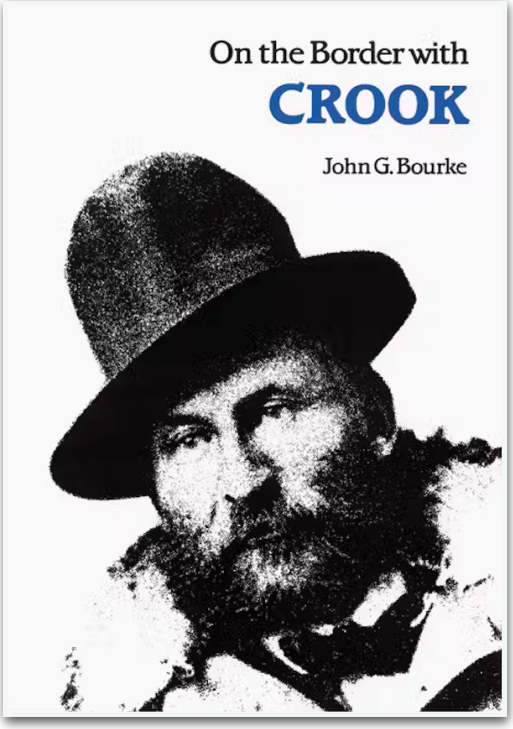
Regarding elk in the White Mountains of Arizona, Nelson wrote:

> *From 1885 to 1887, while living on my ranch at the eastern base of the White Mountains, near Springerville, Arizona, I heard frequently of elk living in the higher and more remote parts of these mountains, mainly along the border of the White Mountain Indian Reservation, near the head of Black River (a tributary of the Gila). . . . I saw signs of their presence in various places. . . . The most abundant signs were found about some beautiful damp meadows in the midst of the dense fir forest on the rolling summit of the Prieto Plateau, between the Blue and Black rivers. Owing to the presence of hostile Apaches at that time, it was dangerous to linger in the country where we saw most of the elk signs, we always pressed on to a safer district before doing much hunting. Outside the Indian country they were not common enough for one to hunt them with any degree of certainty.*

The Black Range was one of the last bastions of hostile Apaches, so one might wonder if hunters simply weren't penetrating it frequently enough to document elk. However, the lack of records of elk from trappers, military expeditions, prospectors, and homesteaders leads me to conclude that extremely few, if any, elk existed anywhere in the Black Range proper.

Major John G. Bourke. Maj. John G. Bourke's book, entitled *On the Border with Crook* (2d ed., 1892), contains several references to the Arizona elk, among them the following:

> *It was through the country of the tribes to the south that the Spaniards first were brought face to face with the "Tinneh" of Arizona, and it was from these Maricopas and others that the name was learned of the desperate fighters who lived in the higher*



> *ranges with the deer, the elk, the bear, and the coyote (p113). . . . The Apache was not so well provided with meat as he might have been, because the general area of Arizona was so arid and barren that it could not be classed as a game country; nevertheless, in the higher elevations of the Sierra Mogollon and the San Francisco there were to be found plenty of deer, some elk, and in places like the Grand Canyon of the Colorado, sheep. . . . (p129).*

Bourke rode with General Crook during efforts to subdue South-western Apaches. In late October, 1892, he wrote:

> *. . . the cook of one of the surveying parties, a man who had never lived in the West before and who had not even heard of the elk, but who had shot, skinned and become thoroughly familiar with the mule deer while with the survey came to camp and told with much excitement of two huge deer with enormous antlers that he had just seen on San Jose mountains, Sonora, Mexico. He had started them when too far off for a successful shot and was unable to overtake them. Soldiers who went with this man the next day were quite certain that the tracks were those of elk, and I have no doubt that they were, as the cook gave an accurate account of this animal without any earlier knowledge of its existence. I had previously and have subsequently thoroughly explored these mountains without seeing any signs of elk. The two mentioned were possibly migrating to the neighboring Sierra Madre Mountains in Mexico.*

Carrera and Ballard[22] discount the usefulness of the above observation as evidence of established elk populations in Mexico.

Thomas B. Gable, NM State Game Warden 1911.[23] By the time Thomas B. Gable wrote his first report for the territorial legislature, he considered native elk to have been extirpated from New Mexico. He immediately began restoration efforts, using stock from private herds and from Wyoming, but his efforts were limited to mountains in northern New Mexico. He wrote:

> *Of all the big game found in the west the elk stands supreme in a class by himself. New Mexico has not known this noble specimen of the antlered tribe for many years, though formerly it was known as the elk's home. When the Indians roamed and hunted at will through this great hunter's territory, and held the lands as their own, as a supposed right of inheritance, they ruthlessly slaughtered the elk, and with no opportunity for natural increase, they were finally eliminated entirely from the confines of New Mexico. Even today the horns of this splendid animal are found in the mountain ranges, which is conclusive evidence that elk were formerly abundant in this region. This imposing and kingly animal, often designated as the 'Monarch of the Glen ,' is not surpassed for beauty and majesty in the game animal kingdom. New Mexico is the*

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22. Carrera, R. and W. B. Ballard. 2003. "Elk Distribution in Mexico: A Critical Review." *Wildlife Society Bulletin* 31(4):1272-1276.
23. Gable, Thomas P. 1912. *First Report Of Game and Fish Warden For New Mexico 1909-1910-1911*. State of New Mexico, Department of Game and Fish, Santa Fe.

natural habitat of the elk, as the winters are not so severe, the feed is abundant and the range unlimited.

. . . Realizing the importance of stocking our forests with these superb animals and recognizing the natural conditions so manifest here, I purchased with monies derived from the game protection fund, twelve head of three year old elk. . . . released them into New Mexico in May, 1911.

Their Range, Near Cimarron, County, Colorado. This purchase included nine cows and three bulls, which I divided into three separate bands consisting of three cows and one bull each. One of these bands was released in Red River canyon, about fifteen miles north of Raton; a second in Gallinas canyon, twelve miles northwest of Las Vegas, and a third in the Cimarron canyon in Colfax county.



The elk Leek's pictures showed resembled pets, domesticated but with personality. His speaking tours built sympathy across the nation for their plight. American Heritage Center.

Some of these transplant efforts apparently succeeded, and elk populations in the northern end of the state began to grow and disperse. No records suggest that any of them reached the Mogollon, Gila, or Black Range complex.

Ligon's 1913 Bird Survey.[24]

J. Stokley Ligon made his epic statewide bird survey on horseback in 1913, starting in the Black Range and riding across the San Andres and Sacramento Mountains, then paralleling the Pecos River to the south end of the Sangre de Cristo Mountains and ending at Stinking Lake on the Jicarilla Reservation, then following the Continental Divide back to his starting point. He thus crossed through large areas that now have large elk populations, but he saw none and did not mentioned seeing any sign.

Aldo Leopold. *Restocking National Forests with Elk*. 1918[25].

By 1918, Aldo Leopold had been working throughout New Mexico and Arizona for nine years and was exercising his writing skills to communicate his growing body of observations and reflections on restoration and management of wildlife. Where earlier writers, including Ligon, had acknowledged the extirpation of elk throughout New Mexico, they did little speculation upon the cause, and they were skeptical about the feasibility of bringing the species back. Neither the state game department nor the U. S. Forest Service had legal mandates to manage elk or regulate stocking. Leopold addressed this conflict, stating early in the article:

> *The question of introducing elk into a given locality naturally resolves itself into two parts: (1) Suitability. Is the locality good elk range? (2) Advisability. Will their introduction result in unavoidable depredations?*

Leopold, citing Parkman[26], noted that elk summered well out into the prairies. He felt that elk would tend to descend into agricultural areas and consume hay crops. His article intimates that rancher response to competition for hay may have brought about extirpation of the species in Arizona and New Mexico. However, none of the references I've found so far discuss mass shooting of elk to eliminate them. Nonetheless, something acute must have happened to have created such a rapid decline of all New Mexico populations in the late 1800s.

The above efforts by the state game warden and a few ranchers to restore elk suggest that they were treating them more or less as another form of livestock. They had little idea of the concept of habitat and food requirements of wild elk. The period when the elk population disappeared in Arizona and New Mexico is the same general era when overstocking of the range with cattle and sheep occurred and ranchers experienced major die-offs of their livestock. It was also the era of home-steading when people were spreading across the land and trying to survive on parcels of land that were too small to support them, so add to this year-round opportunistic killing of elk, and their decline was perhaps inevitable.

Elk are a herd animal. Given suitable concentrations of food, especially winter forage, they will gather in extremely large numbers – to the point of decimating grass or alfalfa hayfields. Leopold notes S. N. Leek,[27] who pioneered elk feeding programs that created large winter concentrations and ultimately starving populations of elk and transplant programs that sent elk to states wanting to restore or establish elk populations. The success of restoring New Mexico's elk was largely dependent upon these early transplants, but they only created elk populations in the northern part of the state.

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24. Shaw, H. G. and M. E. Weisenberger 2011. *Twelve Hundred Miles by Horse and Burro - J. Stokley Ligon and New Mexico's First Breeding Bird Survey.* University of Arizona Press, Tucson.
25. Leopold, A. S. 1918. *Restocking the National Forests with Elk: Where and How it may be done*. Outer's Book – Recreation: 58(4): 412-415.
26. Parkman, Francis 1849. *The Oregon Trail. Being Sketches of Prairie and Rocky Mountain Life*. George P. Putnam, New York.
27. https://www.wyohistory.org/encyclopedia/stephen-leek-father-elk

Leopold was the first to discuss habitat requirements of elk and to note need for some kind of legal constraints on transplant programs, acknowledging the potential for competition between ranching and elk. Prior to about 1913, many spurious elk transplants had been carried out by private landowners. In a sense, they were treated as live-stock. Leopold notes In 1913 that 50 head of Yellowstone elk were released in the Santa Fe National Forest and became a problem with ranchers on winter range. That same year, 72 head of Yellowstone elk were released on the Sitgreaves National forest in Arizona. This area had wide expanses of winter range without pasturage. These elk scattered quickly and by 1918, some had moved eastward 130 miles to the Datil National Forest.

In their editor's notes about Leopold's article, David E. Brown and Neil Carmony[28] comment on his prescience in recommending elk transplant procedures that would sustain their wildness and minimize their tendency to establish herds in pastures on private lands. At the time of Leopold's article, no transplants of elk into the Gila National Forest, including the Black Range, had yet occurred.

Stokley Ligon's 1927 statewide game survey.[29] In his 1927 report, Ligon noted that elk had been re-established in the state and estimated that the population was 712, all originating from transplanted stock. He suggested that a population of 10,000 elk could exist in New Mexico.

In the Life Sketches section of the book, he devotes only a page to elk, noting that the species once inhabited "much of the elevated and mountain-ous regions of New Mexico." He states that the native population was finally exterminated in 1900, with the last animals being in the Sacramento Mountains. He notes, like Leopold, that the agricultural communities must be considered in any efforts to restore elk and that the Game and Fish Department must include the U. S. Forest Service and Biological Survey in any restoration decisions.

Ligon wrote that in 1927, there were four bands of elk in New Mexico,



Elk, like this group, are frequently seen in the Black Range.

none of them in the Black Range. But he does state that 25 elk were introduced on the G O S Ranch in Gila County in 1926. G O S Ranch was on the headwaters of the Gila River and very close to the upper Mimbres River watershed. Some of these animals, or their progeny, could have easily expanded onto the northwestern portions of the Black Range, but I've found no evidence so far that they did.

Vernon Bailey, 1931. As with other writers, Vernon Bailey focused most of his writing regarding elk upon the northern mountains of New Mexico. In *Mammals of New Mexico*,[30] Bailey discussed his own observations and reported upon extensive communi-cation with other naturalists. Concerning elk, he wrote:

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28. Brown, D. E. and N. Carmony. 1990. *Aldo Leopold's Southwest*. University of New Mexico Press. Albuquerque.
29. Ligon, J. S. 1927. *Wild Life of New Mexico – Its conservation and management*. State Game Commission, Dept. of Game and Fish. Santa Fe.
30. *Mammals of New Mexico*. North American Fauna, no. 53. USDA, Bureau of Biological Survey. Washington, D. C.

Distribution and habitat – There is probably no museum specimen of the elk from northern New Mexico, but from its continuous range with the Colorado elk it may be safely considered the same form as that extending down through the Rocky Mountains from Montana and formerly reaching its southern limit in the Sangre de Cristo and Jemez Mountains approximately on a parallel with Las Vegas and Santa Fe. There is slight probability that wild individuals of the native elk are still to be found in the mountains of New Mexico, but if they are it is probably in the San Juan and Sangre de Cristo Mountains just below the Colorado line. If not, the natural restocking of these wild and rugged mountains is entirely possible through adequate protection of the animals on both sides of the line and the natural increase and overflow of the present Colorado herds.

Merriam's elk is now probably extinct; certainly it no longer occurs in New Mexico. Forty years ago it was common in the Sacramento, White, and Guadalupe Mountains east of the Rio Grande, and in the White Mountains of Arizona. There are old records for the Datil and Gallina Mountains of Socorro County and a doubtful record for the Manzano Mountains. To the north there are no more elk records until the Jemez and Pecos River Mountains are reached, where the Colorado elk comes down from the north.

Bailey notes that Humboldt had mentioned a set of antlers from the Spanish era:

> ***The enormous stag horns which Montesuma showed as curiosities to the companions of Cortez might have come from the deer [elk] of New California. I have seen two found in the monument of Xochicalco which have been preserved in the palace of the viceroy.[31] (translation.)***

Much uncertainty exists regarding the source of these antlers, and they were not seen by any future naturalists. The uncertainty of their origin excludes them as a valid record of elk in New Mexico.

Nelson accepts the historic presence of the Merriami subspecies and discusses in some depth early records of elk further south in New Mexico, as well as his own sightings through the 1880s. The most consistent records were in the vicinity of the White Mountains, Black River, and Blue Range of Arizona, with a few records and old antlers noted for the Mogollon Mountains of New Mexico. Insofar as the Black Range is concerned, he writes:

> ***In the Mimbres Range[32] it has not been possible to get a trace of even old elk horns from residents who have ridden the range there since 1886.***

James A. McKenna[33] in his *Black Range Tales* mentions no elk.

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31. Cortez captured the city of Mexico in 1521; Humboldt lived there in 1803-04.
32. Mimbres Range is another name for the Black Range.
33. Mckenna, J. A. 1936. *Black Range Tales*. Wilson-Erickson.



Bailey worked to create more humane animal traps, especially after his retirement. This Gray Wolf photograph dates from 1909-1918. RU 007267, Box 5, Folder 12; Photograph taken for Vernon Orlando Bailey during his work as field naturalist for the United States Department of Agriculture Bureau of Biological Survey. Bailey was Dates: 1909-1918. Smithsonian Institution Archives.

New Mexico Department of Game and Fish 1967 report.[34] **In 1967, the New Mexico department published a report intended to update Ligon's 1927 volume (noted above). As might be expected, much had changed in the 40 years since Ligon made his assessment of wildlife management in the state. The job was too big and accumulated knowledge too great for one person to handle, so chapters were farmed out to employees best suited to address particular management subjects or species. In a chapter on "Land Utilization and Wildlife, Samuel H. Lamb noted:**

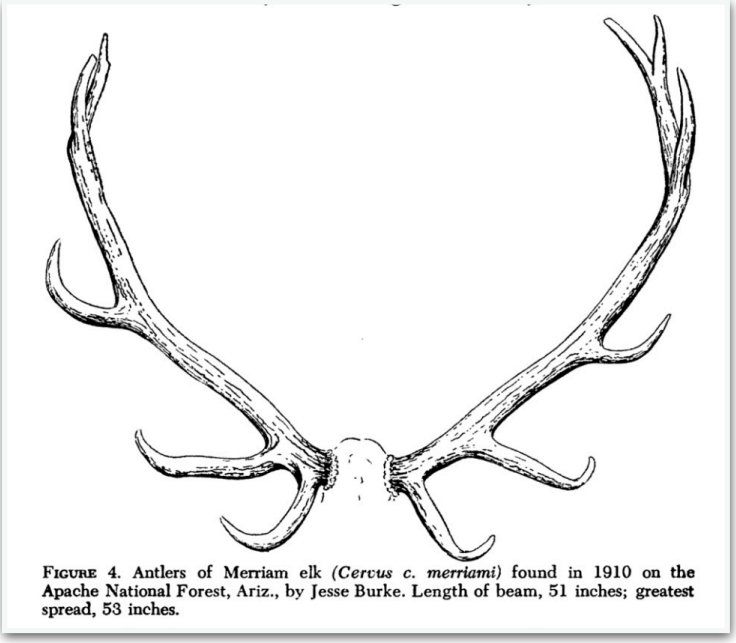


FIGURE 4. Antlers of Merriam elk (*Cervus c. merriami*) found in 1910 on the Apache National Forest, Ariz., by Jesse Burke. Length of beam, 51 inches; greatest spread, 53 inches.

From: Murie, O. J. 1951. *The Elk of North America*. Stackpole Company, Harrisburg, and The Wildlife Management Institute. Washington, D. C. p. 13

> ***. . . in many cases, conditions have improved greatly for game since 1927. . . . Range use by livestock has been stabilized by fencing the national forest allotments and by controlling use of the National Land Reserve by domestic livestock, in accordance with the Taylor Grazing act. Much of the range of the state is in better condition than it was years ago. This stabilization has made room on these lands for increased numbers of elk. . . .***

In a general chapter on "Species of Game in New Mexico", Levon Lee wrote:

> ***. . . Elk were exterminated in New Mexico toward the end of the last century and were restocked about the time of World War I. . . . Subsequent releases supplemented the initial shipment and . . . elk now occupy the southwestern, northcentral, and northeastern mountains, with scattered numbers being found in the southeastern part of the state clear down to the Texas border. . . .They are most abundant in the Santa Fe, Lincoln, Carson, and Gila National Forests. There are perhaps 11,000 to 15,000 head of elk present in the state and their numbers are increasing. . . .***

In a chapter devoted to elk, Gerald H. Gates took a traditional viewpoint regarding elk taxonomy and numbers. He notes:

> ***. . . two species of elk ranged in New Mexico. These were Merriam's elk (Cervus merriami) and the Rocky Mountain or Nelson's elk (C. canadensis nelsoni). . . . Merriam's elk were found in southern New Mexico in the Sacramento, White, Guadalupe, Mogollon, Datil, and Gallina Mountains.***

In giving Merriam's elk full species status, Gates failed to recognize Murie's 1951 designation of the *merriami* as a subspecies of *C. canadensis*, rather than a separate species. He doesn't mention elk as occurring in the Black Range.

Rogelio Carrera and Warren B. Ballard, 2003.[35] **These authors make a strong case that elk range did not reach to the south border of New Mexico or into Mexico.**

More recent assessments of elk history.

While distribution and numbers of elk in southern New Mexico have changed immensely during the past 50 years, little has been written about the history of their management in this region. [36] [37]

Interviews of residents near the Black Range.

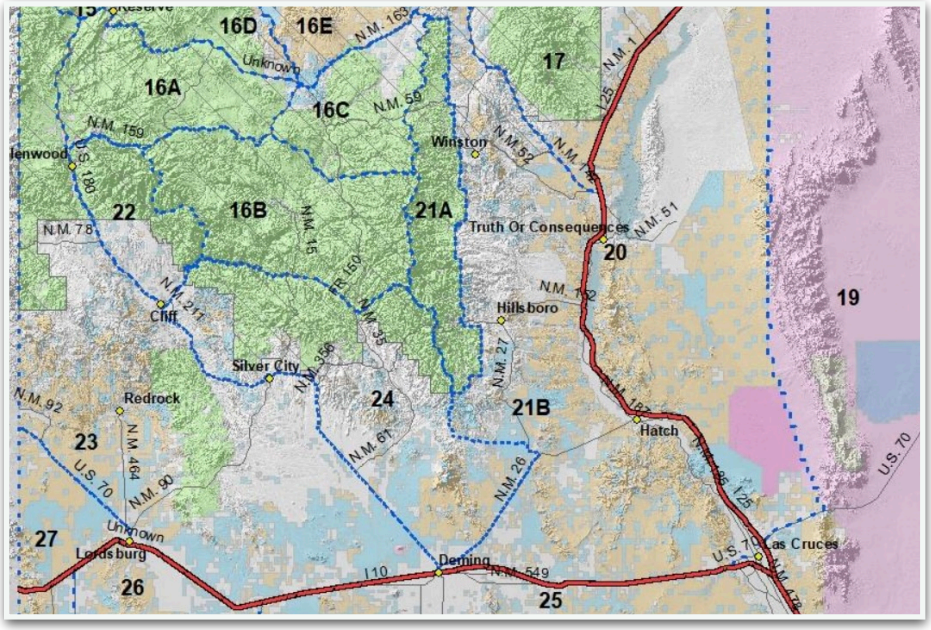
Art Evans. Ladder Ranch. May 25, 2012. **I talked with Art Evans by phone about the elk pen in Seco Canyon on Ladder Ranch. He says the pen was built during the time Robert O. Anderson owned the ranch. Art couldn't remember the exact dates of the release. Anderson bought the ranch in 1960 and sold it in 1985. They brought three truckloads of elk down from Anderson's Diamond A Ranch at Wagon Mound. For the first load, they simply released the elk, and these disappeared, so Anderson had the pen built and put the next two loads in it. A lion got in the pen right after the first load came and Henry Turner caught the lion with his hounds. Turner was working for Ladder at that time. Art says they held the elk about 4 months and released them. He feels that this was the beginning of elk on the Ladder Ranch.**

Lonnie Rubio, July 27, 2024. **A native of Hillsboro, Lonnie told me that the first elk sighting in the Black Range he remembers was made by one of the men on his father's**

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34. NM Dept. of Game and Fish 1967. *New Mexico Wildlife Management*. Santa Fe, NM.
35. Carrera, R. and W. B. Ballard. 2003. *Elk Distribution in Mexico: A Critical Review*. Wildlife Society Bulletin 31(4):1272-1276.
36. Findley, J. S., A. H. Harris, D. E. Wilson, and C. Jones.1975. *Mammals of New Mexico*. University of New Mexico Press. Albuquerque. pp 327-328.
37. Thomas, J. W. and D. E. Toweill. 1982. *Elk of North America – ecology and management*. Wildlife Management Institute and Stackpole Books. P. 49.

highway crew. Lonnie was still in high school, which would make it 1955 or earlier. The first he personally saw was around 1957-58, shortly after he graduated from high school. These were on the Reid ranch, and probably near the Ladder Ranch boundary.



Elk have been introduced into New Mexico, and are "managed" in New Mexico as a game species. The Game Management Units in the Lesser Gila Herd are shown above. In 2022 the population was estimated to be between 1,300 and 4,400 in these units. *2023-2024 New Mexico Elk Hunting Prospects And Population Summary*, New Mexico Game and Fish.

Terrel Shelley (3rd generation rancher near Cliff, NM) wrote in private email:

As far as the elk population goes. I never heard my Granddad or my Dad talk about any elk in this country. There was an elk horn that hung in the old log cabin but it was given to my granddad and brought here from someplace off from here for him to make knife handles out of. The GOS ranch on the head of the Mimbres fenced off a part of the ranch with a big tall seven wire pasture. They imported some elk and put them in there for there own hunters. This was in the early thirties. They multiplied to the point that they got all the cowboys in the area to come up and round up the pasture and corral them in those old big corrals out in the middle of that upper field. That was a flop they all came back over the top of them. They roped about ten head of them and put them in a semi truck. That night they all died. They had planned to transplant them somewhere. They finally cut the fence in several places and let them out to keep from overgrazing the pasture.

Several years ago a group of ranchers and I were meeting with the forest and game and fish people over whether or not the elk were native to this area. The forest service said they were. I got up and told them that the Mimbres Indians who were native to this area, from the years 1100 to about 1300, while they were living in the area which included the whole Gila national forest. They documented every kind of animal that lived in the area with their paintings on their bowls. I have looked at thousands of pictures. There (are) pictures of all kinds of animals. But no Buffalo and no Elk. There was no question about the Buffalo. I told them that was enough proof for me and they would never make me believe any different. . . .
. . . The ones we have now were transplanted here in the early 50s. I can remember them doing them. I think they were the first in this area.

I know that is correct about the GOS having the fenced off pasture because when they went to gather it my dad went up and helped them. He said that they had most of them out of the brush and into that big open flat. The corrals sat over in the corner of the flat. He said they had about 30 cowboys. The elk started for the corrals and then wouldn't go in the corrals and turned around and ran over the men and that's when they roped what they could. The rest of them headed for the brush. That pasture is still known as the elk pasture.

Another little note about the elk stocking. In the mid 1950s the New Mexico Department of Game and Fish purchased the old Heart Bar ranch on the west fork of the Gila River. It was a 800 head permit named the Glenn allotment. They made a trade with the forest service to remove all the cattle off the allotment and replace them with elk. The elk were transported in here with semi trucks and trailers. I don't know how many loads were brought but several. They were scattered out releases all around the outside of the permit. The deal did not include any of the private lands that were encased in the area. They were supposed to move any that strayed off the original Glenn allotment boundaries. There was never any effort to control them or remove them. Look at what has happened to the numbers now.

Email from Bryan Bartlett, Garfield, New Mexico.

The first elk I saw when we were young was on the GOS as we were driving around, what we called the "Little Loop". This was the road from Bayard to the Mimbres, to the Sapillo, to Pinos Altos, to Silver City and back to Bayard. It was pre-Lake Roberts, which was built in 1963. I can remember going with my father on a deer hunt in the McKnight canyon area when I was about 7 (1957). We hunted there for years and never saw an elk. In fact, we never hunted elk, because there were no elk out in

the hills. We also hunted turkeys on the trail south from Emory Pass for many years. I never saw an elk on that trail until about 7 years ago after the big fire (that would be the Silver Fire). We hunt that trail every year. We have seen only one more elk, a 400 class 7x7 bull in the last 7 years.

For what it's worth, I don't believe there were any elk in SW New Mexico in the 1,000-1,200 AD period. If you search through all the Mimbres pottery photographs, you will be hard pressed to find a deer. I have never seen a bowl with a large antlered elk-like animal on it. **(Which would have existed)** *I believe, if they were here during that period.*

Relative to comments by Shelley and Bartlett, Laumbach[38] notes the Mimbres shown earlier. The antlers in that drawing are configured like elk, but the Mimbres bowl drawings often took artistic license.

Why elk were scarce or perhaps late to arrive in the Black Range remains a mystery. Water was limited in the extreme south and western portions of conifer forests in New Mexico and Arizona. As herd animal, clusters of elk may well have moved out of mesic habitats periodically, expanding into more xeric habitats only during wet periods. Ranchers and agencies eventually developed stock tanks and other sources of water which may have allowed elk to reside more permanently in portions of the range that they had been periodically forced to abandon. Average annual precipitation for Flagstaff, Arizona, for example is about 23 inches. This can be variable, with large expanses of forested habitat having few, if any, natural springs or streams in drier years. Such variation in water availability fits the limited information of elk distribution at the extremes of their range wherein apparent surges of small populations show up briefly, then disappear. Observations are probably too few and numbers too small to allow anyone to carry out a legitimate test of this hypothesis.

Both grizzly[39] and black bears were present in the Black Range at the time of settlement, as well wolves, coyotes and mountain lions. Predation pressure on elk, particularly calves, may have been high, limiting growth of the elk population. This might have combined with restricted water sources to make the elk populations more vulnerable to predation. Archaeologist Karl Laumbach suggests that wolves, especially, may have kept elk populations low in south-central New Mexico. Elk thrived in the area after the wolves and grizzlies were extirpated.

There is no record of heavy harvesting of elk in the Black Range by either prehistoric or historic indigenous human populations. However, usage of a limited elk population by all of the indigenous populations on an opportunistic basis could have functioned as one more source of mortality that would restrict permanent expansion of elk populations.

And finally, arrival of Europeans, both Spanish and Anglo, may have brought about increased pressure on populations. Elk may have been taken opportunistically for food, and at times they may have been systematically killed to reduce competition with livestock. At the extremes of suitable range, this mortality, along with the losses mentioned above, may well have reduced numbers or prevented permanent expansion in marginal ranges.

Obviously, the historic distribution of any species depends upon timing – the evolutionary or paleontological history of the species. Elk is not the only species that has expanded its range since Europeans arrived and began to document observations in writing. Javelina had barely reached the southern boundaries of Arizona in the 1860s. The species has since moved well into the northern half of both Arizona and New Mexico. White-winged doves have expanded their nesting range northward to at least Albuquerque since 1900. Coatis[40] are recent arrivals in central New Mexico.

Maybe the best answer we can come up with is that, when those early mountain men and, later, naturalists arrived in the Black Range, the elk just hadn't expanded into those habitats yet. The javelina and whitewings apparently kept moving on their own. Perhaps elk would be barely arriving in the Black Range now, if transplants by early ranchers, hunters, and biologists hadn't sped them along.

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38. **Laumbach, K. W. 2001.** ***A Mimbres Environmental Impact Statement: A Review Of Mimbres Environment, Land Use, and Impact*** **by Karl W. Laumbach. Ladder Ranch Conference, March 3 and 4.**
39. ***Black Range Naturalist, Volume 6, Number 1*****, January 3, 2023**
40. ***Black Range Naturalist, Volume 2, Number 2*****, April 3, 2019**



Elk cows and calves startled during a sudden summer thunderstorm and downpour. This trailcam image of Elk on the east side of the Black Range was first published in the January 3, 2019 issue of The Black Range Naturalist (Vol. 2, No. 1).

Double Feature - Then and Now

by Bob Barnes

In 2006 Harley G. Shaw published *Wood Plenty, Grass Good, Water None - Vegetation Changes in Arizona's Upper Verde River Watershed From 1850 to 1997* (USDA, FS, Rocky Mountain Research Station, General Technical Report RMRS-GTR-177).

Arguably, that work has little to do with the Black Range, other than the fact that it is a Southwestern vegetation succession study. (For those who are interested in the human history, and in particular the early European American history, of the region, it is a very informative study.) A good deal of the study focused on the concept of using repeat photography as a tool in the study of natural history generally and vegetative succession specifically.

If I was aware of repeat photography as a concept before I read Harley's study it was only in the vaguest sort of way. Since reading his study years ago I have mulled over the use of this technique on myriad occasions. Harley and I have discussed the history of repeat photography and the technical issues associated with the concept on many a summer afternoon and on a few afternoons in other seasons. And between 2015 and 2018 he and I ventured forth to try to do a bit of documentation in the Black Range, trying to get some insight by using this technique.

Shaw's field work with Raymond Turner (the guru of the concept) had provided him with significant insight about the complexities of something seemingly so simple. (In the photograph at center right, Ray Turner (L) and Harley Shaw (R) are working on an early repeat photography project.) And those complexities are what make the difference between meaningful photographs and snapshots. Turner's (with others') books on repeat photography have set the standard for a generation (links at the right).

I have continued to ponder this idea. Indeed I can not look at an "old" picture without wondering if it is a candidate for a bit of repeat photography. Finally I have decided to put what little I have learned into an article for this journal.

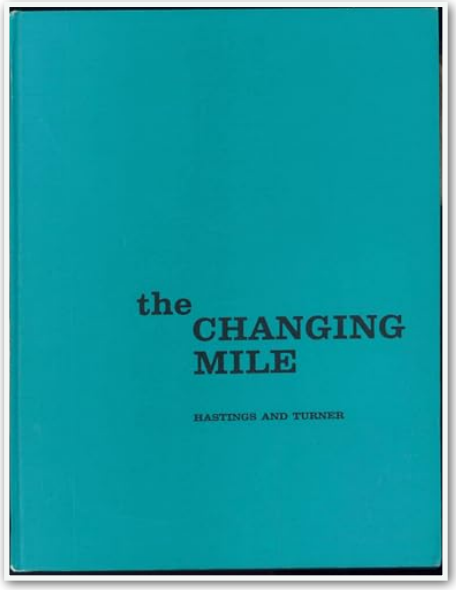
First of all, most "old" photographs are not suitable for the study of natural history. They are generally of people, their homes, their conveyances, their work, and sometimes their play - but there is little natural history displayed in them. Even when there is a bit of landscape in the image, it was not the focus of the image, it just happened to be there.

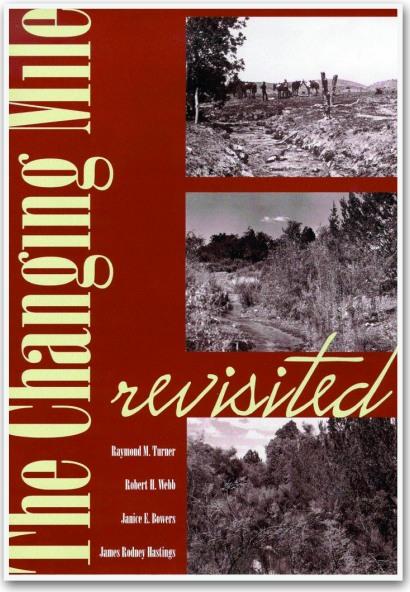
And secondly, in the Black Range the photographic history is only 100 to 120 years long, and that is not a lot of time when studying vegetative succession. In some locales, like the area around the Santa Rita/Chino mine, we are able to utilize early paintings and drawings as the "before" image in a "repeat imagery" effort.

But the concept can be tweaked a bit to deviate from long history. The "befores" can be photos from just prior to some major event, for example. These before and after images are truly "repeat photography" but cover a shorter span of time than those which have a more traditional historical context. We explore some of these examples in this article, as well as those which span the entirety of our photographic history.

In the January 2024 (BRN 7-1 - compressed file) issue of this journal A. T. Cole used "short duration" repeat photography to document the reclamation efforts at the Pitchfork Ranch south of Silver City. The juxtaposition of repeat photographs taken roughly 15 years apart was very informative.







Although the focus of this article is on the concept of repeat photography, I have not attempted to limit this article to historic photographs which can be "repeated". Other photographs have information about the natural history of the area. In what follows, you will find numerous examples of "close enough to make the point" and photographs which are telling in themselves.

Kingston

There are a substantial number of photographs of Kingston from the 1880s to 1910 or so. Most, however, are of buildings and townsfolk, not terribly useful in the study of natural history.

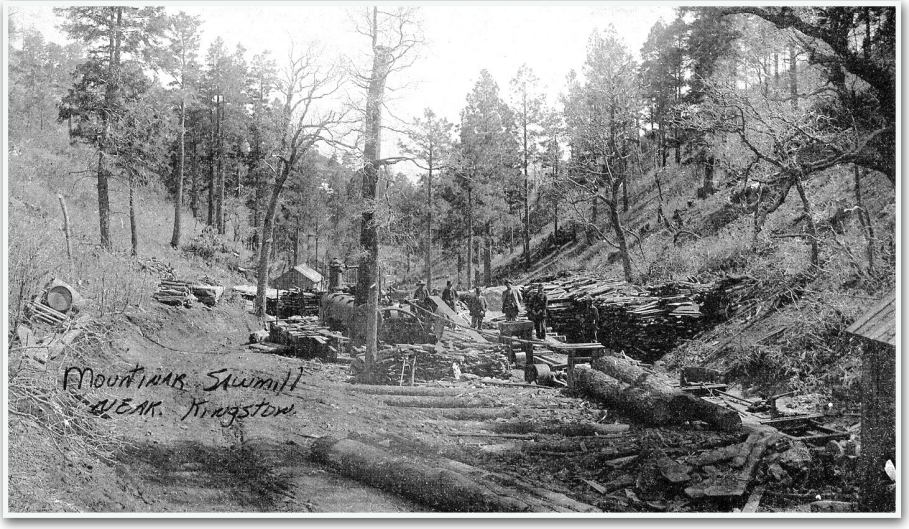
Kingston is tucked into a spot where Middle Percha Creek flows out of the Black Range and into the foothills on the east side of the mountain range.

The natural vegetation prior to the mining era appears to be like that of today, only more so. The tall pines of the forest extended well down the creek through the area which became the town.

The miners needed wood. They needed wood to build their houses, for their mine works, and to fuel their fires. Most of the tall straight trees (Ponderosa Pine) were cut for dimensional lumber, mostly for the homes and commercial buildings of the new town. Juniper and oak were cut to fuel their fires and sometimes for the mines, when it was large enough. What that meant is that everything within spitting range got cut. Early photographs from the area depict a basically denuded landscape - not completely, just mostly.

Just how effective these early lumber efforts were in getting to the wood is demonstrated by the photograph with detail "enlargements" shown on this page, from about 1900, from "near Kingston". The lumbermen used horse-drawn steam boilers (see bottom detail) to run their sawing equipment. For this reason these portable mills were located in the bottoms of canyons, along stream beds.

This photograph is a prime example of one of the problems associated with repeat photography. It could be anywhere. The most defining aspect of the image is that the canyon sides are not very steep for the Black Range. But that is not much to go on, and finding the location where this image was taken is impossible given the lack of detail and the vagaries of time. It is safe to assume that trees of any significant size would have been cut and sawed before the mill moved on to another location.







Even a cursory review of current photographs from the area documents a vegetation succession which is still in process. True, the hillsides now have more juniper (mostly Alligator and One-seeded - see BRN 6-3, July 2023), Piñon Pine,

oak sp., and some Ponderosa Pine, but they are smaller than the few which remained in the "before photographs" and certainly far fewer and less vigorous than those that covered the hillsides prior to the settlement.

But that is a bit too simple; vegetation grows and sometimes, as in the situation shown on this page, that makes repeat photography difficult. But don't confuse a technical issue with the substance of the matter. The fact that the vegetation has grown *is the point*.

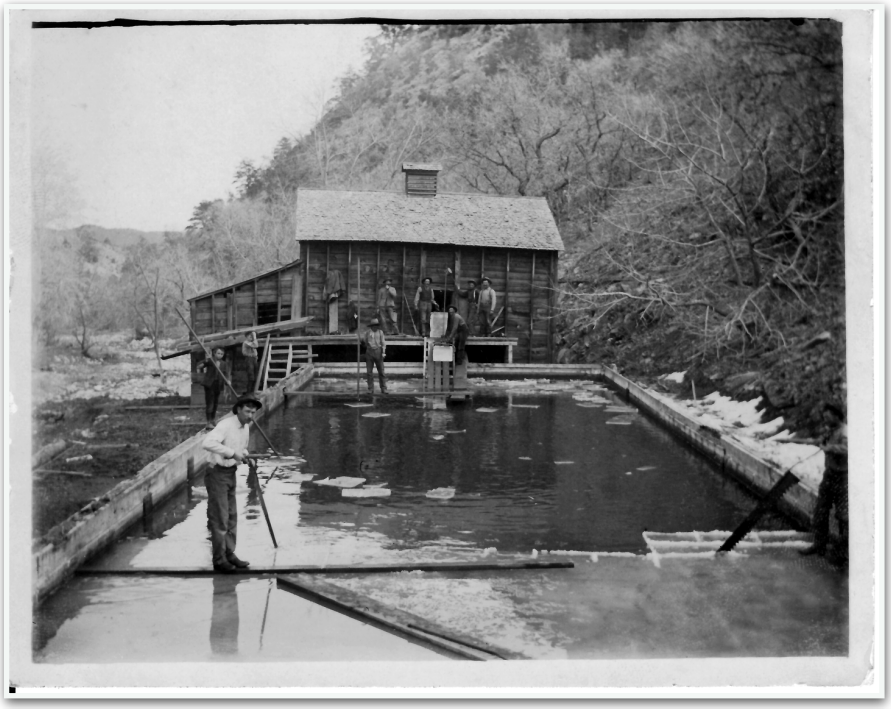
Here we show the Kingston Ice House in the late 1800s (top) and the land plat which shows its location, on the Middle Percha west of Kingston. This facility was located south of Percha Creek and the public wagon road. Note the deciduous trees (mostly oak) which predominate on the hillside. This area is now mostly Ponderosa Pine, with interspersed oak. Although not knowable from this photograph, it is quite possible (even probable) that there were tall Ponderosa Pine on these slopes and that those trees have been cut.

The repeat photo at the center was taken on March 22, 2018. A good repeat photograph is currently difficult because of access issues. See the Black Range website for additional photographs.

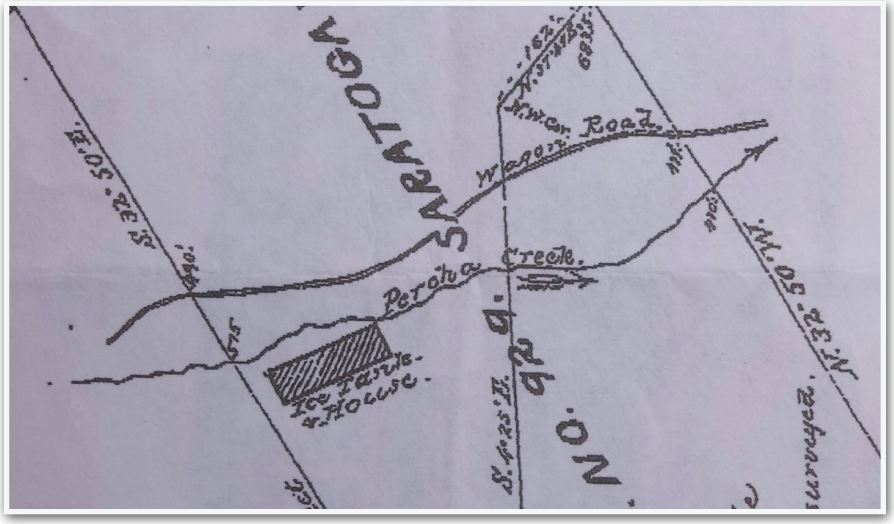
Caution is prudent when looking at any photograph. A photograph is a moment in time, and although we may assume that we understand what went on before the picture was taken, or what will happen in the time after the photograph was taken, that is often not as certain as we may think.

In the next few pages, we use repeat photograph efforts and a historic picture to describe the historic natural history of the Black Range and how it has changed since the earliest photographs of the area.

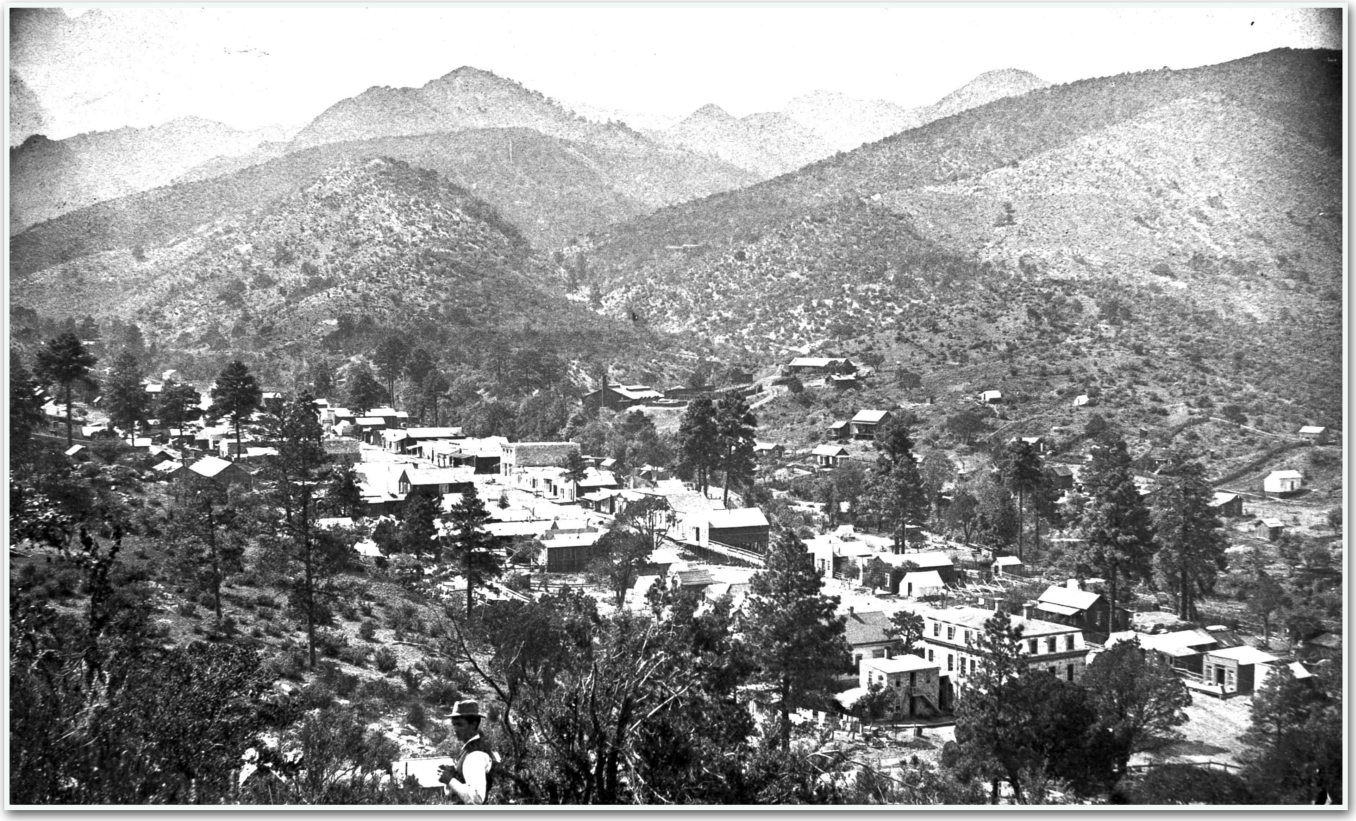
When our focus is on natural history, the strengths and weaknesses of the photographic process should always be considered. For example, even for the larger species it is not always possible to identify a plant or animal to species. And for the myriad species which are small - the fungi, the flowering plants, the lichens, the shrubs - we can only guess at what is



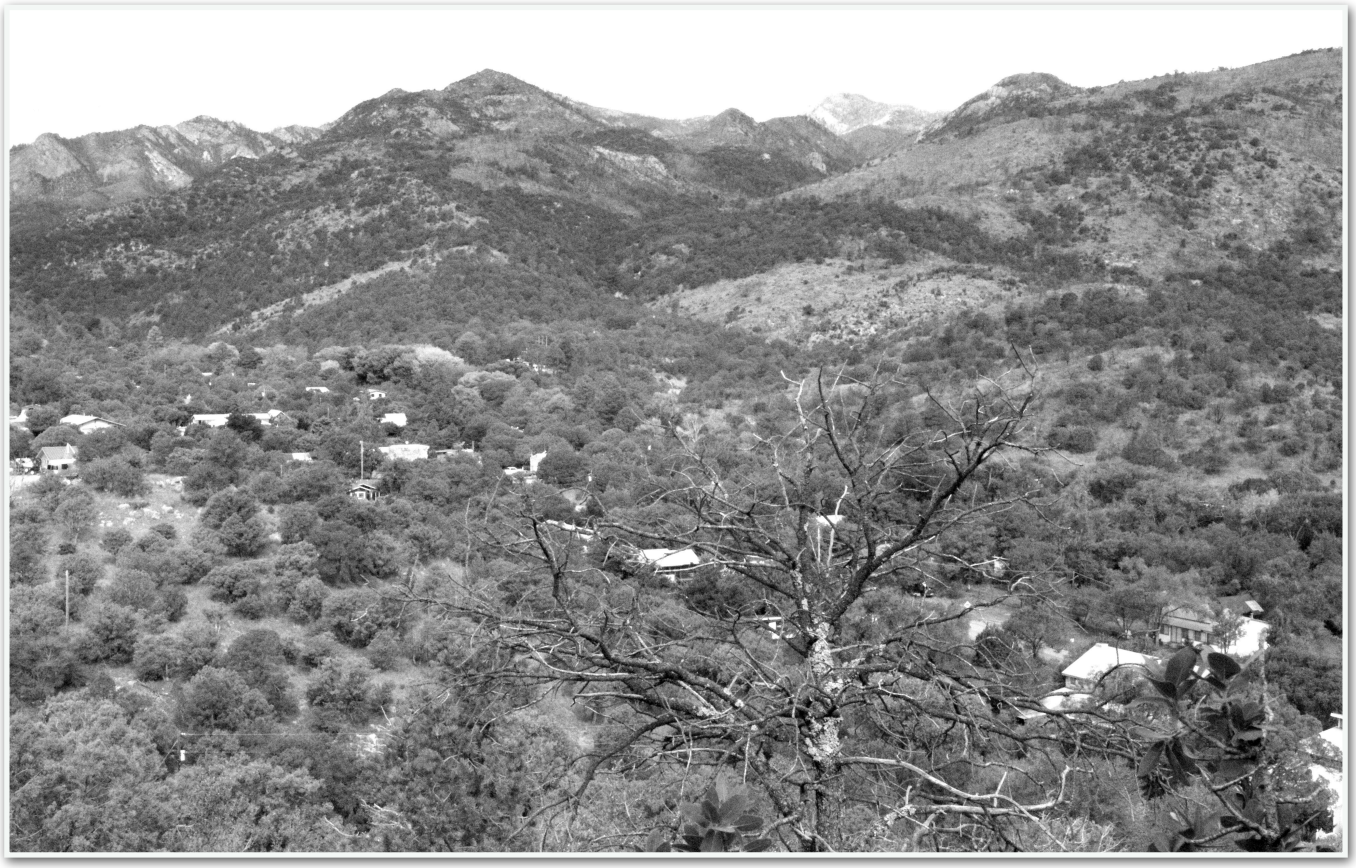


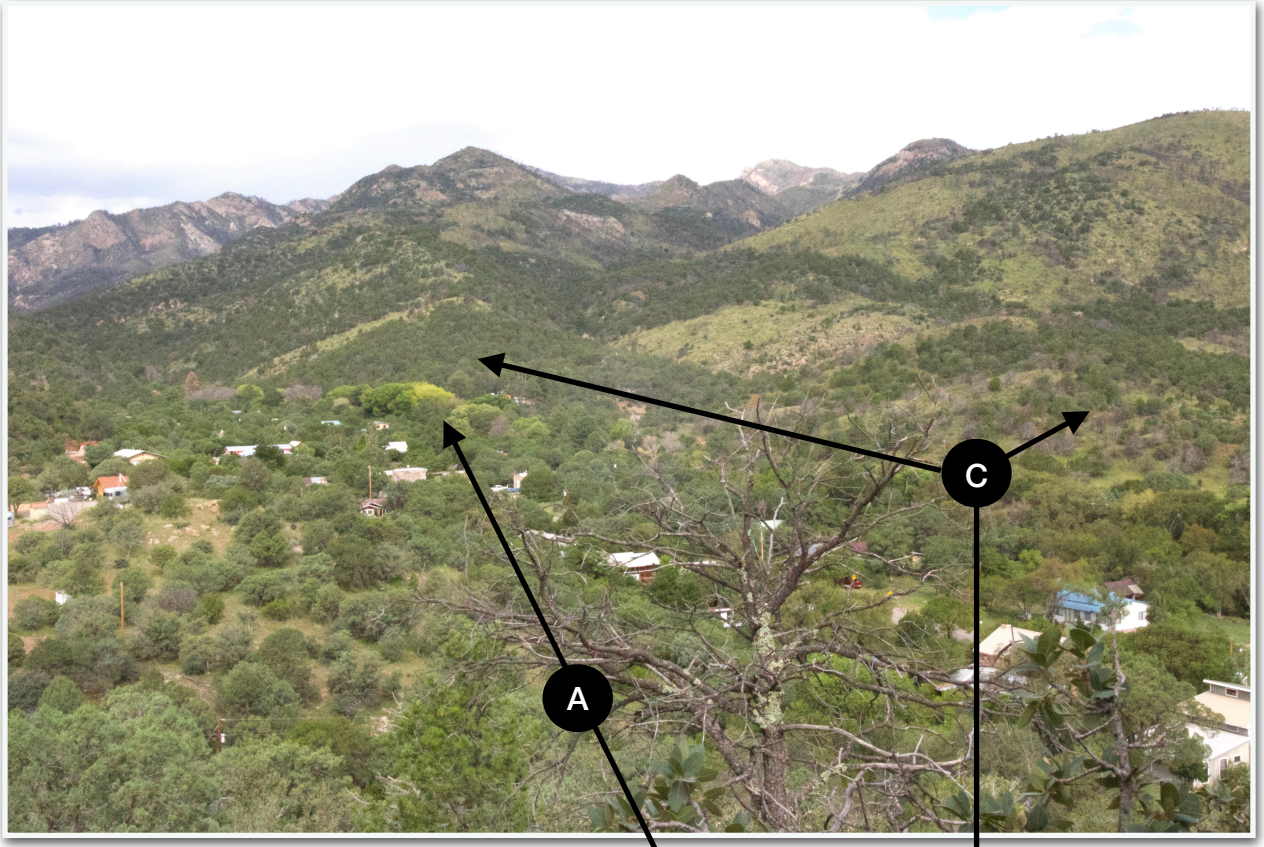


in the community depicted in a photograph. Perhaps an informed guess, but a supposition which lacks absolute knowledge. Our knowledge of plant and animal communities can be very helpful in such endeavors.

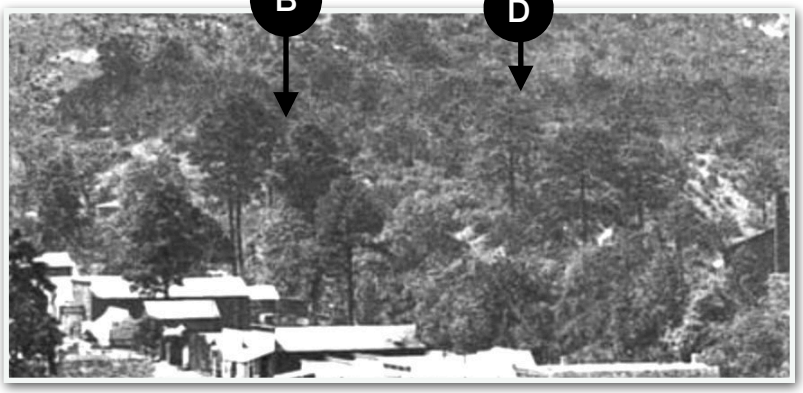


Above: Kingston 1892. Below: Kingston August 2015









Over 123 years Europeans cut much of the growth around Kingston and then gradually allowed it to grow back, with changes. The following vegetative succession has occurred in the Kingston area.

A. Large deciduous trees predominate along Percha Creek in 2015, compared with the tall evergreens in 1892.
B. There are very few deciduous trees in the photo from 1892.

The craze for lumber, especially the relatively long straight pieces of wood which could be harvested from pine trees, resulted in most of those trees being cut wherever they were accessible. This makes the tall evergreens which still exist in this area even more remarkable. See "E" on the following page.

C. Although the hills around Kingston can look bare to some people today, they are a virtual jungle when compared with the nude hillsides of 1892.
D. For the most part, juniper, oak, and pine sp. have grown back on the nude landscape. It is unclear what vegetation existed at this location prior to the cutting of everything which grew in the early 1890s.

The photograph of the eastern part of Kingston on the next page (also from August 2015) shows some of the larger pines which still exist (E) and the greater presence of broadleafs along this section of Percha Creek (F). The hillsides are generally devoid of the vegetation which existed there prior to Kingston (G).





See the following page for larger versions of the two bottom photographs, one from the late 1890s and the other from 2018. This retake series shows all of the changes which are referenced in our first set of photos from Kingston. From this vantage point the change from evergreen to deciduous trees along Percha Creek is obvious and extends from east to west through the core of town.

Because of differences in lens focal length (and a few other factors) these photos are not an exact match. It is possible that the trees highlighted by the arrow are in fact the same tree. If so, it is truly a legacy tree.

Repeat photography is an art form and a technical challenge. Much more is involved than finding the exact spot a photograph was taken from a hundred years ago and taking a shot in the same direction. For instance, the lens and camera arrangements used a hundred years ago are much different than they are today. When trying repeat photography, always default to a wide angle lens. A modern wide angle lens with a variable focal length (zoom lens) can ease the pain a great deal. In most cases, an exact match will be extremely difficult to achieve.

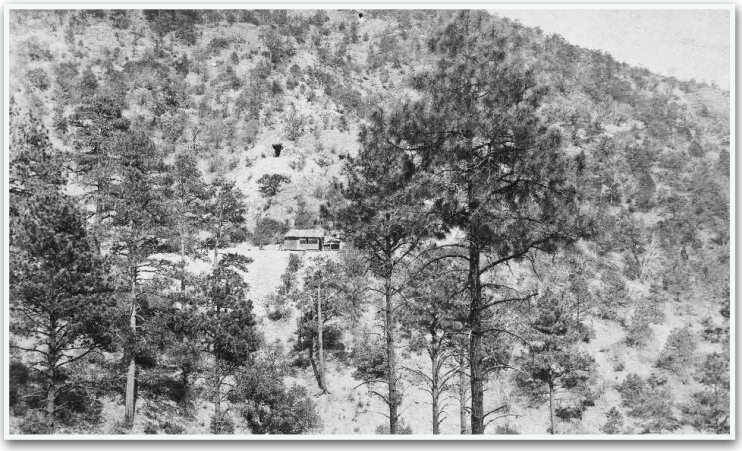
One of the more frustrating factors a person doing repeat photograph will encounter is the differences in the attributes of the media being used: glass plates vs. digital cards.







Kingston in the late 1800s (top) and a retake of the locale from roughly the same vantage point in 2018 (bottom). The changes highlighted in the previous photo set are all seen in this set.





Top Left: This image of the Ingersoll Mine on Bald Hill (Dumm Canyon), north of Kingston, dates from the late 1880s.

Center (Top) Left: The approach to the mine on September 11, 2017. Mature evergreens are visible in both photographs. Today the slope below the mine is littered with various mining debris and nothing grows on the mine tailings. Otherwise this area is little changed, at least from what is evident in the photographs.

Hillsboro

Established in 1877, Hillsboro was a mining town and the early photographs from the area clearly show the impact of mining and the demands that the mining community placed on the landscape. Early photographs from Hillsboro may be seen in this series of photo galleries.

Center (Bottom) Left: This 2018 photograph was taken west of the vantage point used to photograph the top image. Little vegetative detail is visible in either of these shots. There is not much vegetation in the landscape around Hillsboro which grows to noticeable size - then or now.

Bottom Left: The house pictured in the two lower photographs at the left are of Jack Burke's home from 1880. Burke was a mine manager at Lake Valley. The hillside around the home, in the bottom photo (shortly after the house was built) has been so overgrazed and trampled on that there is nothing there. In the photograph at center right plantings around the house have grown and grass and other vegetation can be seen on the hillside.





Below: A photograph of the Sierra County Courthouse in Hillsboro in 1892 (15 years after the town was established).





Top: Fur Trapper, Col. Hopewells' Ladder Ranch, Hillsboro, by George T. Miller ca. 1880

Center: U. S. Forest Service photo of wood gatherers near Hillsboro in about 1928 by E. S. Shipp.

Bottom: U. S. Cavalry near Hillsboro in about 1890. Probably associated with Camp Boyd.

The exact location of the top image can not be discerned. Probably on the mesas along Las Animas Creek but possibly closer to the Rio Grande. This individual is a fur trapper, indicating that there was enough wildlife to support him in some way. The catch on his horse may be a small Mountain Lion (but possibly a small Black Bear). Whether this catch was opportunistic or represented only what was available is unknown. Despite the caption on the image it is not possible to know if the catch was shot or trapped. Given the date of this photo, the lack of low growth is probably seasonal rather than the result of overgrazing.

Wood gatherers scoured the hillsides for firewood gathering everything that was dead or of any size.

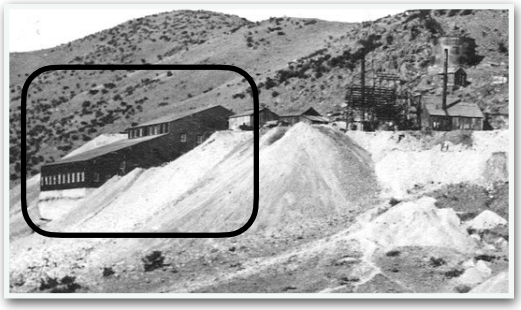






Above: The Rattlesnake Mine site on October 23, 2024. Vegetation has returned to the slopes and arroyos. The foundations of some of the early structures remain, especially of the stamp mill at the upper left of the image (see left column of next page).
Below: The Rattlesnake Mine complex east of Hillsboro ~1900.





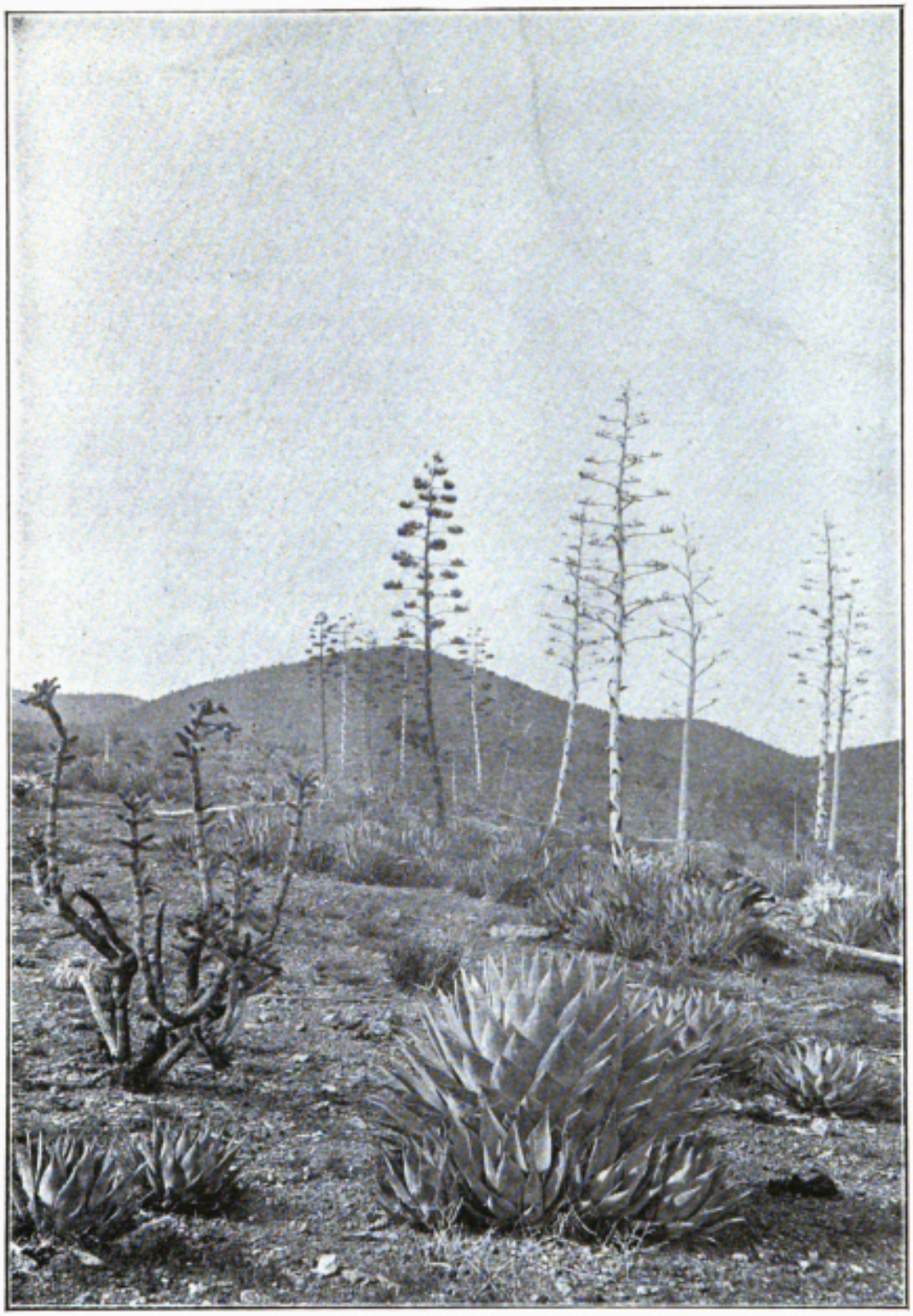




The Mamie Richmond Mine site in about 1890 (below) and on March 12, 2016 (right). The view is from just below the saddle which is south of Empire Peak. The peak at the left of these images is Animas Peak. In the valley, just out of sight in the image to the right, is the Copper Flat mine site which is at the base of Animas Peak.

Grasses have returned since the mining era, juniper and some oak is also a bit more prevalent. Other vegetative changes are not possible to discern.





AGAVE APPLANATA, VAR. PARRYI.

Plate 38 from Anna Isabel Mulford's *A Study of the Agaves of the United States*, published by the Missouri Botanical Garden: *A . applanata parryi*. From photograph taken by Mulford near Copper Flats, New Mexico. *Opuntia arborescens* Engelm. is seen at the left.



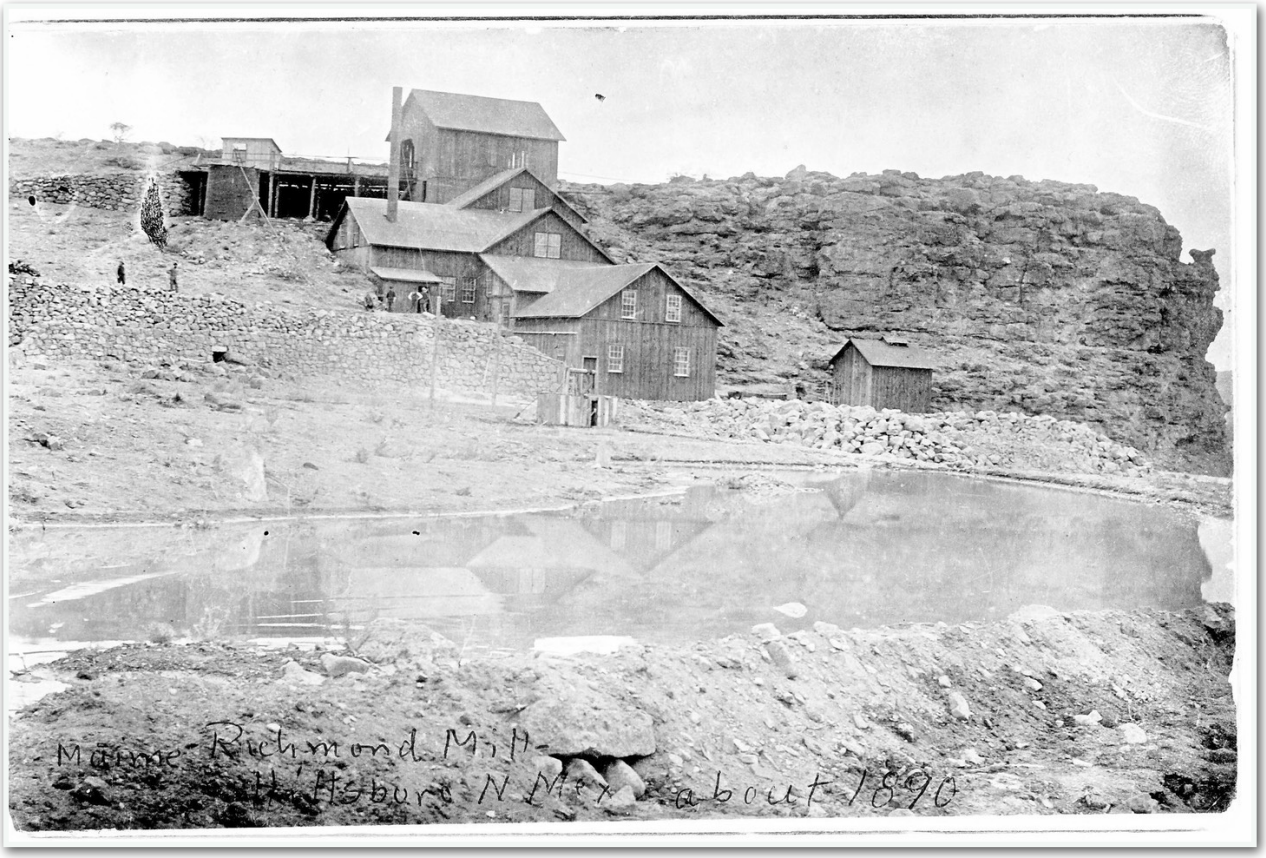
The three photographs of Hillsboro on this page date to ~1930. The attributions on two of the photographs indicate that they were taken sometime between 1922 and 1939. The other photograph indicates that it was taken sometime around 1930. All three photographs have the same style of lettering printed on the image and the same numbering sequence, indicating that they were taken at the same time and probably on the same flight.



The days of large agave specimens like those shown from Mulford (previous page) are long gone. Now you are lucky to find a small bud of a plant nestled in the rock. The photograph below is from east of Hillsboro on 25 May 2016.









Top Photo: Photo inscription reads "Mamie Richmond Mill, Hillsboro, NM about 1890". Note the earlier entry for the "Mamie Richmond Mine" near Empire Peak. Bottom Photo: The mill site in 2016. More to say about human cultural history, crumbling ruins, than natural history, the intrusion of wait-a-minute bush.





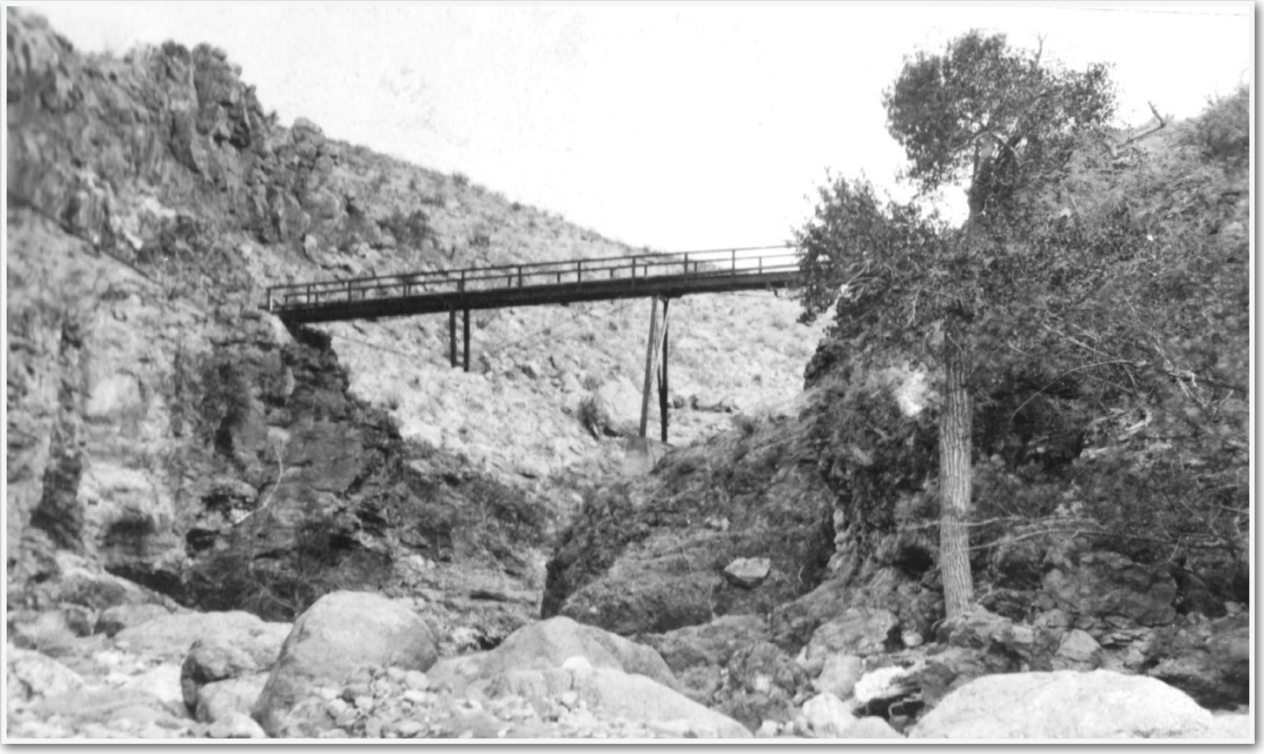


Top Photo: "Saddle Rock" ~1900.

Center Photos: Across from the mill site is one of the more dramatic geologic features in the area. See the arrows. The sharply uplifted rock formation is the western boundary fault of the Animas uplift. Vegetative changes can not be determined by studying the two images.

Bottom Photo: Looking west up the Percha Creek drainage in August 2013. Saddle Rock is at the right. Note that the there is much more vegetation in the stream bed, when compared with the top photo. Periodic high water events scour the creek bed and surrounding areas, which had probably happened in the recent past in the top photo.

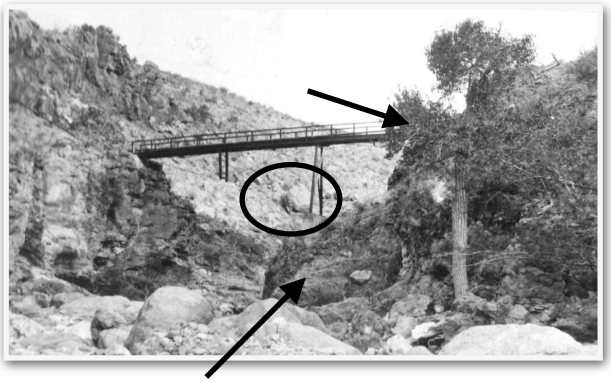




Top Photo: Water pipe trestle in the Percha Box east of Hillsboro, ~1900. Looking east. The more commonly seen photograph is the one shown at the top of the next page.

Bottom Left Photo: Photograph of the same location shot from the east side of the bridge (looking west) on December 25, 2010.

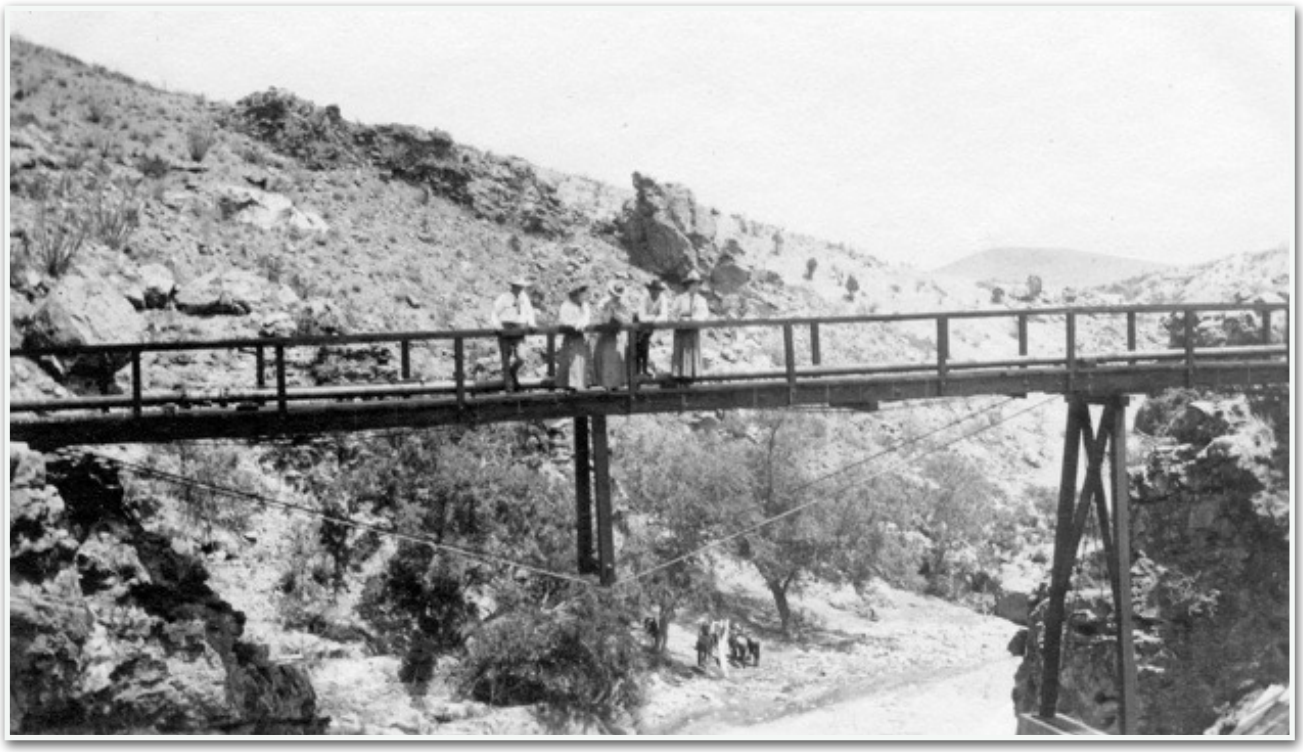
Photos at Right: Note boulder on hillside and absence of a large rock in the creek bed in the photograph from 2010. The fact that trees come and go is not as dramatic as the "missing" boulder - but perhaps it is an illusion created by focal length cropping. The general vegetative growth in the stream and along the margins is more robust in the current photo, but the difference is probably a function of the periodic stream scouring which occurs during high water events.







See *Volume 2 of Walks In The Black Range* for access details.



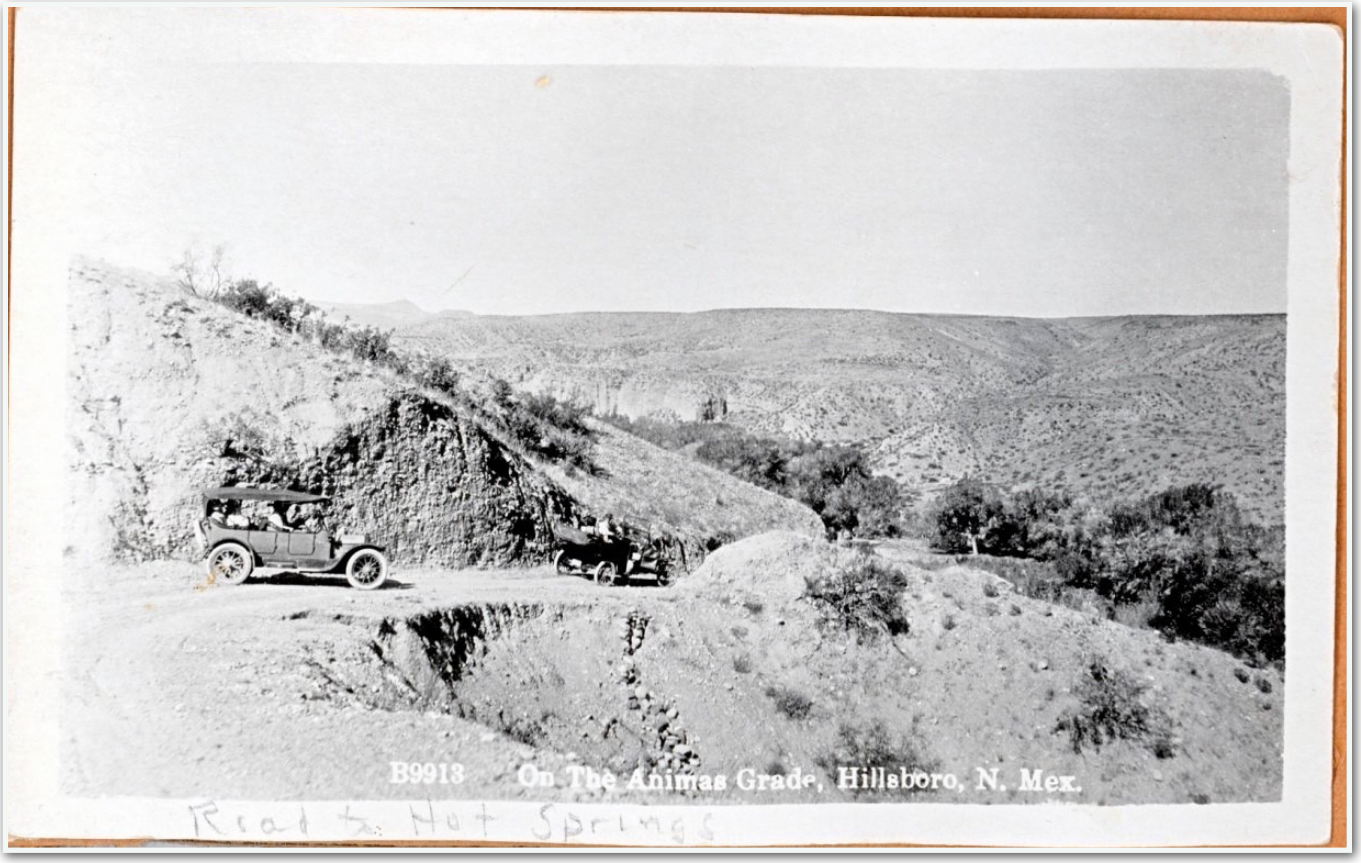
Top Photo: This is the image most typically seen of the bridge.

Bottom Left Photo: Detail of the photograph at the bottom of the previous page, showing part of the foundation for the bridge.

Bottom Right Photo: Photograph of the same location shot from the west side of the bridge (looking east) on December 25, 2010. The cement foundation is the same which is shown in the photo to the immediate left.









Above: Animas Creek Grade, Hillsboro. ~1920s. This road was the way from Hillsboro to Hot Springs (Truth or Consequences) at the time. The photograph to the right shows the sycamores and cotton-woods which still grow in the Animas drainage.

During the vetting of the top photograph, Steve Dobrott (who managed the Ladder Ranch for many years) noted that: "Prior to Highway 152, this is the old county road that is still passable (although not sure if it has been maintained since I left the ranch). We used it as a trail for moving bison from the Avant Pasture (entrance) to Seco Creek and beyond. There is still evidence of early reinforcements to the road. It washed out in the early 1990's and we took measures to reopen it. This road used to run from Gold Dust along the current power pole lines to the Ladder airstrip (gate in fence at east end of the strip) and on down into the Animas and over the next ridge into Seco Creek (existing road to lower Seco). The road tied into Palomas Creek to the north and on to Hot Springs (T or C)." (Personal emails between Dobrott, Shaw, and Barnes - September 28-29, 2024.)

The sycamore and cottonwood along Animas Creek are still flourishing, although under increasing threat from activities which lower the water table.

Compare these images with the one from Cave Creek, below Myers Mesa, which is shown on the following page.

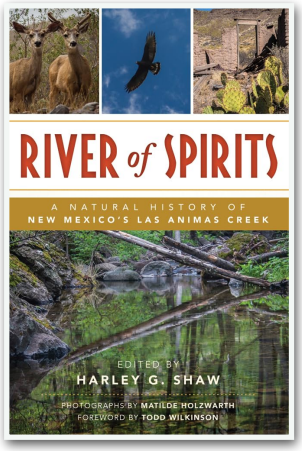


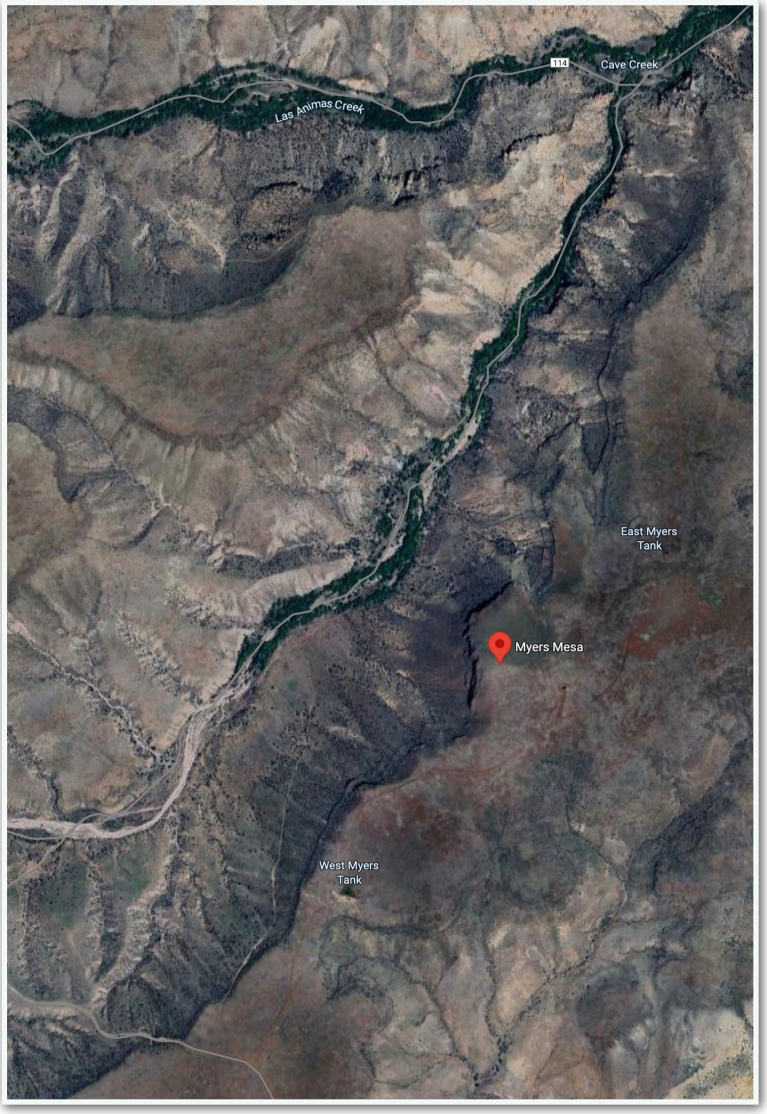
Above Photo From ~1900: "I am pretty sure that this photograph was taken in the area of the Myers Ranch (Upper Myers Pasture) on the Ladder Ranch. The Myers Ranch/homestead was located on the old road from Hillsboro, that led up Warm Springs Canyon to the Myers Place, then over Myers Mesa, to Cave Creek and into Las Animas on its way to Hermosa as a freight road. One can still see the remnants of this road on the ranch. You can make out the road on Google Maps. I believe the photo in question was taken in the vicinity of the Myers Well, one of the wagon stops on his road. The flat mesa in the background is Meyers Mesa." (Steve Dobrott, September 30, 2024)

Following Page

Top Photo: 1941
Bottom Photo 2012

In the next few pages Harley Shaw shares some of his repeat photography. This series was photographed at the Ladder Ranch, using original photographs from their archives. This work was done as part of the publication of *River of Spirits*, which he participated in as writer and editor.









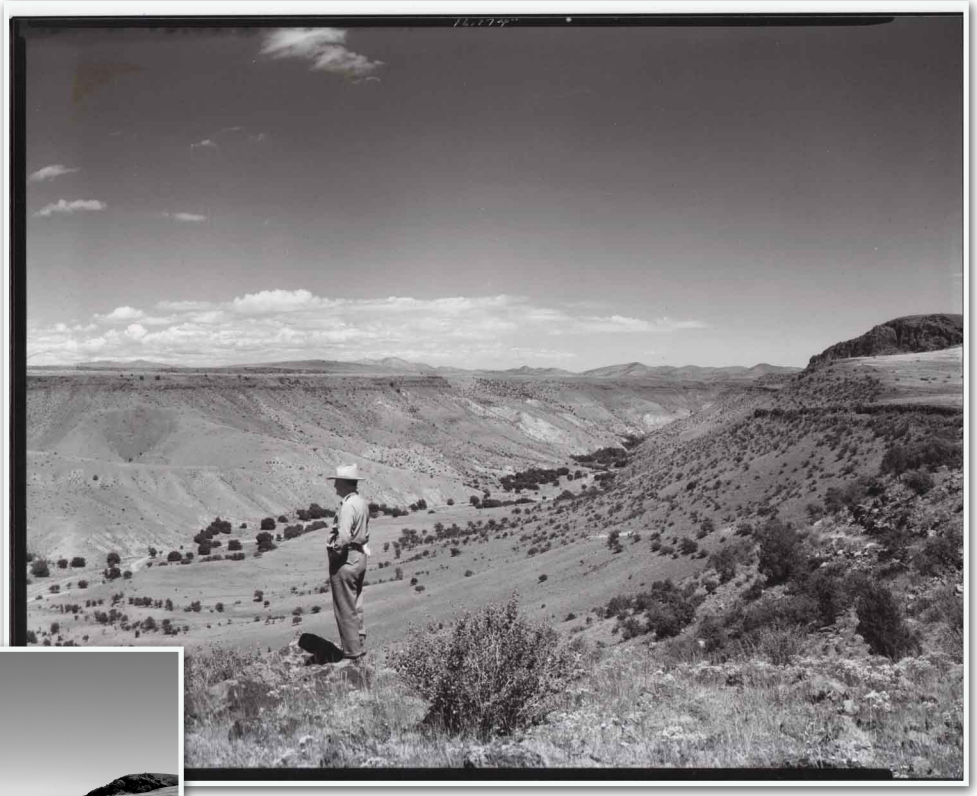
This Page and Next

Large Photographs: The man in these photographs, and in the photo at the top of the next two pages was named Burton Roach. These photographs were taken in the 1940s.

Small Photographs: Repeat photographs taken in about 2016 by Harley Shaw.

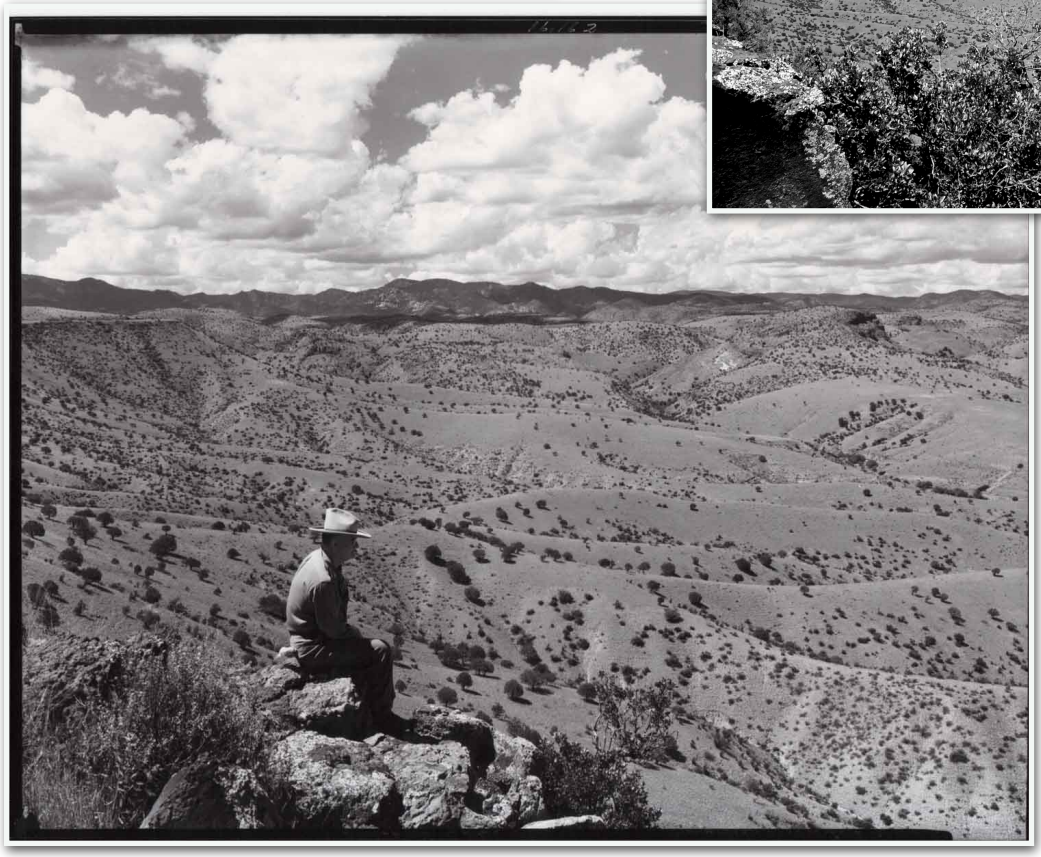
There appears to be a bit more vegetation in the repeat photographs of these four images. Juniper appears more prevalent on the hillsides and the riparian area in the valley appears denser. There may be more grass on the slopes in the repeat photographs, but that may be the result of seasonality or annual rainfall variation. In the repeat photograph directly above, the vegetation behind and to the right of the rock Roach is sitting on, in the photograph to the left, has grown substantially.

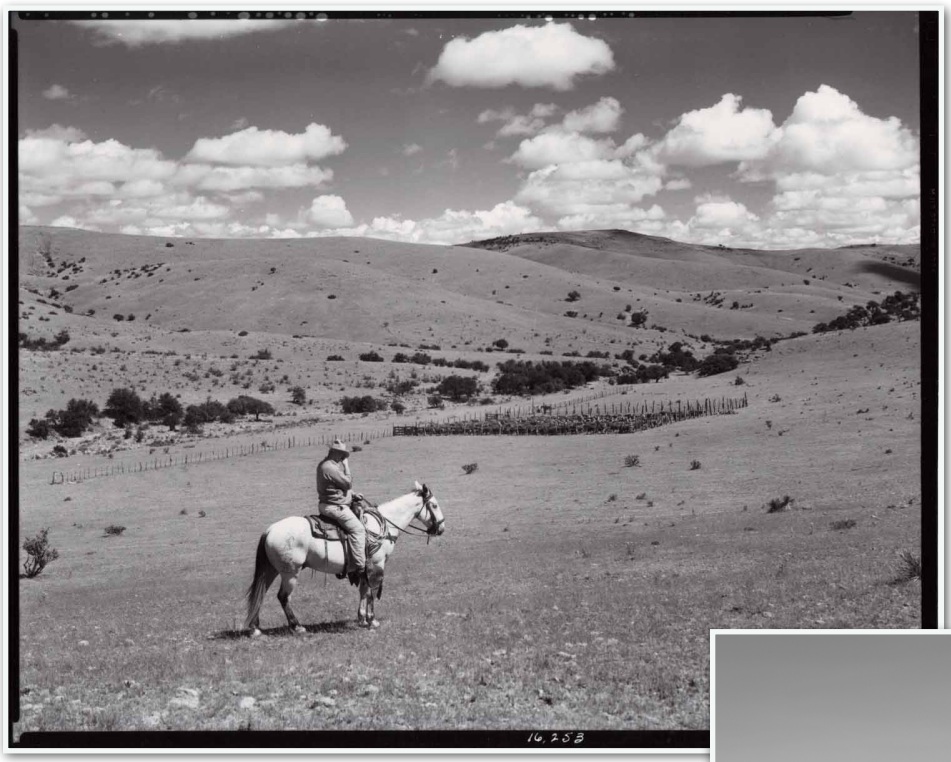
An untested hypothesis is that repeat photography in xeric landscapes will tend to show less change over time, than those made in wetter habitats.













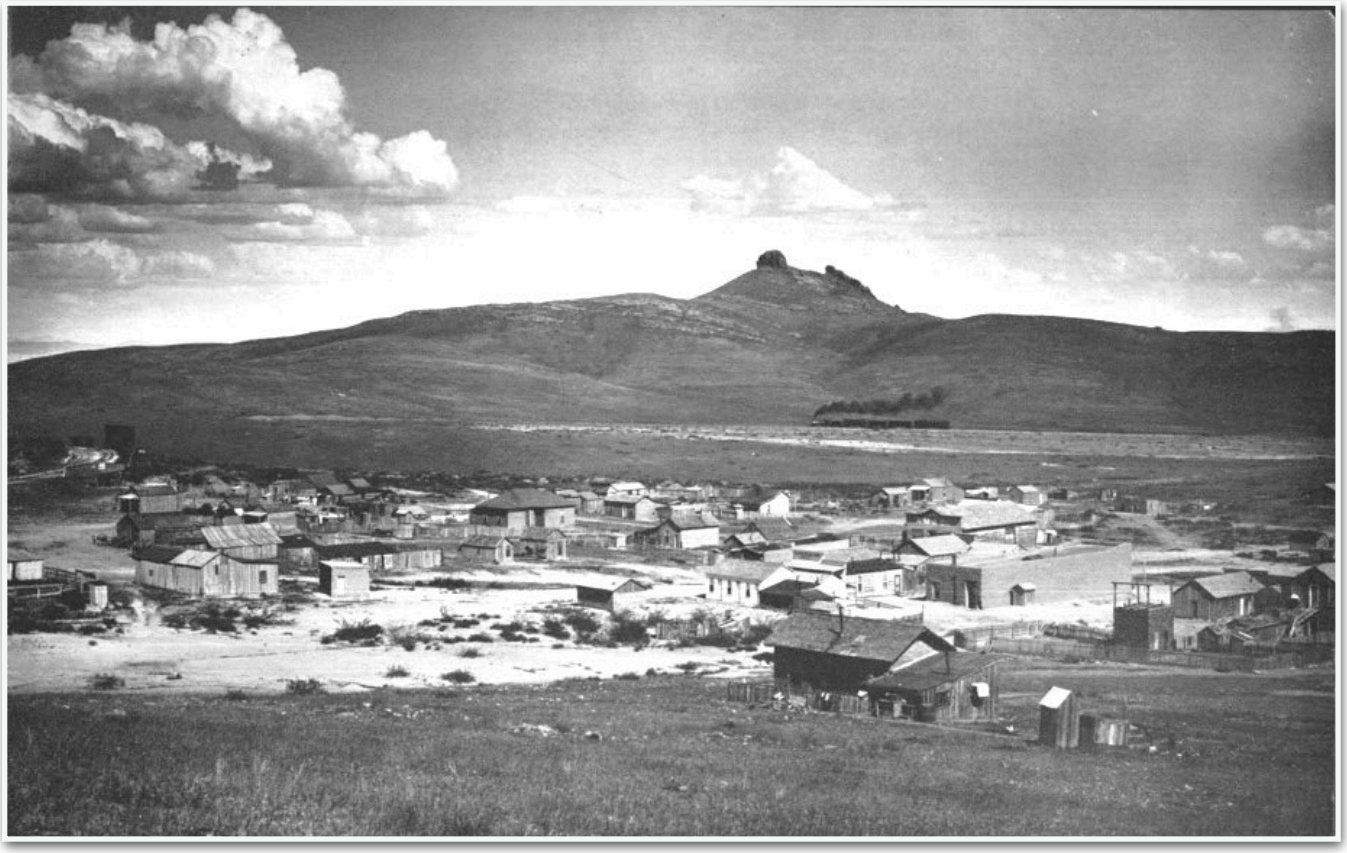


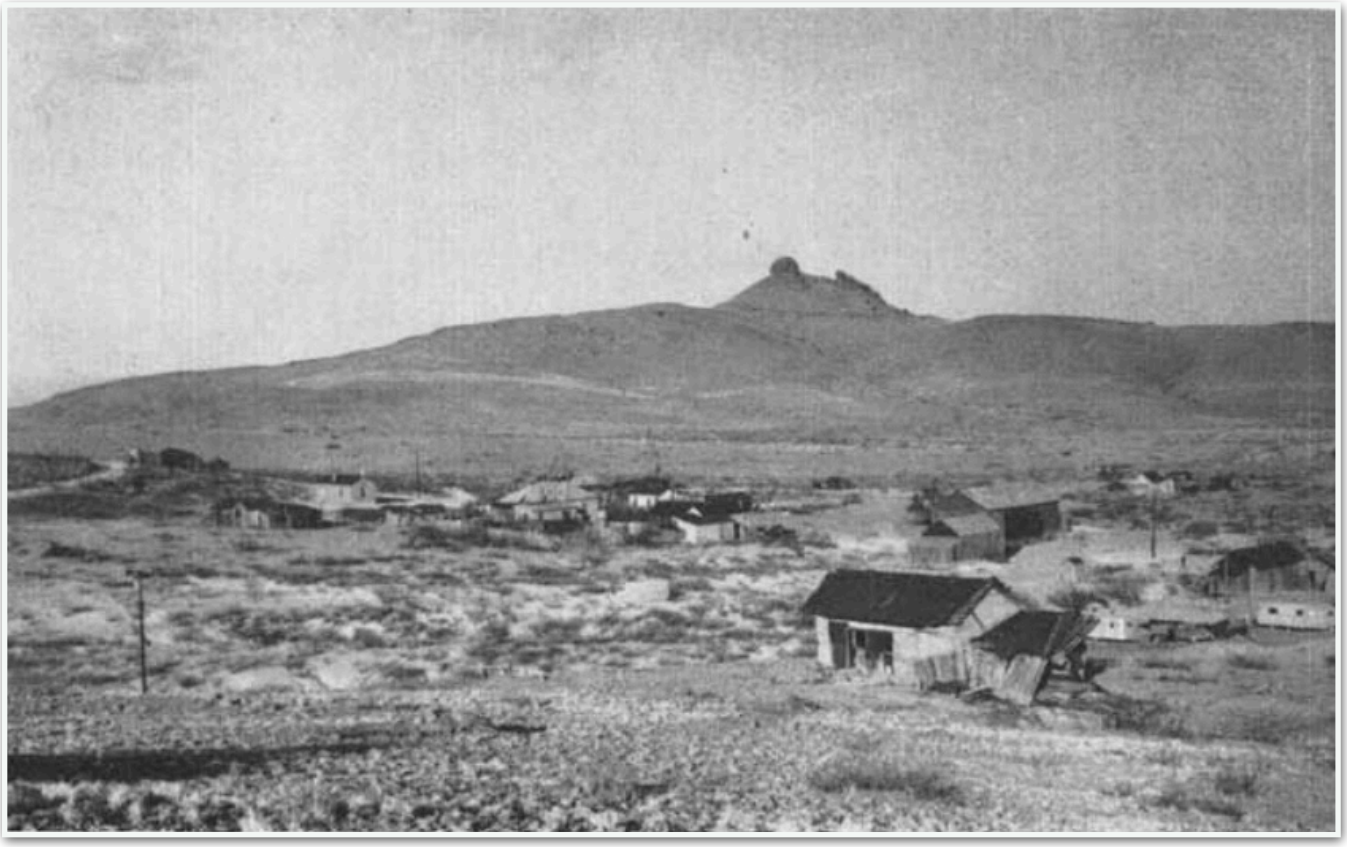


Top Photo: Lake Valley ~1905 by Henry Schmidt. Note train in the background.

Bottom Photo: Lake Valley, 1954.

Compare these photographs with those on the next page and especially the bottom photographs on that page. The photographs from ~1900 and the one from 1954 show a fairly barren landscape while those from ~1905 and the present show more vegetation (relatively). Yearly and/or seasonal, rather than long-term, variation?







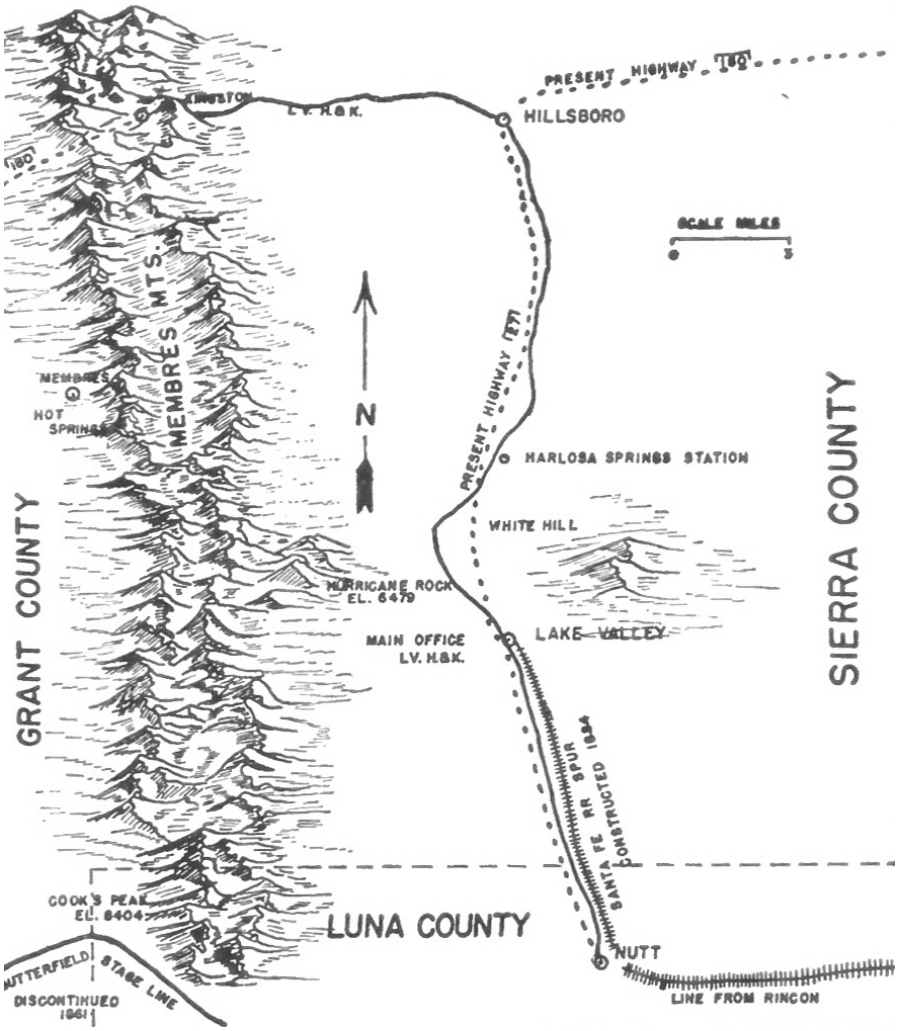
The photo, above, of a train just south of Lake Valley dates from about 1900. Lizard Rock and Monument Peak can be seen in the background. The photo to the right was taken on July 21, 2013, from a spot which would have been just to the left of the locomotive. The vista, below, was photographed from Apache Peak, north of Lake Valley, on April 14, 2020. "Grass" cover appears to be roughly the same, perhaps a bit more currently. The train ran from the main trunk at Nutt to Lake Valley. From Lake Valley, wagon, including the Mountain Pride stage coach, provided service on to





Below: "Mountain Pride" near Harlosa Springs station, circa 1900, from Lake Valley School Museum collection. The stage took was named after the "Hotel Mountain Pride" at the route terminus in Kingston.





Hillsboro and Kingston. William Swilling Wallace's "Short-Line Staging in New Mexico" in the New Mexico Historical Review, Volume XXV!, 1951, provides an excellent history of the Lake Valley to Kingston stage coach route. The map to the left, showing among other things the location of the Harlosa Springs Station, is found on page 90 of Wallace's article. (The name "Harlosa" appears on present-day maps as "Jaralosa". The company's chief driver, William J. Reay, is holding the reins in the photograph above. Much of the referenced article is based on interviews with Reay. (America is a country of immigrants: Reay was born in England on March 31, 1876, and immigrated to the U. S. in 1883.)

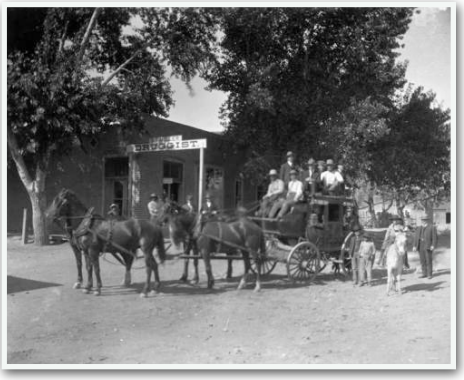
The stage line, which included the Mountain Pride, was owned for some time by L. W. (Sadie) Orchard. It was sold to Fred W. Mister in 1902 after Orchard lost a mail contract.

Note the sparsity of vegetation in the photograph. This area was not heavily mined and was grazed somewhat. This, as now, is probably the natural state of the vegetation.

FREDERICK W. MISTER ET AL TO WILLIAM D. SLEASE

BILL OF SALE.

KNOW ALL MEN BY THESE PRESENTS, That Frederick W. Mister and Nancey Mister his wife,of the town of Hillsboro,Sierra County,New Mexico, parties of the first part,for and in consideration of the sum of One dollar and other good and valuable considerations to them in hand paid by William D. Slease of the town of Hillsboro,Sierra County,New Mexico,party of the second part,the receipt of which is hereby acknowledged ,do grant,bargain,and sell unto the said party of the second part,his heirs and assigns,the following described propety viz:-The Automobile and Stage line outfit,running between the towns of Nutt,Lake Valley,Hillsboro and Kingston,in said Sierra County, consisting of one "Chandler" seven passenger automobile No. 36,460 and one "Dodge" five passenger automobile No. 209.013 and two "Ford" five passenger automobiles No. 1744114 & No. 397.916 and one "Smith-Form Ford truck No 1.299.842 and one bay horse called "Dock" branded P on left shoulder,and one bay horse called "Jim" branded 7H on left hip,and one gray horse called "Willie" branded 3(on left shoulder,and one black horse called "Raven",branded 3(on left shoulder,and one gray horse called "Alex" branded T on left hip,and one brown horse called "John" branded E on left hip,and one brown horse branded QUD on left hip,and one gray horse called "Lightfoot" and one gray horse called "Bluck",and one bay horse called "Dandy",and one brown horse called "Johnson",and one bay horse called "Dick" the said five horses,last mentioned are branded A.L. on left thigh: Also four buggies,two hacks,one Concord Coach,two saddles,one large safe in the office at Hillsboro,one "Jerkey" wagon, 4 sets double harness, one office desk,3 robes,the building and corrals,at Lake Valley,N.M. consisting of one adobe building,corrals,stables,and sheds, one frame building all situate near the Railroad Depot in Lake Valley N.M. also about two tons oats at Lake Valley,N.M. also two underground metal gas tanks at Hillsboro,N.M. and about 250 gallons gasoline,and 60 gallons of lubricating oil and all all automobile tires,tubes,patches ,tools,and supplies,and all tools and suppliesconnected with the horses,and the household and Kitchen furniture & fixtures ,including stoves,cooking uhensils and fuel,at the residence property Lot #8 Block 34 Townsite of Hillsborough,N.M.,also all rights and privileges use and control of,in and to the lease No. 5111 of school section 16 Township 16 South Range



all improvements situate ther con,
ire fence,and posts (said grantee to pay
ation of said lease) hereby intending to
not herein enumerated,and used in connection
tage line outfit,and business,also all rights
goods and chattels unto
his heirs and assigns,forever,
first part,for themselves,their heirs,
rs,do hereby covenant to and with said
his assigns,that they are lawfully possessed
els,as of their own property;
all incumbrances,that they will warrant
said party of the second part and his assigns
demands of all persons.
he said parties of the first part have hereunto
his fifth day of January,A.D. 1918.

Frederick W, Mister (L.S.)

Nancy Y. Mister (L.S.)

T .H. Byrne.

State of New Mexico

County of Sierra SS.

On this 7th day of January A.D. 1918,before me personally appeared Frederick W. Mister,and Nancy Y. Mister,his wife,to me known to be the persons described in and who executed the foregoing instrument and acknowledged that they executed the same as their free act and deed.

Witness my hand and official seal,the day and year last above written.

T.H. Byrne,Notary Public

My Commission expires Aug. 19,1919.Sierra County,N.M.

SEAL.

STATE OF NEW MEXICO
County of Sierra ss.

I HEREBY CERTIFY that this instrument was filed for record on the 17 day of January, A.D. 1919 at 9 o'clock A.M. and duly recorded in book B pages 302-303 of Bill of Sale records. Fees $ 1.50

J.P. Dines County Clerk

On January 7, 1918, Frederick and Nancy Mister sold the stage line and all of its equipment to William D. Slease. Although the Mountain Pride has garnered historical importance over the years, at the time of the sale is was simply "one Concord Coach".

Note that the motor vehicles sold in the transaction were given more notice; the time of the stage coach had long passed.

Cooke's Peak, Fort Cummings & Cooke's Spring

Cooke's Spring and Fort Cummings are found at the southeastern boundary of our study area on the eastern base of Cooke's Range.

The "before" photographs of Fort Cummings have never been particularly sharp. In the Black Range, only the Santa Rita mine area to the west has a longer history of European human impact. Ft. Cummings was established at Cooke's Spring in October 1863.

Petroglyphs in the area attest to the presence of indigenous peoples at this site. The Spanish were later in the area, for instance Martinez of the Anza expedition. He stopped at Cooke's Spring on November 18, 1780, naming the spring San Miguel. On the 28th of the same month, Anza's main expedition stopped at the spring, naming it Picacho. By the 1830s the spring was a stop on the Gila River Trail (Santa Fe to San Diego and Los Angeles). In 1846 Cooke and his battalion stopped at the spring on their long walk through the west. The various boundary survey expeditions used Cooke's Spring, often called by that name by the time Bartlett came through in 1851. Bartlett described the spring area as "a pool, some 50 feet across, surrounded by rushes. The water is a little brackish, but the grass in the vicinity is excellent." From that time on cattle, sheep, and horse drives plowed through the area, wagon trains were regular, and stage and mail service (like the Butterfield and Pony Express) used the spring as a stopping point.

The two-edged sword of the coming of the railroad had a significant effect on the Ft. Cummings/Cooke's Spring area. The railroad needed water for its steam-driven trains, so a spring house was built at Cooke's Spring and water was piped south to the railroad. This, of course, diminished the amount of water in the immediate area immensely. The effect was not all negative, however. The railroad decreased the human movement and usage of the Cooke's Spring area considerably (not completely).

All of the above to make the point that this particular area has a record of significant European human impact and its natural state was changed significantly. If you have an interest in the human history of this area, and it is by far the most interesting in this area, please read ***Cooke's Peak - Pasaron Por Aqui,*** a BLM publication by Donald Howard Couchman. It is one of the best southwest histories around.

Following Page - Top Image: Ft. Cummings in 1882 just after the decision had been made to rebuild the fort. It is a tent camp. Nearly all of the vegetation on the landscape had been eaten by decades of cattle and sheep, and diminished by human movement through the area.

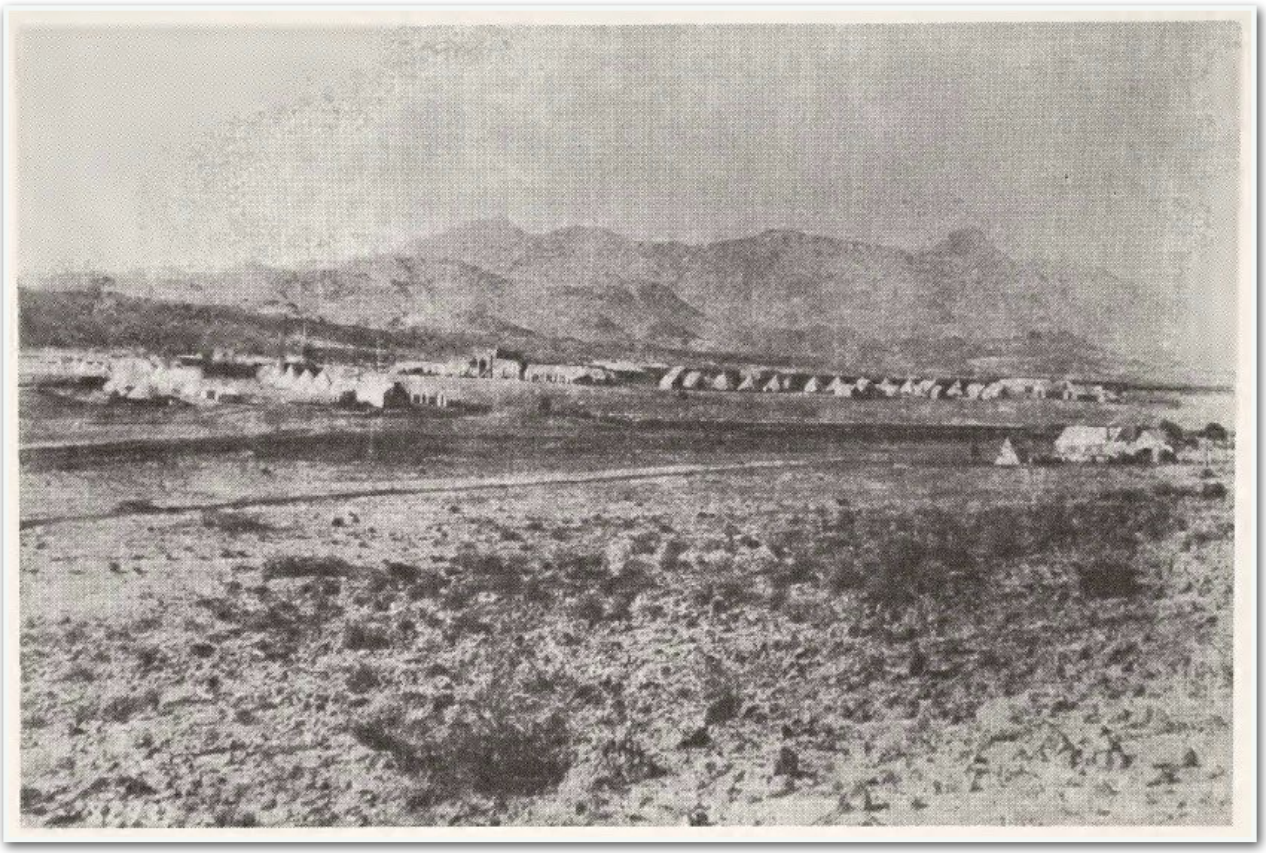
Following Page - Middle Image: In 1886 the reestablished fort looked basically the same, although some adobe structures had been built.

Following Page - Bottom Image: By 1904 the fort was well on its way to disintegrating into the landscape.

Sometimes an exact repeat photograph is not possible or does not tell a complete story. The saddle in the photo at the top of the next page is accentuated in the photo at the bottom of this page. This is what happens when you are photographing slightly uphill from a swale. This image is included here because of all of the grass in the bottom photograph. It was taken on July 19, 2018. To the east and southeast of the Ft. Cummings site is the Chihuahuan Desert grasslands, here known as the Nutt Grasslands, after the hamlet of Nutt (or the owner of the ranch). Prior to the introduction of European cattle the grasslands were vegetated with much higher growth. Even after more than a century of heavy grazing, the Nutt Grasslands can erupt with grass during/following the monsoon. Not nearly what it was prior to the arrival of the European peoples, but lush compared with its (current) normal state and much more heavily vegetated than the landscape in the top photo below. Perusing old photographs can tell you many things and it can fail to tell you much more. Take the middle photograph on the following page for instance. Is there a lot of grass in the photo? What species are the shrubs growing in the area?

Another series of images (pp. 41-42) demonstrates both the effect of color when using repeat photography and









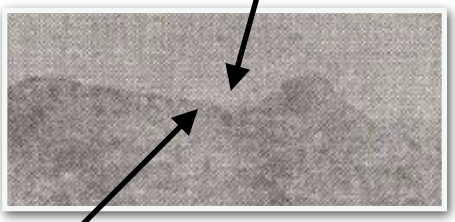
the seasonal and yearly variation which occurs in the Black Range. Documentation of this type of phenomenon can be highlighted by repeat photography over fairly limited time scales.

The photograph of the Nutt Grasslands, with Cooke's Peak in the background, was taken on March 22, 2020. That happened to be a very good time for the Gordon's Bladderpod, *Physaria gordonii*, bloom (close up at top right from the same photo session). Again, not a true repeat, this image is taken from a different angle and has a dramatically different field of view. The fact that this image is in color shows the limitations of true repeat photography. If a true repeat, it would have been in a gray scale - and the drama of all that yellow would have been lost, and the knowledge of seasonal



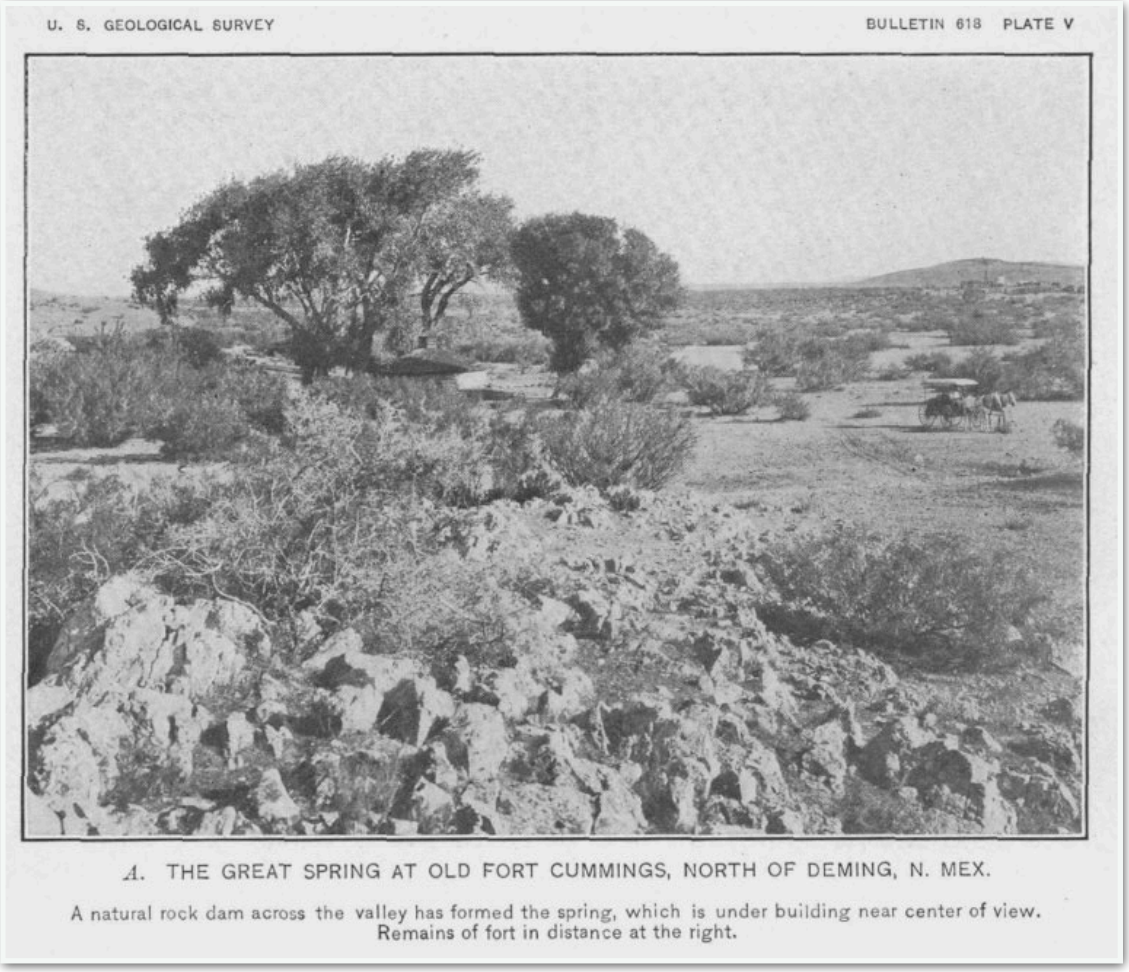












Top: Cooke's Spring & Spring House ca. 1882.
Bottom: From Bulletin 618. Geology and underground water of Luna Country, New Mexico - Nelson Horatio Darton - 1916

variation which it encapsulates. There is no right or wrong here. It is simply a matter of what techniques you wish to utilize and an acknowledgement of their strengths and weaknesses. The Pronghorn photo on page 42 highlights the (limited) resilience of the grasslands.

Top Right: Cooke's Spring & Spring House January 16, 2014. (Spring House reconstructed in 1987.)

Center/Bottom Right: From Bulletin 618. Geology and underground water of Luna Country, New Mexico - Nelson Horatio Darton - 1916

Immediately below: The view to the east from roughly the same spot as the photograph at the middle right, February 7, 2020. Another example of revegetation in the area.

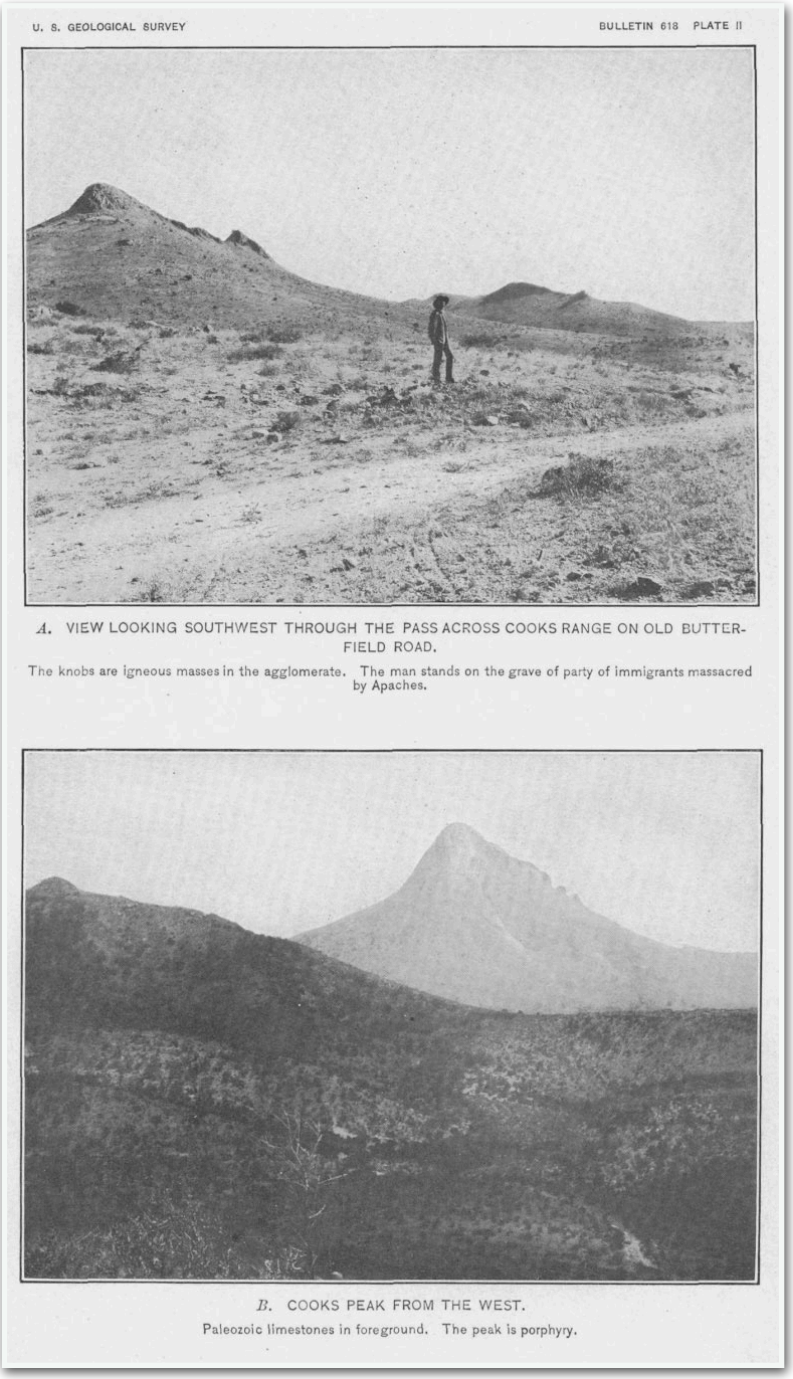


This area, where the stage line crossed from Cooke's Spring (at the east) to the Mimbres Valley (at the west) is rich in human history. This particular spot, north of Massacre Peak, saw many cattle, horse, and sheep drives from the mid 1800s. That activity laid waste to the landscape as seen in the photo at center right. In the photograph immediately above, vegetation, as sparse as it is, has returned.



This area is rich in land forms. The photograph immediately above shows strata resulting from several major volcanic events. But vulcanism is not the only thing that happened here - see geology map.





U. S. GEOLOGICAL SURVEY BULLETIN 618 PLATE II

A. VIEW LOOKING SOUTHWEST THROUGH THE PASS ACROSS COOKS RANGE ON OLD BUTTERFIELD ROAD.

The knobs are igneous masses in the agglomerate. The man stands on the grave of party of immigrants massacred by Apaches.

B. COOKS PEAK FROM THE WEST.

Paleozoic limestones in foreground. The peak is porphyry.



Cooke's Township

Cooke's township was quite active for a period in the late 1800s. Lead and fluorite were both mined in this area at various times.

Both of the above photographs are from 1891. The top photograph shows the post office (right) and various businesses (left at the same level).

Compare these photos with the image at the top of the next page, which was taken on February 17, 2016. This image is taken a bit higher up the slope and is oriented more to the south, to include Cooke's Peak. The juniper appear a bit more robust in the current era. This is probably because those in the past were cut for firewood.

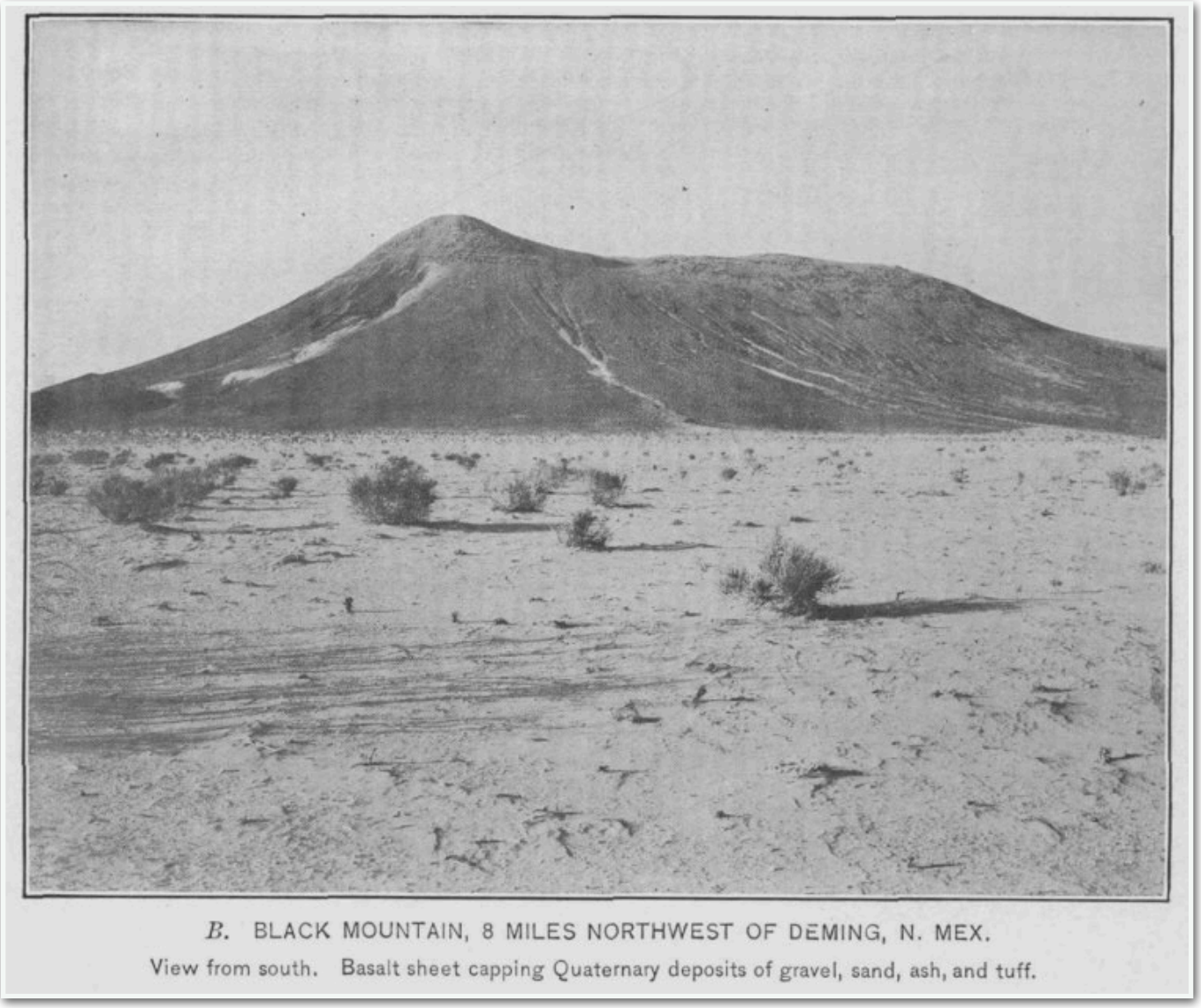
The capstone seen at the top of the ridge in the bottom photograph, above, is seen running from the upper right toward the center in the top photograph on the next page. The township continued to operate in some fashion into the automotive age, as evidenced by the bottom photograph (and the detail at the center) on the next page. Vegetation appears to be more robust now than in the 1891 photographs.

Of note in this area is the relict population of Arizona Cypress which is found to the northwest of the townsite beneath a saddle. See Volume 5, Number 3 (July 2022) of this journal.









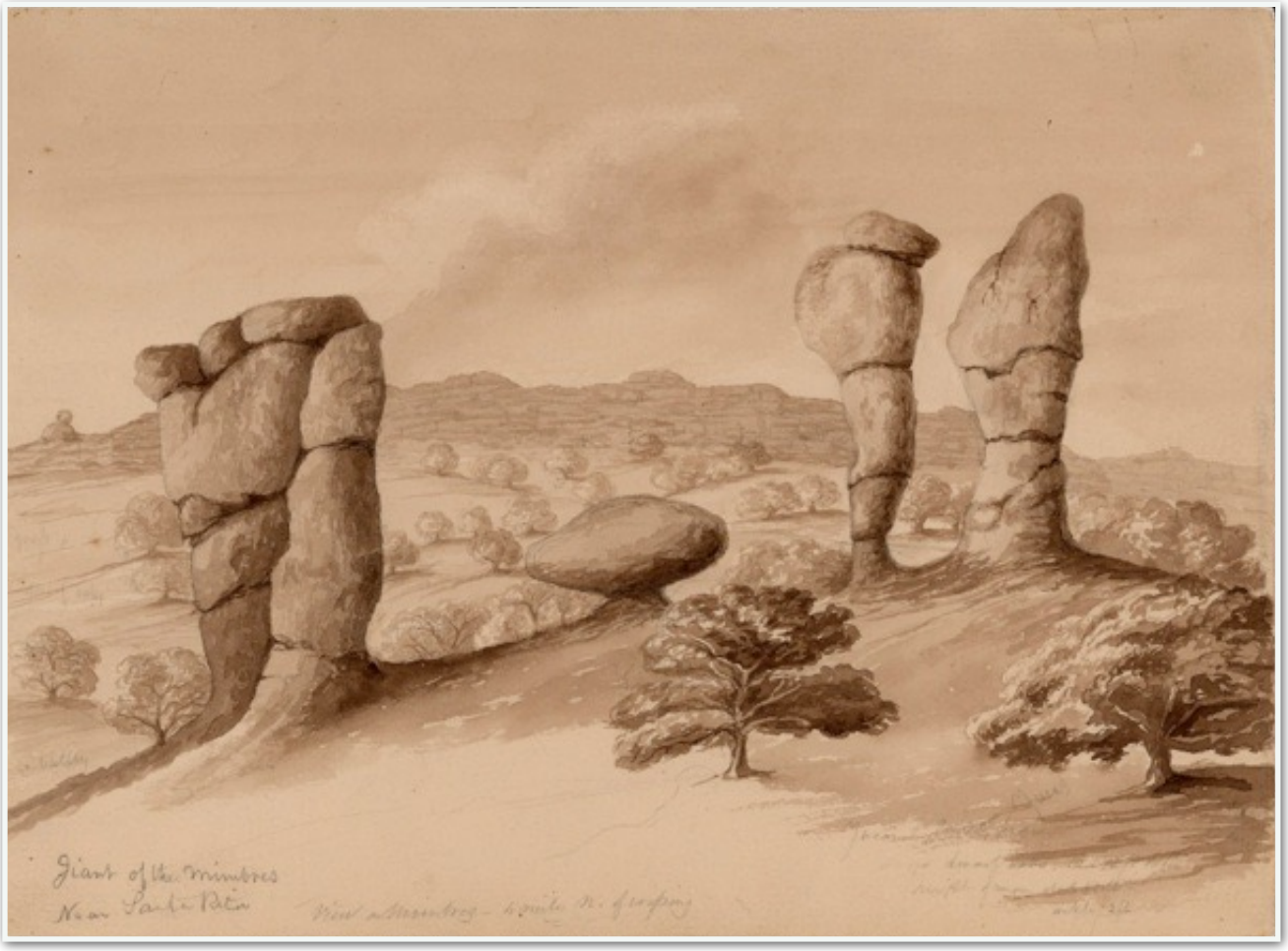
B. BLACK MOUNTAIN, 8 MILES NORTHWEST OF DEMING, N. MEX.
View from south. Basalt sheet capping Quaternary deposits of gravel, sand, ash, and tuff.

Above: Black Mountain is a short distance to the northwest from Deming; as such it is typically out of our reference area. This photograph from Bulletin 618. Geology and underground water of Luna Country, New Mexico - Nelson Horatio Darton - 1916

Black Mountain northwest of Deming has a sorry history, including things like ranchers "road grading" Mimbres sites to make pasture for scrawny cattle. The southwest base of the mountain has a (former?) national guard firing range, a desolate place.

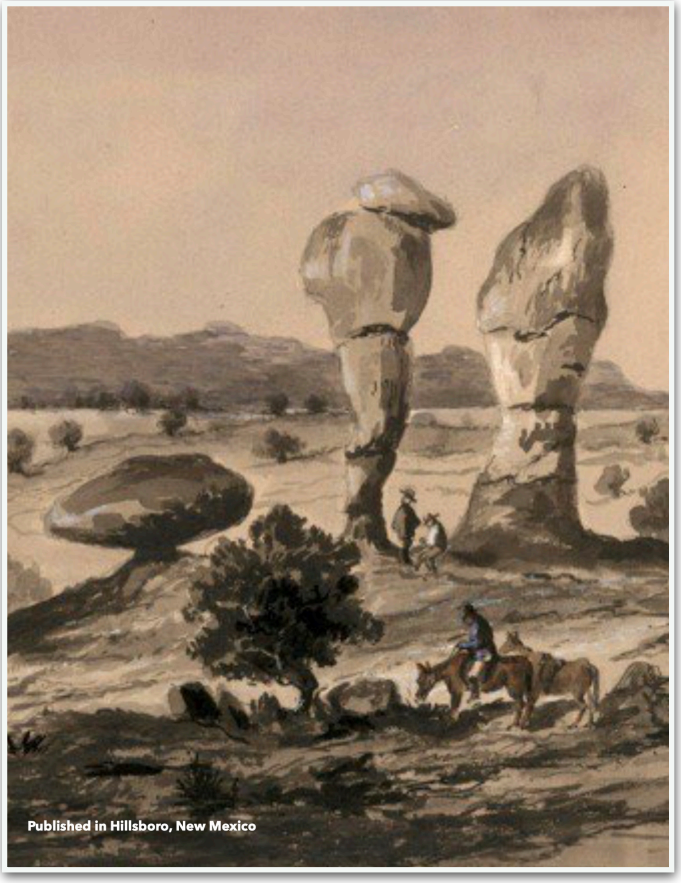
All of that said, it was truly bad in the photo taken above, making a point which is sometimes missed. Ranching in the late 1880s and early 1900s savaged the landscape. Since that time it has rebounded somewhat. See the photograph at the right from March 5, 2015. As bad as the landscape might appear now, it has been worse.





Mimbres Valley

Above: This John Russell Bartlett draft drawing from 1851 contains the following notation. "View of rock formations and valley with figures on horseback in the foreground". This draft drawing was never completed (the men and horses were not drawn in) and contains many notes in pencil: on the lower left is "Giant of the Mimbres Near Santa Rita;" in the lower center: "View on Mimbres -- 6 miles n. of crossing;" on the right is "grass, line of oaks, valley;" and on the lower right are "Yucas" and "Yucas and Prickly pear, dwarf oaks, 10 feet high, height of man about 50 ft. Ankle 3 ft." On the verso is "Sandstone Rocks, Rio Mimbres," the title used in Bartlett's Personal Narrative, Vol. 1, p. 224".



Right: *Back Cover of Early Naturalists of The Black Range*. This is a later version of the drawing at the top. It is a detail of an original drawing which was featured in *Personal Narrative of Explorations and Incidents in Texas, New Mexico, California, Sonora, and Chihuahua, Connected With the United States and Mexican Boundary Commission During the Years 1850, '51, '52, and '53.* John Russell Bartlett. Bartlett's journal contains the following:

> ***May 1st. In camp on the Mimbres. As our animals had been poorly fed since leaving El Paso, I determined to remain here to-day to give them the benefit of the fine young grass. All the party seemed to enjoy the relaxation; and they sallied out after breakfast, some in search***

of game, others of the picturesque. For my part, I took the two together; for when I went to the hills in search of game I carried my sketch book with me, as it was only among the wooded hills, the defiles, and the thick groves along the river bottom, that game was to be found; and there, too, was the most picturesque landscape scenery, and the best field for the exercise of my pencil. I first walked down the stream about two miles to a thick grove of large cottonwoods. The bottom was much contracted here; nevertheless, it was thickly wooded and forest-like. Ash and oaks were interspersed among the cottonwoods. Saw many signs of turkeys, but shot none myself. Some of the party were more fortunate and brought in several. About five miles north of our camp the river enters the hills, and a little further up, is closely hemmed in by lofty mountains. Noticed wild roses in great profusion, also wild hops, and the Missouri currant. These, in some portions of the valley, were so closely entangled together that it was impossible for one to work his way through. Found several old Indian encampments, with their wigwams standing, and about them fragments of pottery. Many well-marked Indian trails followed the river on both sides, showing that it had been, and probably is now, a great thoroughfare and place of resort for the Apaches. In the afternoon, Mr. Bausman, one of our most indefatigable sportsmen, came in from a hunt, and reported that he had seen some remarkable rocks about five miles up the river, to the north of our camp, which were worth visiting. I immediately had my mule saddled, buckled on my pistols, attached my rifle to the pummel of the saddle, and taking my sketch book, accompanied him to the place referred to, which was about half a mile from the river on the western side. Arriving at the place, I found some singular masses of sandstone standing detached from the adjacent hills, one of them bearing a curious resemblance to a man. My timid mule was much alarmed at the gigantic object which stood before it, trembling from head to foot. We therefore stopped a short distance from it and hitched our animals to an oak which hid from view the source of their terror. Around us stood these singular isolated rocks, some appearing like castles, others like single pedestals and columns. The one resembling a human figure, which is shown in the accompanying sketch, and which I christened the "Giant of the Mimbres," measured but three feet in its narrowest part near the ground; while its upper portion must have been at least twelve feet through, and its height about fifty. Others of equal height stood near. All are disintegrated near the earth, and are gradually crumbling away, several having already fallen. When I had completed my sketch, we mounted our mules, and hastened back to camp, which we did not reach until some time after dark, my long absence meanwhile causing much uneasiness. Several turkeys were seen during our ride, and a couple shot. A number of fish of the trout species were taken here.

The lithograph below is from *New Tracks in North America*, Volume 2, by William A. Bell, plate between pp. 26 & 27. Titled "The City of Rocks", it is actually the Giant of the Mimbres. "There are the valley of rocks, the city of rocks, & c., in which huge masses of sandstone form pillars, chimneys, altars, giant mushrooms, and temples which would compare not unfavorably with Stonehenge, had they not been geological curiosities only. I enjoyed a few hours photographing amongst these grotesque forms, for they made splendid subjects for the camera." (p.26) He visited the area in 1867.



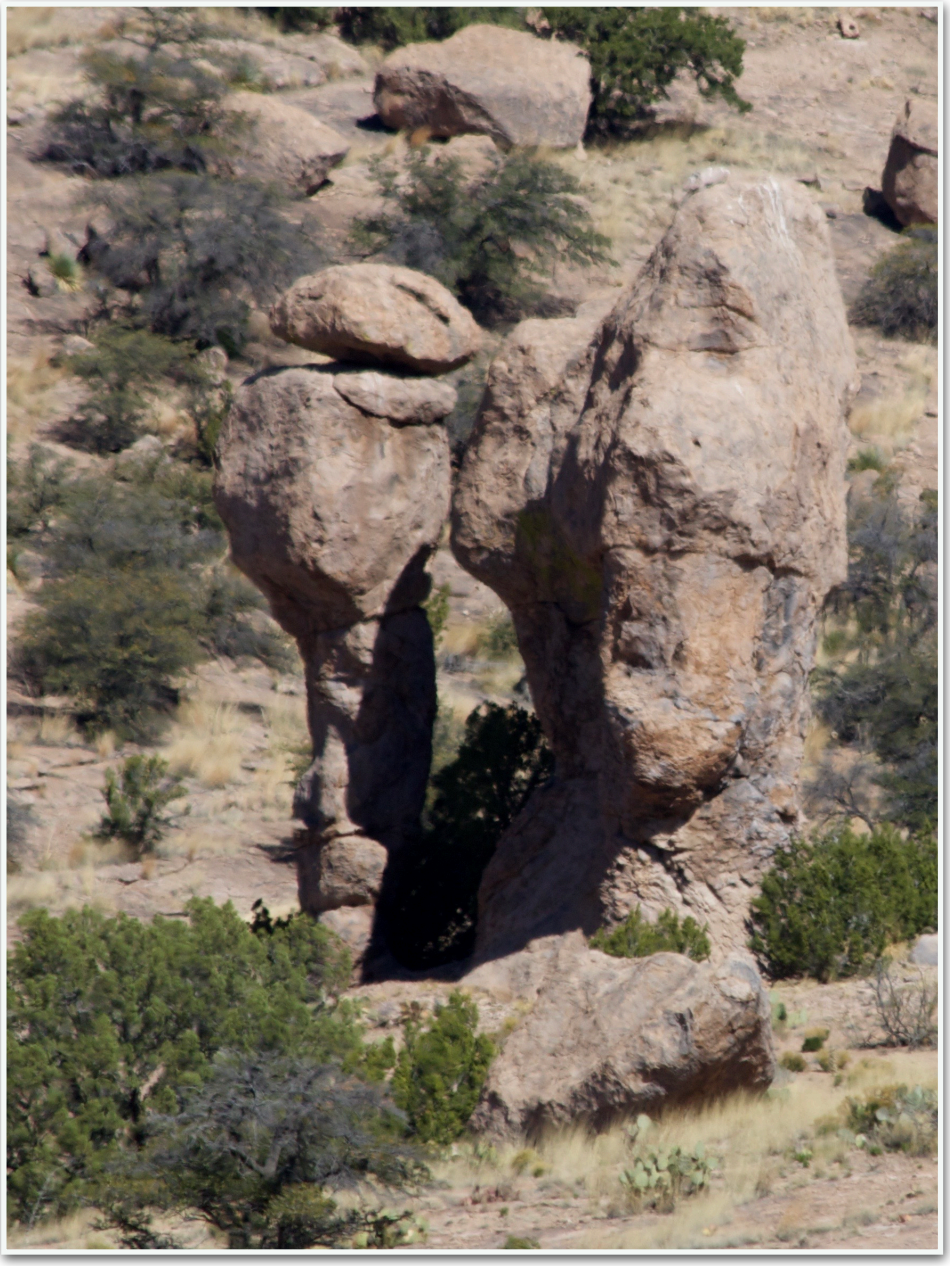
The Bartlett drawings and the Bell photograph match well with the images to the right which were taken on March 22, 2016. This site is on private land so the vantage point of the drawings, which is from the ridge to the northwest of the rock formation, toward the Black Range (Mimbres Mountains at that time), could not be replicated. The Bell photograph was taken from east of the formations, and the detail at the bottom, taken from the larger image, matches the vegetation present today, roughly down to the amount of grass.

Emory came through this area in 1846. (See *Notes of a military reconnoissance, from Fort Leavenworth, in Missouri, to San Diego, in California, including parts of the Arkansas, Del Norte, and Gila rivers.*) The paintings at the top of the following page are part of that report and cannot be repeated with certainty. Note however that the Mimbres River corridor is populated with tall deciduous trees. Although it is not possible to verify their species from the top painting, they would have been cottonwood. The peak in the background is probably Cooke's Peak, not known by that name at this time but generally known by that name by the time Bartlett came through in 1851.

Note the meadow the pack train is winding through. It is not clear if this is an artistic device added for effect or if there were meadows along the Mimbres at that time.

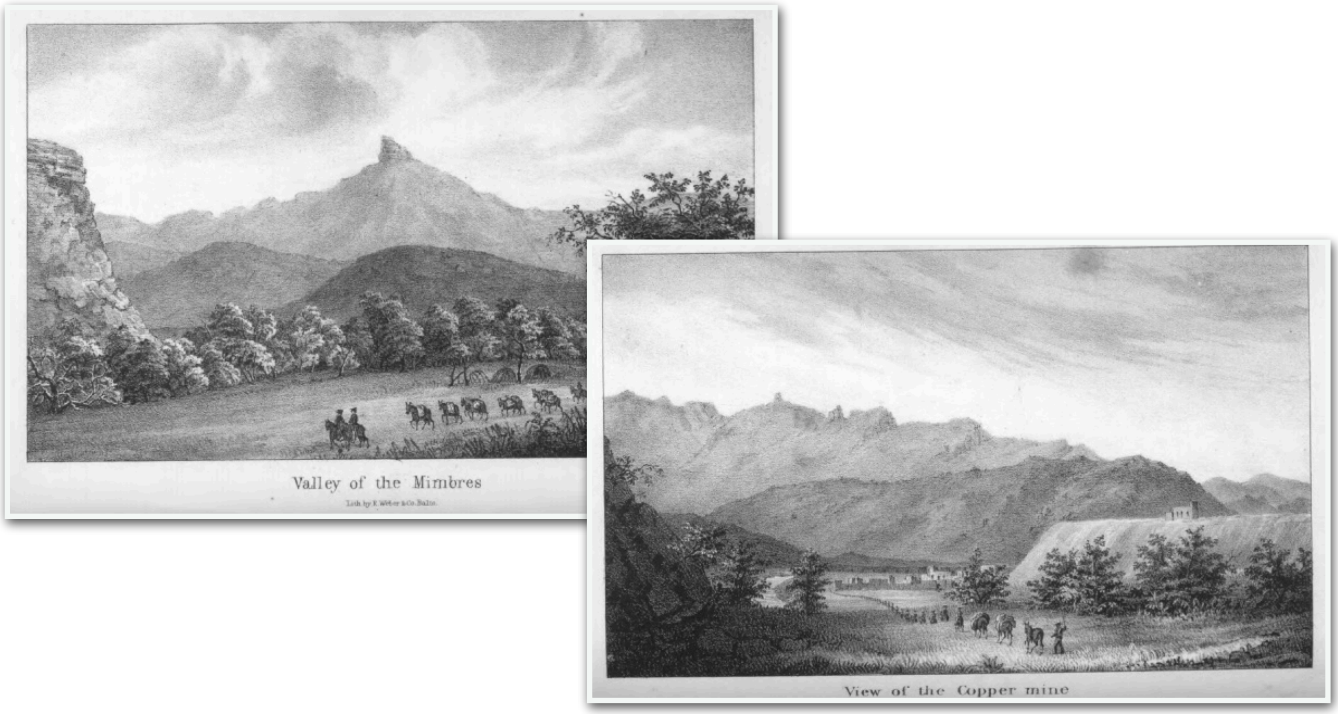
The drawings of the copper mine at Santa Rita (Chino) can not be replicated at this time.

The painting by Eastman, at the bottom of the next page, is one of the best natural history images of this era.











Santa Rita del Cobre (Copper Mines) by Seth Eastman (from a sketch made by others). Sometime between April and August 1851. Camp of the Commission is shown at center left, the village is shown in the middle of the watercolor.



Above: Henry Pratt - "View in the Canyon of the Coppermines" - Associated with Bartlett's Personal Narrative of Explorations and Incidents in Texas, New Mexico, California, Sonora, and Chihuahua.



Above: This photograph is purported to be "Wright's Cabin" on the western slope of the Black Range, on the north side of NM-152. Era is unknown, photographer is unknown. There are a number of old cabin photographs from the Black Range most do not show any of the landscape/vegetation in the vicinity. This one shows nice Ponderosa.



Above: Early photographs of the people living here when the Europeans arrived (more accurately those people's descendants) are generally studio shots, like this of Nana in about 1880. Nana was a Chihene (Warm Springs Apache).

Right: The Hillsboro Peak Fire Lookout as it appeared in the 1920's. Note the guy wires. They appreciated the wind in the 1920's.

Bottom Images: The tower on May 25, 2015. Evergreens at the summit area have grown up over the intervening years and in general this area has been "saved" from fire.

One of the major deficiencies of landscape level repeat photography is that it is generally not possible to determine changes in small flora like this sedum species, possibly Lanceleaf Stonecrop, *Sedum lanceolatum*, which was photographed at the summit on May 25. 2015.













McKnight Cabin is located south of McKnight Peak along the crest of the Black Range. The top photograph is a U. S. Forest Service photo by C. K. Cooperrider in 1931. The bottom photograph is from April 23, 2015 (a blog posting from the visit on this day can be read here). As of 2015 the habitat around the cabin had changed little from 1931. Aspen, spruce, and pine were (and are) well established. The lower vegetation, including that associated with the spring which is at this site, is robust in both images.

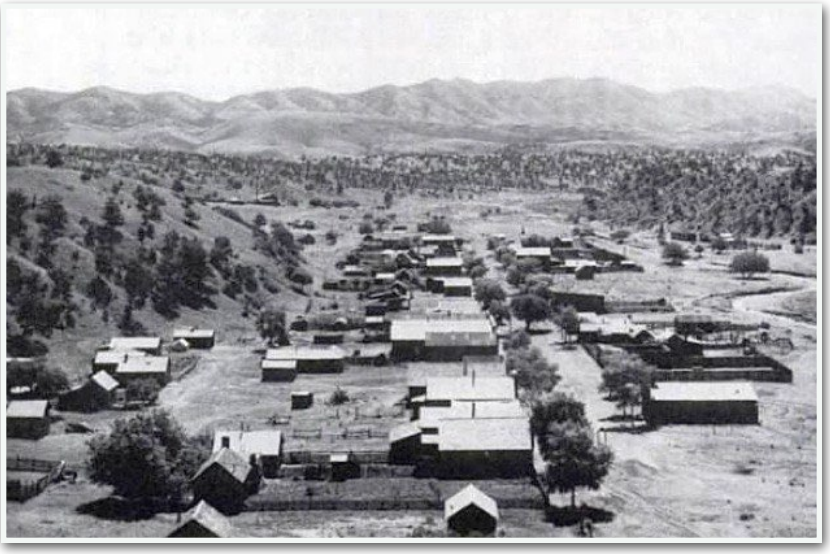
The Forest Service is quick to wrap structures like the cabin so it was undamaged in both the Silver Fire (2013) and Black Fire (2022).

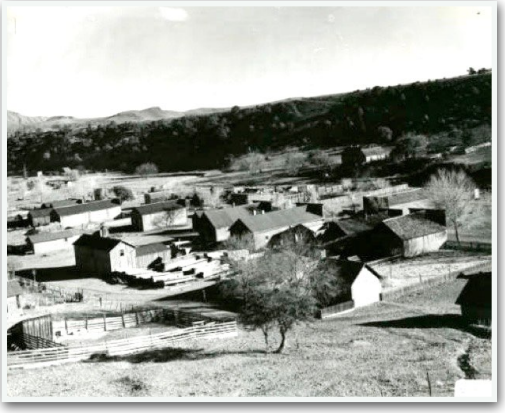
The photo at the top of the next page is of firefighters from the 38th AAA Battalion (Ft. Bliss) fighting the 1951 McKnight Fire which burned 48,052 Acres (see Vol. 2, Number 1 of this journal).



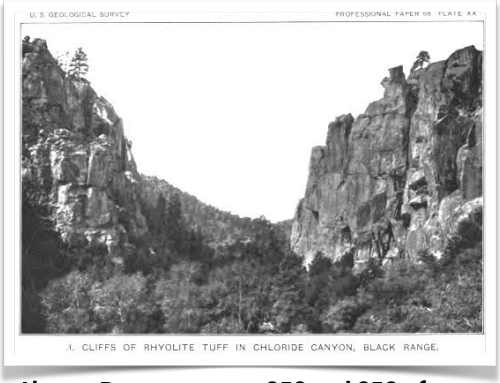


Directly Above: The U. S. Forest Service photograph from 1912 depicts logging activity in the Black Range, most likely on the western slopes where some of the timbered areas were on shallower slopes.





Bottom Left: Chloride looking east - September 13, 1907 - Photograph by Henry A. Schmidt (Photograph 13780 from the Museum of New Mexico, Santa Fe)
Above: Chloride - Between 1908 and 1910 - Photograph by Henry A. Schmidt.



Above: Between pages 258 and 259 *of* Lindgren, Gordon, and Garton, 1910, *Ore Deposits of New Mexico*.

Conclusions

Hypothesis: At the beginning of this study it was assumed that repeat and near-repeat photography would demonstrate the continual and persuasive degradation at scale (local, subregional, regional …) of the natural world by human activity.

General Findings: Our conclusions are more nuanced. Variation between "before" and "after" photographs was dependent on temporal "long-term" human enterprises, seasonal and yearly weather variation, and a variety of local conditions. Although human mega-impacts like climate change are obvious from numerous lines of evidence, the photographs shown here do not demonstrate those effects.

The timing of early photography had a significant effect on what was demonstrated by the repeat photographs. In many cases, the initial photographs show significant

degradation of the local environment. People were laying waste before they were photographing. This created a false baseline, as noted below.

Changing local uses of the landscape created variation in the trajectory and the shape of changes during this period of roughly 150 years.

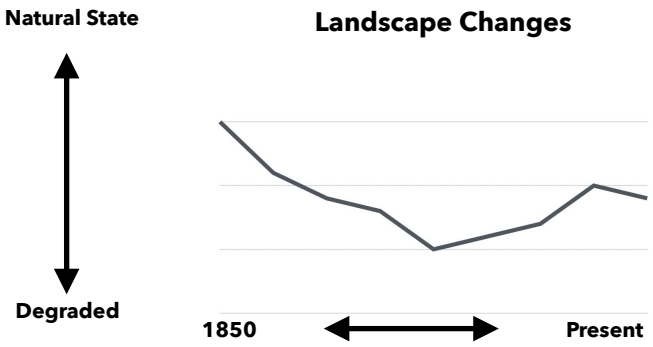
Our use of early paintings and drawings, to augment the early photographs, may have introduced bias in the form of artist discretion. It is not possible to parse the degree to which artists were painting something less than "picture-perfect".

And, the scale of the photography played a major role in our ability to discern changes. Although the wide-angle views of most of the early photographs made landscape-wide changes more evident, they did not have enough detail to show variations in smaller flora assemblages.

Specific Findings: The most surprising finding was the degradation which was present at the time the early photographs were taken and the degree to which the landscape has recovered. There is ample evidence that the landscape might have recovered more, absent continued (but often different in type and/or scale) human activity. There is also clear evidence of some recovery following the late 1800s/early 1900s.

The recovery, in some locales, has been diminished and even negated by increasing small scale changes in use. These changes run the gamut of human activities. For instance, mining claims proliferate on public lands around Hillsboro. Regardless of the potential economic value of the claims, the owners demonstrate mining in support of the claims. Although each disturbance is relatively small in scale, they are numerous. In the same vein, there is increasing human development in the area (everything from new homes and the infrastructure which supports them to new businesses and agricultural plantings). Arguably, pecans are the new cows.

Human activity at the local scale has been, and is, a factor in landscape changes. Human activity, globally, has also been influential. The continued megadrought which we find ourselves in has a number of drivers, one on which is human-induced climate change. Although much of the world has experienced dramatic and sudden weather events created by rising temperatures, we have experienced the effects of a more gradual change with increasing average temperatures.



The most dramatic changes in landscape have been caused by the demise of mining in the Black Range (ignoring the large scale operations at Santa Rita and Chloride and proposed operations at places like Copper Flat (near Hillsboro). Mining, in itself, and the changes people made to the landscape in support of their mining efforts greatly degraded many areas of the Black Range. This is shown most dramatically in some of the photographs from the Kingston area where mine tailings and bare hills prevail in the early photographs.

Photographs from the present effort demonstrate that the damage created by mining activity has been reduced, despite new home building and ranching activities.

This general trend, the recovery of old mining sites, facilities, and towns was also shown in Ray Turner's books (see first page of this article).

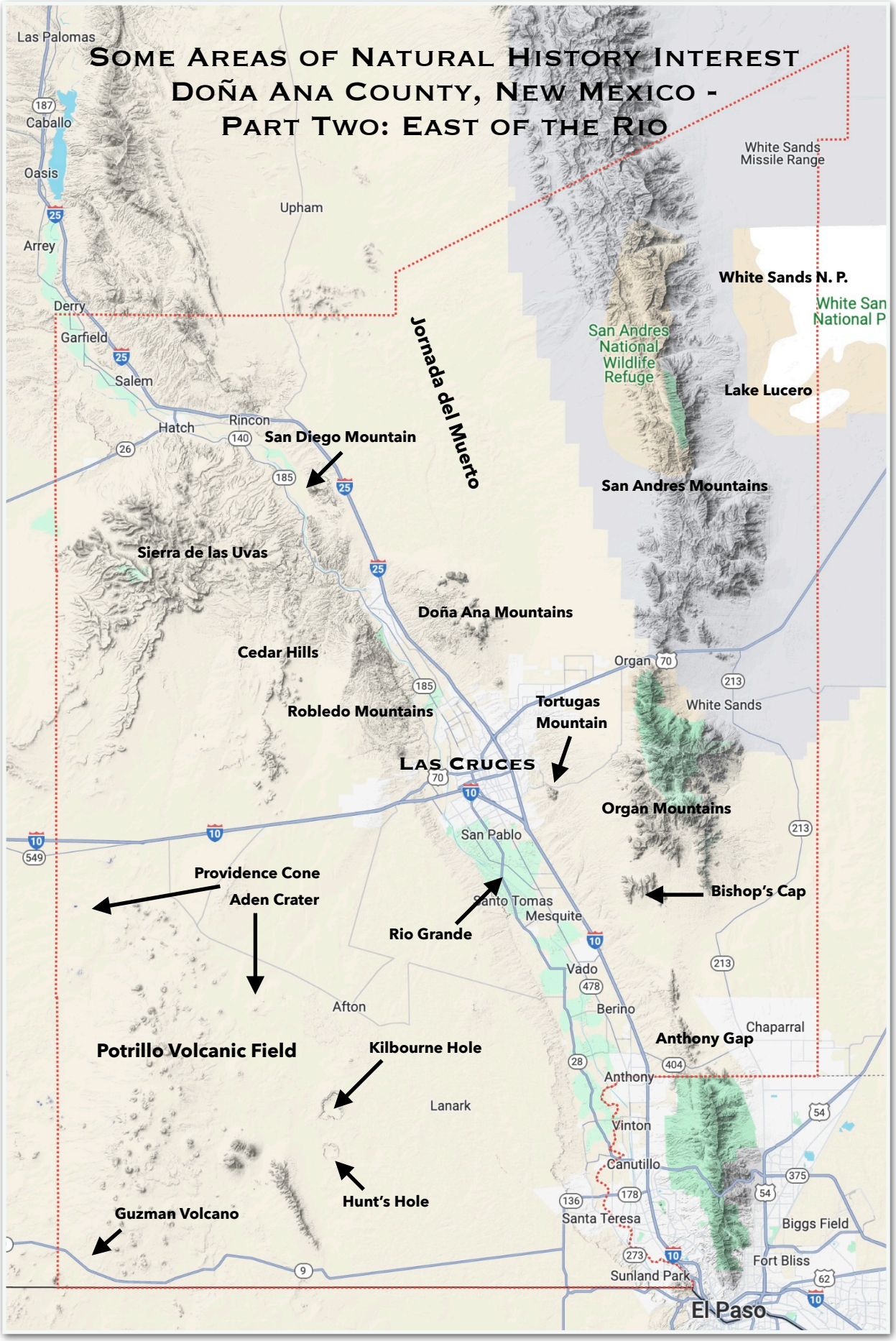
The details of the shape of the curve describing the changes in the landscape of the Black Range may be argued, but the general shape is clear, looking something like that above. The long-term trend is unclear. The rural to urban flight has been the dominant human population movement trend over the last two hundred years. It may now be mitigated by technological innovations and changing business practices (the potential effects of a "wired and interconnected world" can not be overstated). If so, any landscape restoration in rural areas will be diminished as some portion of the human population seeks a more rural lifestyle. This graphic is drawn, rather than data derived, and is meant to represent a perception of change.

The degraded landscape which has resulted from extensive mining, ranching, and general human encroachment is undeniable. It has been worse. It is not clear if any positive changes can be sustained, and local efforts may pale when confronted by global climate changes.



Just Saying

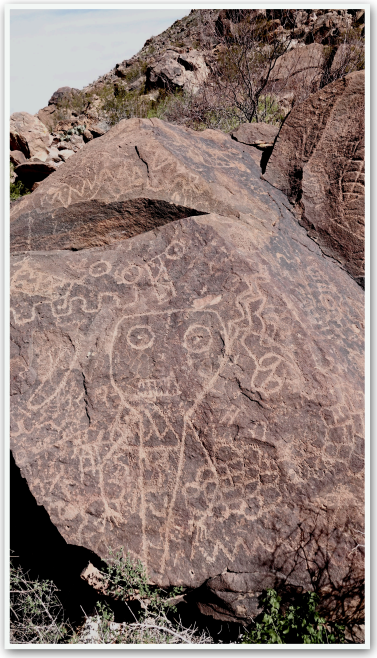
The images above were taken two months apart in 2020. Given the distance between observer and object (about 239,000 miles), the insignificant distance between observation sites, and the time frame, there do not appear to be any changes.


Some Areas of Natural History Interest
Doña Ana County, New Mexico -
Part Two: East of the Rio
Las Palomas
Caballo
Oasis
Arrey
Upham
Derry
Garfield
Salem
Hatch
Rincon
San Diego Mountain
Jornada del Muerto
Sierra de las Uvas
Cedar Hills
Robledo Mountains
Doña Ana Mountains
Las Cruces
Tortugas Mountain
Organ Mountains
San Pablo
Providence Cone
Aden Crater
Rio Grande
Bishop's Cap
Santo Tomas
Mesquite
Vado
Berino
Afton
Potrillo Volcanic Field
Kilbourne Hole
Lanark
Hunt's Hole
Guzman Volcano
Anthony Gap
Chaparral
Anthony
Vinton
Canutillo
Santa Teresa
Biggs Field
Fort Bliss
Sunland Park
El Paso
White Sands
White Sands Missile Range
White Sands N. P.
White San National P
San Andres National Wildlife Refuge
Lake Lucero
San Andres Mountains
Organ

San Diego Mountain

One of the best descriptions of the geology, and the geologic history, of Doña Ana County north of Interstate 10 is found in Seager*. The geologic map to the right is Figure 3 from that paper and the cross section shown below is Figure 10.

***William R. Seager, Shari A. Kelley, Jacob O. Thacker, and Richard E. Kelley; "San Diego Mountain: A 'Rosetta Stone' for Interpreting the Cenozoic Tectonic Evolution of South-Central New Mexico"; *New Mexico Geology*, Summer 2023, Vol. 44, No. 2, New Mexico Bureau of Geology and Mineral Resources.**



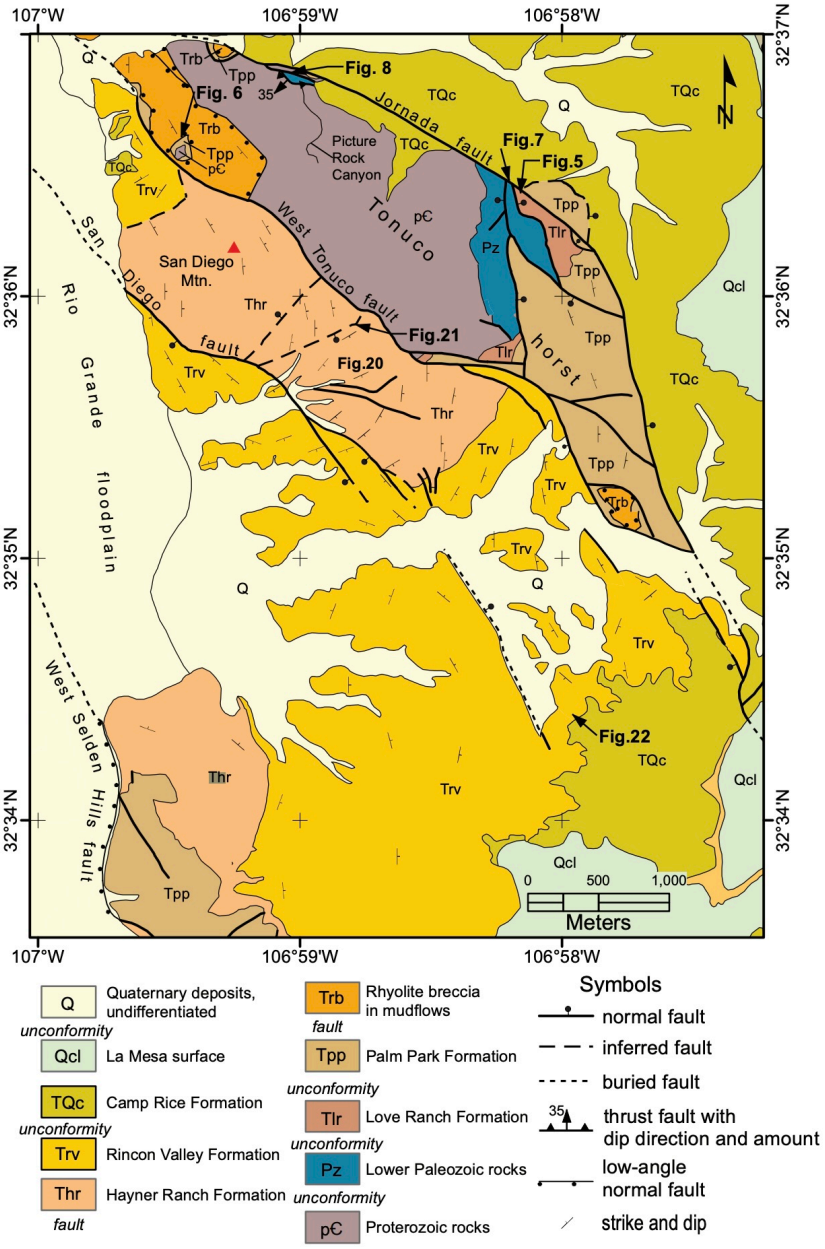


Figure 3. Geologic map of Tonuco uplift (San Diego Mountain) and surrounding area. Note locations of Figures 5–8 and 20–22.

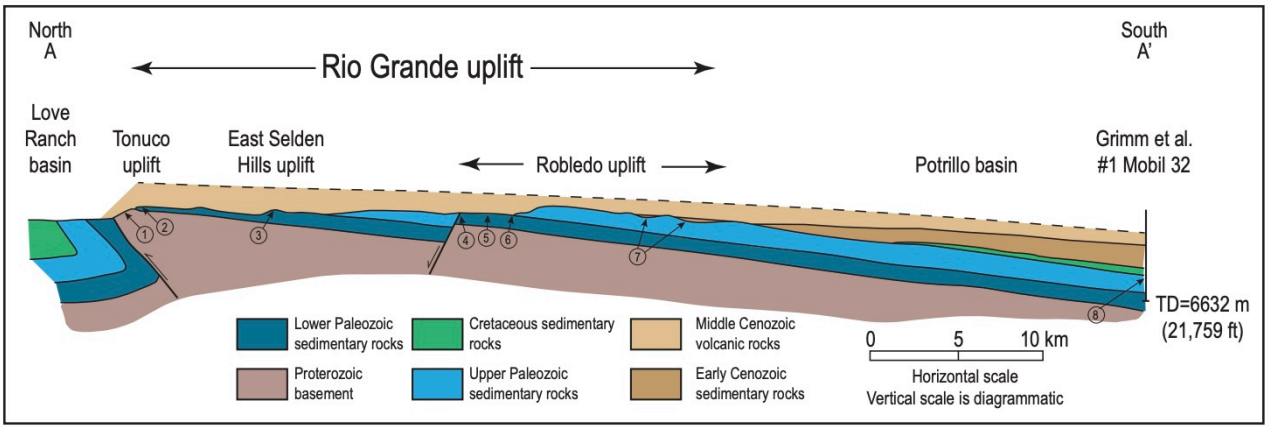


Figure 10. Interpreted N–S cross section of Rio Grande uplift based on exposed unconformities, structures, and subsurface data from the Grimm et al. No. 1 Mobil well. Circled numbers refer to outcrops on which the reconstruction is based: (1) Palm Park Formation nonconformable on Precambrian granite, (2) Love Ranch Formation unconformable on lower Paleozoic strata, (3) Palm Park Formation unconformable on Silurian dolomite, (4) Laramide (?) normal fault intruded by 35 Ma rhyolite (Kottlowski et al., 1969), (5) Palm Park Formation unconformable on Devonian shale, (6) Love Ranch Formation unconformable on Mississippian strata, (7) south-draining channel-fill of Love Ranch Formation on lower Permian strata, and (8) Paleogene sedimentary rocks overlying Cretaceous strata. See Figure 9 for location of cross section.



On the north slope of Tonuco Mountain there is a well-known glyph site (see image on the previous page), and in April the ridges above the canyons can be covered with Claret Cup (Scarlet Hedgehog Cactus), *Echinocereus coccineus* (above and center right), Fendler's Hedgehog Cactus, *Echinocereus fendleri* (bottom right), Pincushion Fishhook Cactus, *Mammillaria microcarpa* (below), and several other cactus species. Photos on this page were taken on April 14, 2024.







Lake Lucero & White Sands National Park

The gypsum dunes of White Sands National Park are not unique, but they are one of the most dramatic manifestations of this land form. They cover 275 square miles of the Tularosa Basin. To the west of the dunes lies the Alkali Flat, whose southwestern end is the area now known as Lake Lucero covering an area of about 10 square miles. The dunes, the flat, and the lake are all part of a dynamic geologic process which may have started 24,000 years ago. At that time gypsum was dissolved in water, in both the San Andres Mountains to the west and in the Sacramento Mountains to the east of the Tularosa Basin. This runoff formed Lake Otero, which is estimated to have been about 1,600 square miles in area. By about 12,000 years ago the influence of the last glacial period had waned and Lake Otero began the slow process of evaporation, concentrating the gypsum in the Basin. Lake Otero gradually diminished in size, and its remanent is what we now call Lake Lucero.

Rainwater (from the sky and as runoff) periodically pools in Lake Lucero and then evaporates out. The concentrated gypsum in the area forms selenite ($CaSO_4 \cdot 2H_2O$) crystals. These crystals break down into the white sand which forms the dunes to the east of the lake. (Prevailing winds in the area are to the east and north.)

Selenite is very soft (a hardness of 2 on the Mohs scale - you can scratch it with your fingernail) and it readily forms beautiful crystals. See images on this page of the playa (Lake Lucero when it is wet) and crystals from the playa.

Tours of the lake, which is in a restricted zone, occur periodically. Contact the White Sands National Park headquarters for details.

The dunes of White Sands National Park are the largest concentration of gypsum dunes in the world. The three largest gypsum dune complexes are located at: 1) White Sands; 2) Cuatro Cienegas, Coahuila, Mexico; and 3) Guadalupe National Park, Texas. All three are in the Chihuahuan Desert.











(As an aside, the Cuatro Ciénegas may be the most biologically diverse place in the world. Every nature show you have ever seen has someone claiming some version of "most diverse". But in this case it is probably the real thing. The geologic formations which the spring water flows through to get to the ciénegas create an interesting chemical mix. The chemistry and access to primordial archaea make for an astonishing biological environment.)

The gypsum sands of the these areas are much softer than those in most other sand dunes in the world, which are often composed of grains of silica. They are also white, again because they are gypsum. The softness of the dunes and their color make for a nuanced "dune experience". To savor the very best, visit late, or early, in the day. At mid day the reflected light on the dunes can be very intense. The flora and the fauna found on and about the dunes create dramatic images (see photos on this page and at the Birding in North America website).

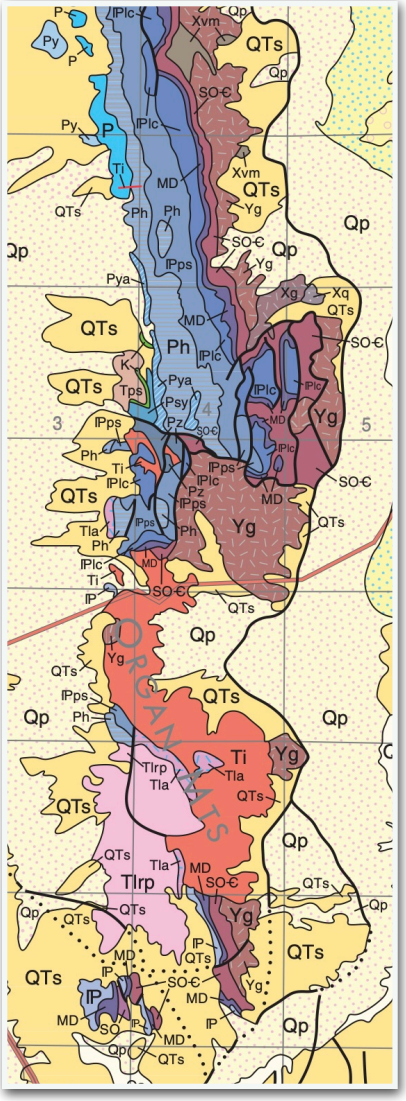
For snowbirds the plowed roadways in the park may seem eerily like mid winter in the far north - but the contours in the bottom images are not the result of human work.













San Andres and Organ Mountains

The Organ Mountains (La Sierra de los Órganos) dominate the Las Cruces skyline and are high enough to affect the distribution of flora and fauna in the area. When viewed from the east they rise from the Tularosa Basin in a rather dramatic fashion. The photograph at the top, of the northern part of the Organ Mountains, was taken on September 21, 2019.

The San Andres Mountains (above center) are just to the north of the Organ Mountains, literally on the other side of San Augustin Pass. The red line which bisects the geologic map to the left is US-70, which crosses the mountains at the San Augustin Pass.

The major geologic formation in the Organ Mountains is "Ti". These "intrusive rocks of intermediate to silicic composition" are from the Tertiary. (Map detail from the State

Geologic Map cited earlier; descriptive quotes are from the map explanatory material.) The igneous rock of the Organ Mountains, mostly granite to the north and rhyolite to the south, is of different origin and age from that of the San Andres Mountains to the north (and the Franklin Mountains to the south).

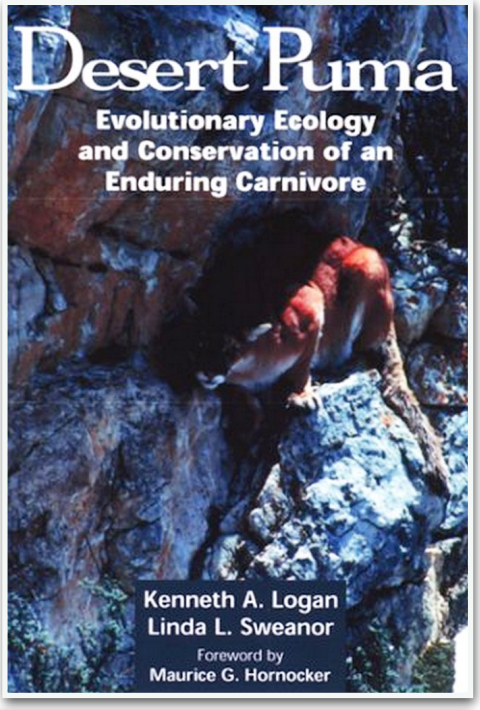
The blue colors on the geologic map show that the San Andres Mountains are much older than the Organ Mountains. They date from the Paleozoic and are sedimentary. "Ph", the Hueco Formation, and "IPps", the Panther Seep Formation, are both limestone. The sedimentary layers of the San Andres Mountains are shown in the middle photograph on the previous page. (Note that there is some "IPps" found in the Organ Mountains - adjacent to "Ti" rock, in case you thought that it might be straightforward.)

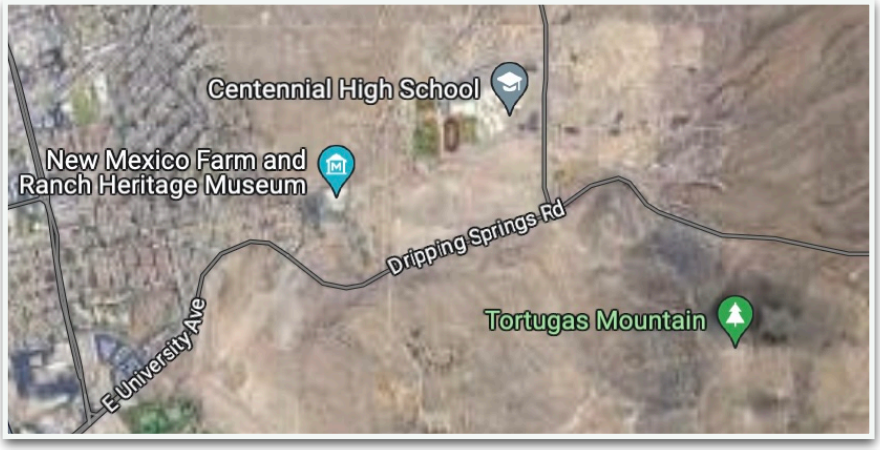
The Organ Mountains are high enough, composed of different material, and have been "isolated" (sky island) long enough that some species have evolved there and are endemic to the range. The Smooth Figwort, *Scrophularia laevis*, and the Organ Mountain Evening-Primrose, *Oenothera organensis,* are both endemic to the range and are found in scattered locations with low populations. (The Black Range has its own endemic figwort, the Mimbres Figwort, *Scrophularia macrantha*.) Wikipedia cites 870 vascular plant species from the range, including a significant number (30) of fern species. The fern distribution is noteworthy in a stereotype-busting sort of way. Fern species are often thought of as growing in humid nutritionally-rich landscapes, not necessarily what we think of when we consider the Chihuahuan Desert and its sky islands. The southern part of the Organ Mountains, which is geologically different from the northern and middle sections, is composed of limestone, and the flora found there is quite different as a result (the southern part is often considered Chihuahuan while the more northern sections are considered Madrean).

The San Andres Mountains are known for their Mountain Lion and Big Horn Sheep populations. As predator and prey they are in a continual dance, but the most significant impact on the sheep population has been caused by a psoroptic scabies mite (W. M. Boyce and M. E. Weisenberger " The rise and fall of psoroptic scabies in bighorn sheep in the San Andres Mountains, New Mexico". *J Wildl Dis*. 2005 Jul;41(3): 525-31.)

Linda Sweanor and Kenneth Logan wrote Desert Puma to describe their Mountain Lion research (10+ year study) in the San Andres Mountains. Their work significantly advanced our understanding of this species and is wonderfully articulated in this book.

In the July 2022 issue of this journal we explored the natural







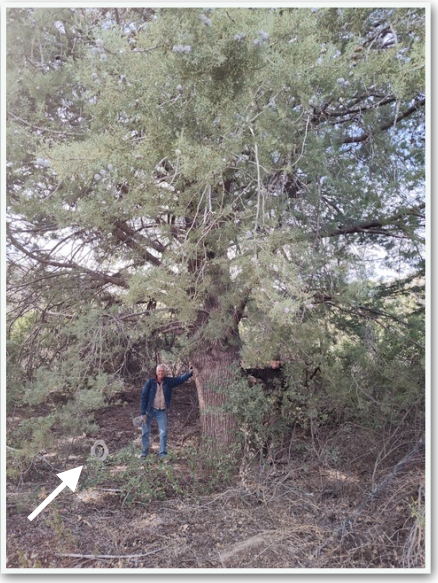
history of the Arizona Cypress, *Cupressus arizonica* var. *arizonica*, and its recent history and status in New Mexico. Several researchers contributed to that effort, including James Von Loh, who has made significant contributions to this journal. The insights provided by Ken Logan and Linda Sweanor about some Arizona Cypress they encountered during their research in the San Andres Mountains helped significantly as we attempted to determine the current native range of the Arizona Cypress, as opposed to planted trees, especially trees planted by the earliest ranchers and miners.

Ken updated his and Linda's observations of the San Andres Mountains trees in a 10 February 2024 email to Harley Shaw (repeated below with permission).

> *"Harley,*
>
> *Linda & I were able to visit the southern part of the San Andres National Wildlife Refuge escorted by the current Manager, Whitney Kroshel, last Friday. Whitney made it easy for our visit and seemed happy to spend the day with us. We were elated to be able to visit an 'old friend'.*
>
> *The mountains looked the same to us. Controlled by natural forces. But it was evident that during the 28 years of our absence floods clearly scoured and widened the canyon bottoms that we drove adjacent to on roads, some that had to be rerouted because washouts had taken out the previous roads. Amazing!*
>
> *We visited Rock House Spring where the channel bottom seemed to be about 4 feet lower than when we were there, and no willows growing in the channel as before. Also the flow of the spring seemed to be lower. Same in Upper Ash Spring, the water flow seems lower, but because of the smaller drainage, no evident scouring there. But the vegetation on the west bank was noticeably denser. Linda took photos of the 2 big Arizona Cypress trees there, making me feel better about my memory. Quite impressive trees at this time. In the first photo, that's me and Whitney standing on the road west of the trees. In the second photo, that's me and Whitney standing in the thicket beside the largest tree. See my hat on the ground on my right?* (Ed.: Arrow added.) *There is a fresh puma scrape there; one of maybe 3 fresh scrapes and about 6 old ones. This was the only place we found puma sign on that day.*
>
> *Oryx sign was common on the Refuge, and we saw 6 individuals. Back in the day we were there, oryx sign on the Refuge was rare. Although, we also saw 5 mule deer bucks all of which looked healthy."*

Ken noted that the location of these trees, taken from the San Andres Peak, N. Mex. 7.5 minute topo map. NAD27 is UTM: 354.980m E, 3611.750m N.





Tortugas Mountain and the Dripping Springs Natural Area

Tortugas Mountain is just south of Dripping Springs Road, which connects Las Cruces and the Organ Mountains (see Google Map at the center right on the previous page).

The flora and fauna of Tortugas Mountain have been featured on many occasions in this journal and we will not repeat that information here. Tortugas Mountain was one of the "stomping grounds" of Paul C. Standley in the early 1900s. (See a copy of page 145 from *Early Naturalists of The Black Range*, on page 66 of this article.)

Standley often worked with E. O. Wooton at this time in his career. E. O. Wooton was also an important naturalist, and his contributions are covered in the "Early Naturalists …" (link above) on pp. 106-108.

In "The Larkspurs of New Mexico" (*Bulletin of the Torrey Botanical Club* , Jan. 1910, Vol. 37, No. 1, pp. 31-41) Wooton shed some light on the status of botany in the Territory when he noted that:

> *"Recently I had occasion to name a specimen from the Black Range, and in comparing it with our herbarium material my 'eyes were opened' and I saw that there were various and different specimens labeled D. scopulorum, more forms than could properly belong in what Dr. Gray called "a collective species." Whether these various different kinds of plants are to be called different species, varieties, or races is a question which has not yet been decided, but it seems to me proper to call attention to the differences which I think can be seen by any one who is sufficiently interested to look, and I shall follow my own solution of the above question and call them species. Others may do as they like in designating the degrees of differentiation." (p. 31)*









Above, this is what he was speaking about when he said: *"but it seems to me proper to call attention to the differences which I think can be seen by any one who is sufficiently interested to look, and I shall follow my own solution".*

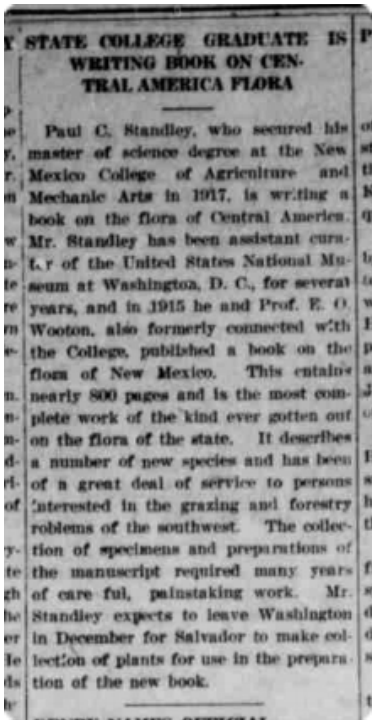
Farther east along Dripping Springs Road is the Dripping Springs Natural Area. The canyons, trails, and retention pond at the visitor center are favorite spots for naturalists in Las Cruces, and the Las Cruces chapter of the Native Plant Society of New Mexico is very active in the area. Many of the butterfly species featured in *Butterflies and Moths of the Black Range and Doña Ana County* were photographed along the nearby trails.

This area continually produces interesting observations. In the October 2024 issue of this journal we reported on Red Rock Skimmer observations in the Black Range, and especially the color variations which were being noted and "scheduled" for additional attention (pp. 34-36). On 30 October 2024, Gordon Berman photographed a Red Rock Skimmer near Dripping Springs. As of that time, there were no other reports on iNaturalist for this species in Doña Ana County. Three photographs from his observation are shown here.

And, of course, the early naturalists in this area (Wooton and Standley [see next page] are just two examples) were attracted to the area - as many are today.

Paul C. Standley

The history of naturalists in the Black Range is extensive but often forgotten. Paul C. Standley received his bachelor's degree from New Mexico State College in 1907 and his master's the following year. After graduating, he spent two years there before moving on to the United States National Museum (1909-1922), where he was the Assistant Curator of the Division of Plants. He worked at the Field Museum of Natural History (Chicago) from 1928 to 1950. In 1950 he retired from the Field and taught at the Zamorano Pan-American Agricultural School in Honduras until 1956. He died in Honduras on June 2, 1963.

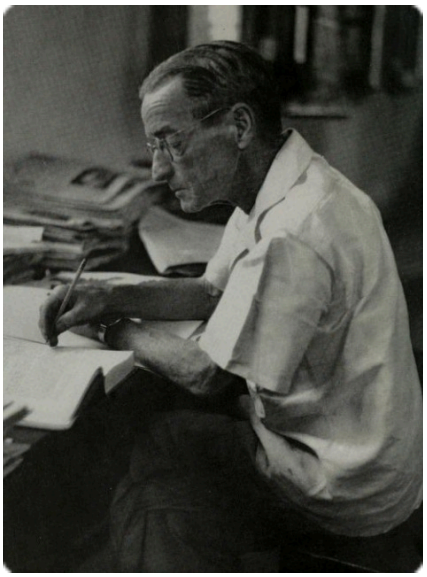


STATE COLLEGE GRADUATE IS WRITING BOOK ON CENTRAL AMERICA FLORA

Paul C. Standley, who secured his master of science degree at the New Mexico College of Agriculture and Mechanic Arts in 1917, is writing a book on the flora of Central America. Mr. Standley has been assistant curator of the United States National Museum at Washington, D. C., for several years, and in 1915 he and Prof. E. O. Wooton, also formerly connected with the College, published a book on the flora of New Mexico. This contains nearly 800 pages and is the most complete work of the kind ever gotten out on the flora of the state. It describes a number of new species and has been of a great deal of service to persons interested in the grazing and forestry problems of the southwest. The collection of specimens and preparations of the manuscript required many years of care ful, painstaking work. Mr. Standley expects to leave Washington in December for Salvador to make collection of plants for use in the preparation of the new book.

What was he doing between 1922 and 1928? The answer lies in this article from *The Deming Graphic* issue of October 24, 1921. At that time the first volume of the seminal *Trees and Shrubs of Mexico* had just been issued. He worked on the other volumes until the last was published in 1926.

In 1915, he and E. O. Wooton published *Flora of New Mexico*, the standard botanical work for our area for decades. That work was one of many he was to research/write in a long and illustrious botanical career. He was characterized by many prominent peers as one of the premier botanists of his era.



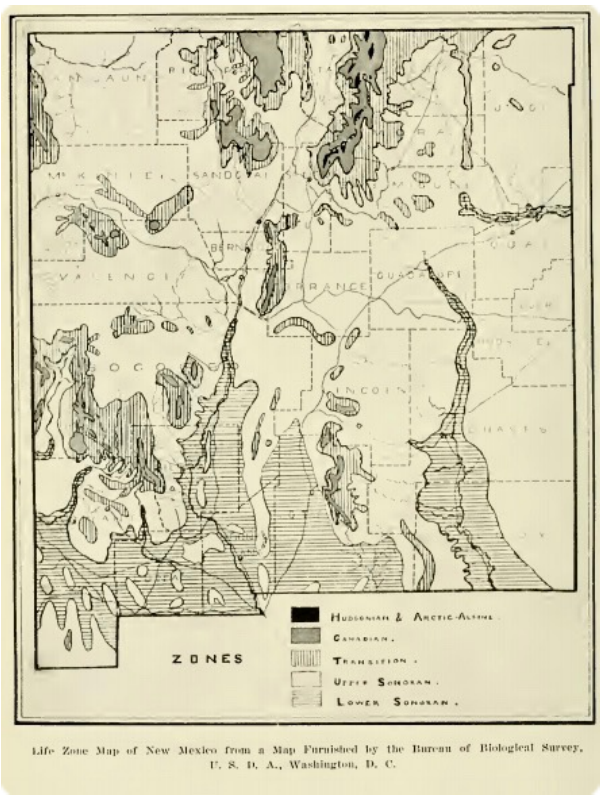
Standley at the herbarium of Escuela about 1952. Photo attribution: unknown

In December 1911, Wooton and Standley completed *The Grasses and Grass-Like Plants of New Mexico* (published the following year). The life zone map (page 8) and description of the "lower Sonoran" life zone (page 11) from the *Grasses* book are shown here. These two books, *Flora* and *Grasses*, are foundational works for the study of botany in New Mexico.



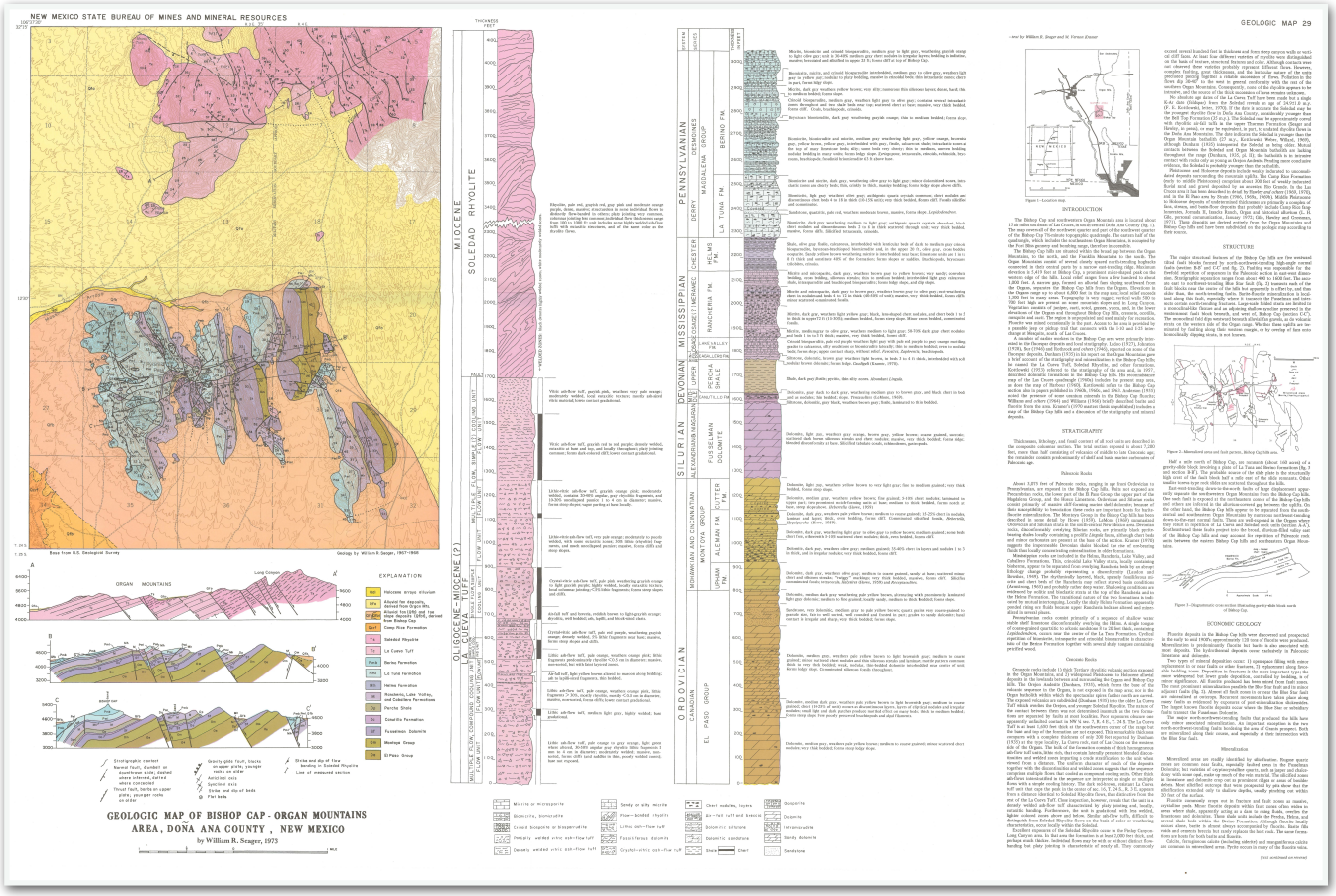
Photograph by H. H. Bartlett

STANDLEY ABOUT 1910
At the United States National Herbarium



Life Zone Map of New Mexico from a Map Furnished by the Bureau of Biological Survey, U. S. D. A., Washington, D. C.

1. **Lower Sonoran Zone.** This covers the lower plains and mesas and the larger river valleys of the southern third of the State. Characteristic woody plants are the Creosote Bush (*Covillea glutinosa*) (often mistakenly called Greasewood), the Spanish Bayonet or Dagger (*Yucca macrocarpa*), *Zizyphus lycioides*, *Condalia spathulata*, Tornillo or Screw Bean (*Strombocarpa pubescens*), *Acacia constricta*, *Acacia greggii*, Desert Willow (*Chilopsis linearis*) and Valley Cottonwood (*Populus wislizeni*). On the mesas Black Grama (*Bouteloua eriopoda*), Tobosa Grass (*Hilaria mutica*), False Needlegrass (*Scleropogon brevifolius*), Mesquite Grass (*Muhlenbergia porteri*) and several of the true needle grasses (*Aristida* spp.) are characteristic, while in the valleys Salt-grass (*Distichlis spicata*) and Bunch grass (*Sporobolus airoides*) are common, especially in alkaline soils. A number of species of Cacti are also common. This zone is dry all the time and hot in the summer time. The average precipitation is 8 or 9 inches and the maximum summer temperature is from 100° to 106° F.



Bishop's Cap

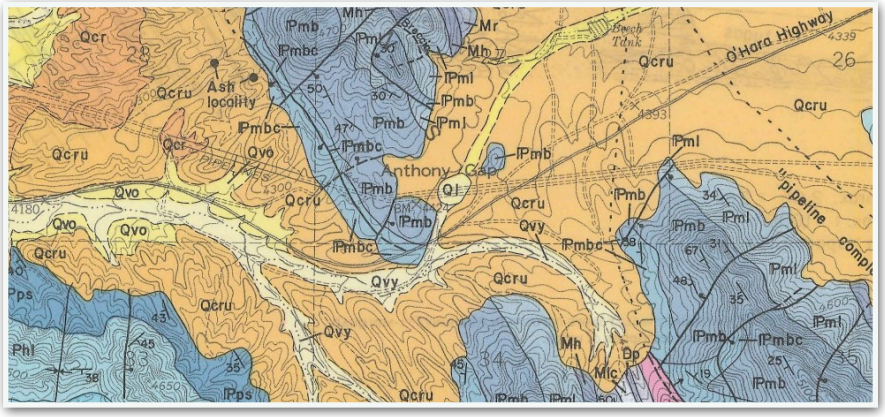
Bishop's Cap is located southeast of Las Cruces and northwest of Anthony Gap. The geologic map of the area is shown above and can be downloaded by clicking the "circled arrow".

To quote the New Mexico Bureau of Geology and Mineral Resources, " The Bishop Cap hills are situated within the broad gap between the Organ Mountains to the north, and the Franklin Mountains to the south. The Organ Mountains consist of several closely spaced north-trending hogbacks connected in their central parts by a narrow east-trending ridge. Maximum elevation is 5,419 ft at Bishop Cap, a prominent miter-shaped peak on the western edge of the hills. Local relief ranges from a few hundred to about 1,000 feet. A narrow gap, formed on alluvial fans sloping southward from the Organs, separates the Bishop Cap hills from the Organs. Elevations in the Organs range up to about 6,800 ft in the map area; local relief exceeds 1,300 ft in many areas. Topography is very rugged; vertical walls 500–700 ft high are present on some mountain slopes and in Long Canyon. Vegetation consists of juniper, cacti, sotol, grasses, yucca, and, in the lower elevations of the Organs and throughout Bishop Cap hills, creosote, ocotillo, mesquite and cacti."

This area is very rich in desert flora displays. Photographs of this area by Daniel Fox were featured in the July 2023 issue of this journal.

Anthony Gap

NM-404 is a short road which joins NM-460 and NM-213 at the south-eastern corner of Doña Ana County, just north of the border with Texas. Just short of half way along its 9.7 mile length it crosses the Anthony Gap between the Franklin Mountains to the south and the North Franklin Mountains to the north.



Detail of Anthony Gap (the O'Hara Highway is NM-404) from the Anthony Quadrangle Geology Map. (Full map at this link.) Additional information about the geology of the area can be found in "On the origin of low angle normal faulting in the Southern Rio Grande Rift", Dana Carciumaru and Roberto Ortega, *Geofísica Internacional* (2011) 50-2: 177-190 and in *Geology of the Northern Franklin Mountains, Texas and New Mexico*, U. S. Geological Survey Bulletin 1298.

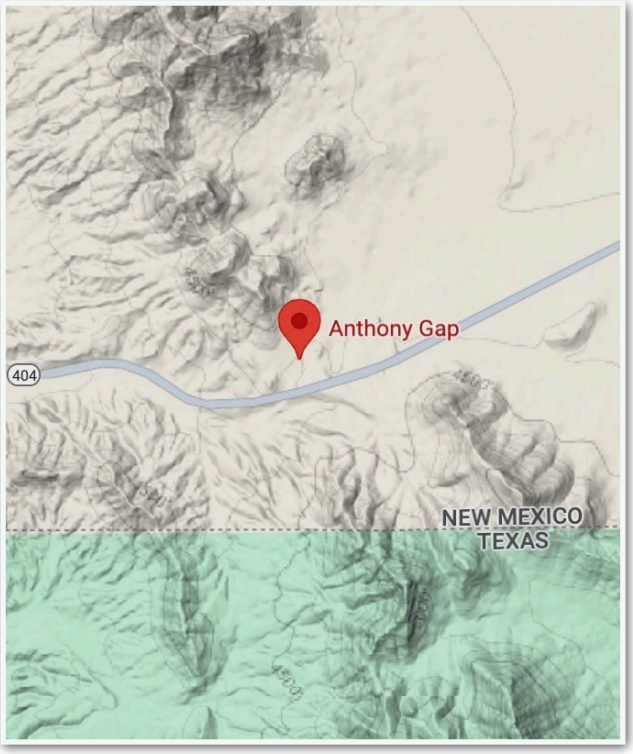
This is a good cactus location with several cactus species. Gordon Berman's photographs from this area (April 12, 2024) include those shown below, of *Sclerocactus (Glandulicactus) uncinatus*, Brown-flowered Hedgehog or Chihuahuan Fishhook Cactus, and *Echinocereus dasyacantha*, Texas Rainbow Cactus (shown right).

***Sclerocactus uncinatus* ([Galeotii] N. P. Taylor) prefers limestone and calcareous soils generally. On the geologic map detail (bottom right, previous page) the blue is limestone.**









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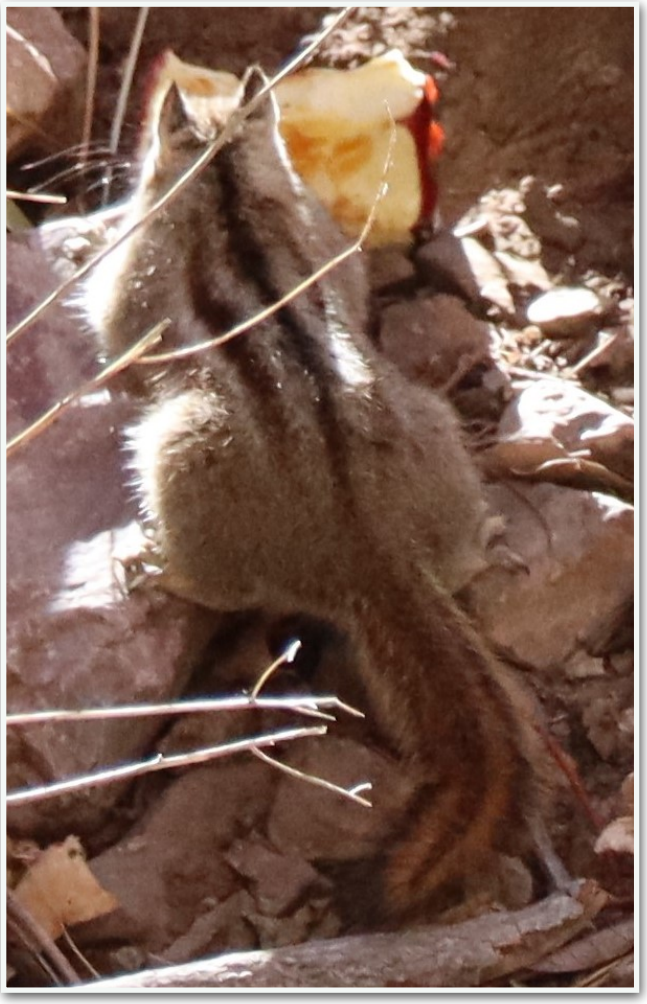
Quality Time With A Chipmunk (Or Two) - Organ Mountains Colorado Chipmunk

by James Von Loh

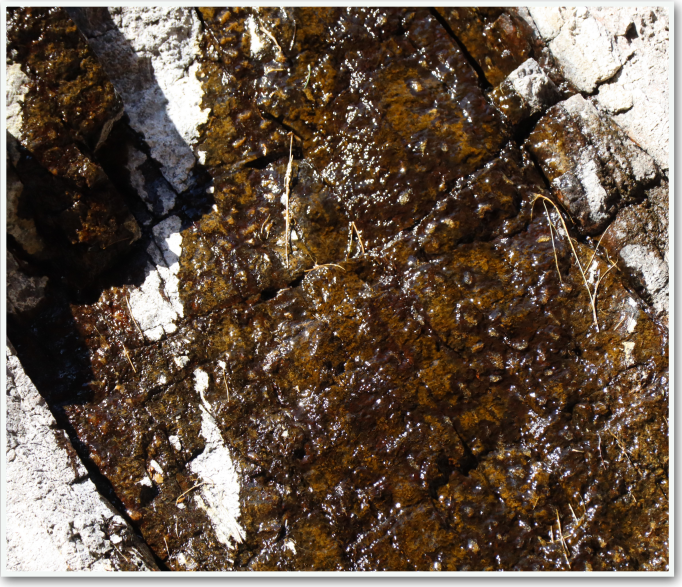
(The Organ Mountains Colorado Chipmunk, *Neotamias quadrivittatus* (Say, 1823) *australis* (Patterson, 1980), is critically imperiled because of its restricted range and habitat requirements. The exact locations referenced in this article are, therefore, obscured. - Editor)

In the early spring of 2023 (March 10th and April 3rd), I was monitoring the flowering condition of the Chihuahuan Pineapple Cactus, *Sclerocactus intertextus* ([Engelm.] N.P. Taylor) population established along the west slope of the Organ Mountains while also surveying additional species (particularly butterflies, bee-flies, bees, and wasps) that were active within the west-facing canyons and headwall springs at about 5,500 feet in elevation. Because I was searching for open cactus flowers, I entered the canyons after noon, during the warmest part of these mild days.

On March 10, I reached the headwall and seep, at 3:20 p.m., and while photographing insects saw a small, quick form run from the rock wall to the base of a maple tree behind me. As



Above: Chipmunk locates and begins eating from a discarded apple core on March 10th



Above: The typical wet layer of "sheen" available to wildlife, including the chipmunk, in the winter and spring months (canyon head seep on March 15, 2022). I would suggest that this minor seepage is likely quite high in dissolved minerals.

Below: The monsoon season sheet-flow over the canyon head seep on August 29, 2022.



I turned slowly around and focused my camera, I was pleasantly surprised to see a chipmunk, later identified to the Organ Mountains Colorado Chipmunk subspecies. It was scratching through leaves and became totally absorbed upon finding a discarded apple core left by a previous hiker.

Thoughts about ethical hiking and camping, leaving no trace, and signs expressing: "Do Not Feed The Wildlife" immediately entered my mind. But, after thinking "at least it isn't orange peels", I began photo-documenting the chipmunk as a unique observation during my time in southern New Mexico. I continued this observation and documentation over the next half hour, ending at about 3:50 p.m.



Above: Because of my camera "clicks", the chipmunk alerts and becomes more attentive to me as a possible threat, while holding the apple core in its paws and continuing to eat. (In April I reached the same headwall and seep just after 12 noon, no human-discarded organic material was visible.)

Below: After feeding, the chipmunk again sprinted to the rock wall, along the dam portion, until it arrived at a deep, horizontal crack that it used for protective cover (always watching me in the process).



Top Right: The chipmunk inched its way away from me, along the crack, to where the dam adjoins native volcanic base rock at the seep.

Right Top Center: It would creep along a few inches, stop to watch me, then creep along a bit more.

Right Bottom Center: Emerging where moist rock supports species of moss, the chipmunk became more exposed.

Bottom Right: It then backed up to its safe perch in the large crack where the dam meets the adjacent rock face and scanned the canyon head, while keeping a close eye on its annoying human gawker.









Top Left (Below): Even though I represented the chipmunk's nearest potential threat, it spent time periodically focusing on the hiking trail under a canopy of ash, maple, oak, black cherry, and hackberry trees.

Bottom Left: Always vigilant, the chipmunk again moved out of the sheltering rock-crack and peered down the near-vertical rock face of the dam.

Top Right: Then, climbing headfirst slowly downward, with legs and nails fully extended on the nearly vertical rock surface, the chipmunk focused on its mid-afternoon need to drink water from the headwall seep.

Center Right: After approximately 1.5m, the chipmunk reached its goal and stretched to take moisture by licking and sipping from the moist sheen of water present on the canyon headwall.

Bottom Right: Retreating rapidly to its safe crack in the rock after drinking, the chipmunk returned to watching me and scanning its surroundings; at this point I left it to continue its day's behaviors. As I walked west down the trail, I encountered perhaps 4-5 other hikers headed up-canyon and wondered what they would see and record.

On April 3, 2023 I returned to the same site and found the chipmunk performing the same behaviors, e.g., searching for water at the headwall seep and looking for and finding food on which to nibble, all while being quite vigilant for predators.













Photographs from April 3, 2023.



Editor: The photo-documentation of this subspecies by James Von Loh presented us with an opportunity to discuss several aspects of the Pleistocene. The Wisconsin glaciation period, which ended roughly 10,000 years ago, had a fundamental impact on southern New Mexico (other places as well but we are rather parochial). We take small steps in our understanding of the glacial period and the effects of it ending, starting with the natural history of the Organ Mountains Colorado Chipmunk and what led to its differentiation as a subspecies. From there we explore how the New Mexico sky islands were created by the retreat of the glaciers, what fauna were present when the isolation of this chipmunk population occurred, and lastly how the tracks from 22,000 years ago in the Lake Lucero basin provide a coherent image of what life was like at that time.

Natural History of the Organ Mountains Colorado Chipmunk

Several studies of the natural history of the Organ Mountains Colorado Chipmunk, *Neotamias quadrivittatus australis*, have been conducted, and as a result, we have a good understanding of its environmental and resource requirements. We provide links to several studies of this subspecies below, but the primary point of discussion here is how and when it became so isolated and what that isolation portends for its continued existence.

In the past these chipmunks were placed in other genera, including *Eutamias* and *Tamias*.

This subspecies is currently listed as Critically Imperiled (S1) by New Mexico. It is not listed by the United States. NatureServe notes the range of the subspecies is limited to less than 40 square miles, centered (north to south) on the Aguirre Springs Basin, of the Organ Mountains. Because of its limited range, small population, disease, and the fact that its habitat has been degraded by drought, the Organ Mountains Colorado Chipmunk faces a high degree of threat. NatureServe goes on to note that "The subspecies' mountaintop isolation severely limits its ability to disperse when climate change or other factors impact its habitat."

Of interest here is the 2021 study by Schweiger, Frey, and Cain. They found that "*N. q. australis* avoided a coniferous forest land cover type and favored particular areas of arroyos (gullies) that were relatively steep-sided and greener and contained montane scrub land cover type. At the microhabitat scale, chipmunks selected areas that had greater woody plant diversity, rock ground cover, and ground cover of coarse woody debris. We concluded that habitat selection by *N. q. australis* fundamentally was different from descriptions of habitat in the literature that described *N. quadrivittatus* as primarily associated with coniferous forests. We suggest that arroyos, which are unique and rare on the landscape, function as climate refugia for these chipmunks because they create a cool, wet microclimate." This closely comports with the experience of James Von Loh, see previous article.

There is a closely related subspecies of Colorado Chipmunk, *N. q. oscuraensis* in the Oscura Mountains (east of San Antonio, New Mexico, south of US-380, roughly 30 miles east of the Rio Grande). It was discovered in 1977 and was considered part of the *N. q. australis* subspecies. In 1996, this subspecies was split from *N. q. australis*. O'Connell and Frey (2024) found that, with this subspecies, the selection of old-growth pinyon-juniper woodland "increased with increasing mean juniper diameter and increasing variation of pinyon diameter and decreased with increased distance to rocky escape terrain and increased mean percent grass cover." (See below.)

A range map for *Neotamias quadrivittatus* from iNaturalist is shown on the following page. Within this range, however, suitable habitat is much more restricted, as is shown in the graphic (lower left on following page) from Perkins-Taylor (2018).

From O'Connell and Frey, 2024

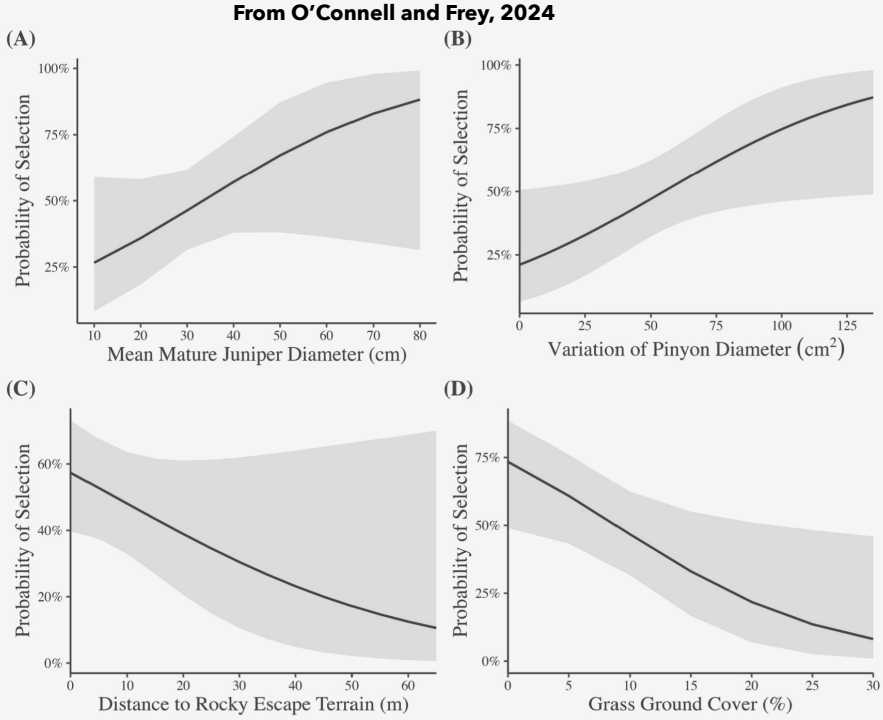
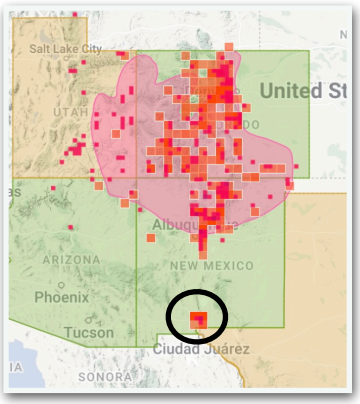


Fig. 1. Probability of microhabitat selection by the Oscura Mountains Colorado Chipmunk (*Neotamias quadrivittatus oscuraensis*) in the Oscura Mountains, New Mexico, predicted by the top microhabitat selection model. Chipmunk microhabitat selection was based on chipmunk camera-trap detections from 2015 to 2017. Used and available habitat features were measured May to October 2020. The probability of selection is represented by the solid line and shading represents 85% confidence interval. Probability of chipmunk microhabitat selection across changes in (A) mean juniper diameter at root collar (cm) of reproductively mature trees (drc ≥ 9 cm), (B) variation of pinyon diameter at root collar (cm^2), (C) distance to rocky escape terrain (m), and (D) mean percent grass ground cover.



Map of observations of *Neotamias guadrivittatus* with the subspecies *N. q. australis* highlighted within a circle - from iNaturalist 26 May 2024.

Patterson (1980) described the Organ Mountains Chipmunk as a new subspecies in 1980. He noted that this population of *N. q. australis* was discovered in 1903 by O. B. Metcalfe (see *Early Naturalists of the Black Range*, pp. 116-117) who studied under E. O. Wooton at the New Mexico Agricultural College (now NMSU). In discussing the origin of the Organ Mountains Chipmunk, Patterson noted that "this divergence may be due to geographic isolation coupled with a unique environment. Chipmunks are not known in the San Andres Range, which extends more than 100 km northward from the Organ Mountains and contains several high peaks. Three collecting trips to prospective localities in Rhodes Canyon and near Salinas Peak proved fruitless, and chipmunks, if present, must have extremely spotty distributions. In either event, the likelihood of gene flow through this montane axis is minimal. In addition to genetic isolation, which is characteristic of chipmunk populations on many mountain ranges in the Southwest, the Organ chipmunk experiences a climatic regimen dominated by the Chihuahuan Desert province. Adaptation to xeric, unpredictable conditions has apparently transformed an ancestral 'forest' chipmunk into a xerophilous woodland form."

Patterson goes on to argue that "the colonization of the Organ Mountains by *E. quadrivittatus* which gave rise to this subspecific divergence took place no earlier than the latest (Wisconsin) glaciation. The limited distribution and small population size of *E. q. australis* after only 10,000 years of postglacial (=interglacial) climates argues against that population having survived the preceding interglacial, the Sangamon, estimated . . . to have lasted roughly 220,000 years. Characteristics of *E. q. australis* thus present a case for taxonomically recognized divergence during recent time. Small population size, total isolation, and the climatic influence of the northern Chihuahuan Desert have undoubtedly interacted in producing the rapid evolution of *E. q. australis*."

Schweiger notes that "The Organ Mountains Colorado chipmunk (*N. q. australis*) is endemic to the Organ Mountains of south-central New Mexico and is the most peripheral population of *N. quadrivittatus*. Compared to the main population, *N. q. australis* exists in a relatively hot and dry mountain range that is surrounded by Chihuahuan Desert." She concluded that the chipmunks' "Intensity of activity (will) increase by 89% in winter and decrease by 51% in early summer under future (2050) climate. The predicted future increase in activity in winter may negatively affect fitness because small mammals have higher survival while hibernating. The predicted future decrease in activity in early summer may negatively affect fitness due to reduced reproductive output. Losing or gaining time for activity because of shifting climatic conditions could have severe consequences to fitness."

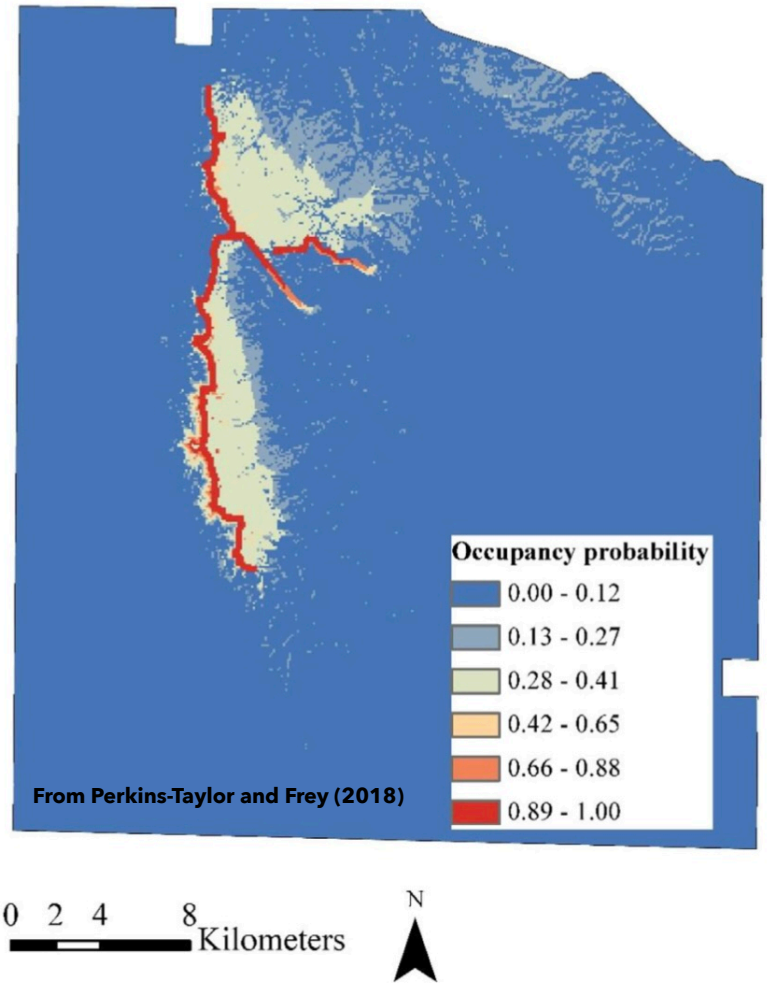
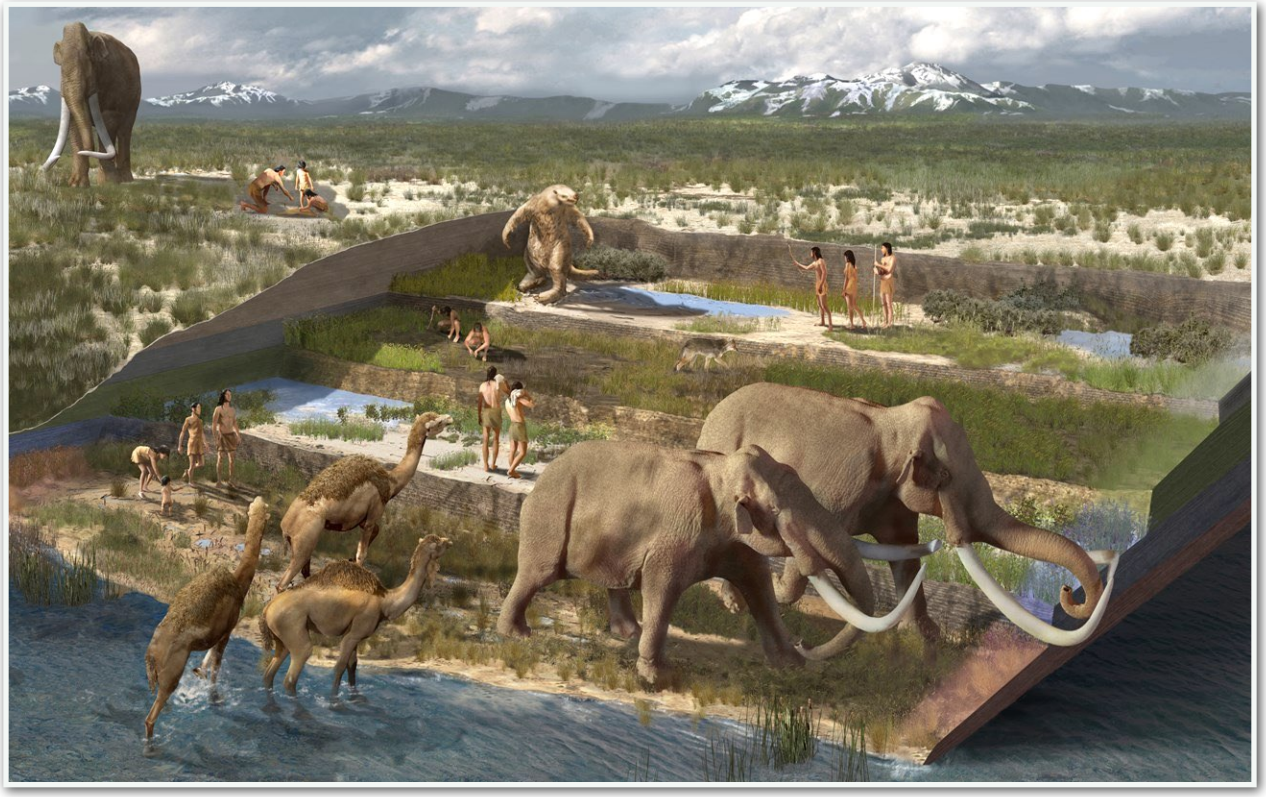


Figure 3. Map of occupancy probability for the Oscura Mountains chipmunk in the Oscura Mountains, New Mexico, USA, 2016, based on the final model. Warm colors represent areas of high occupancy probability and cool colors represent areas of low occupancy probability. We selected breaks in coloring using the Jenks optimization method (Jenks and Caspall 1971).



Take some time with this image from Karen Carr, via the White Sands National Park Service website. This cutaway view of the flora and fauna of different periods is based on excavations at Lake Lucero.

There is uncertainty about the population of this subspecies, but in 1979 it was estimated to be between 1,000 and 2,000 individuals. (Patterson)

Schweiger, Frey, and Cain (2021) end their article with this statement "If the chipmunks are as limited in habitat across their distribution as our study suggests, the conservation stakes for *N. q. australis* could be grim."

Resources

Frey, Jennifer K. and Kopp, Darin A., *Habitat Suitability Model for the Organ Mountains Chipmunk*, Report for the New Mexico Department of Game and Fish, 21 May 2013.

O'Connell, Clare N. and Frey, Jennifer K.; "Microhabitat selection by the Oscura Mountains Colorado Chipmunk (*Neotamias quadrivittatus oscuraensis*): an old-growth pinyon-juniper woodland specialist", *Journal of Mammalogy*, 20 April 2024, XX, 1-12.

Patterson, Bruce, "A New Subspecies of *Eutamias quadrivittatus* (Rodentia: *Sciuridae*) from the Organ Mountains, New Mexico", *Journal of Mammalogy*, Vol. 61, No. 3, August 1980, pp. 455-464.

Perkins-Taylor, Ian and Frey, Jennifer K.; "Ecological factors associated with site occupancy of an endemic chipmunk", *Journal of Wildlife Management,* June 2018, 82(7).

Schweiger, Brittany R., NMSU Master of Science Thesis, *Activity Patterns and Habitat Selection by the Oran Mountains Colorado Chipmunk (Neotamias quadrivitattus australis*, May 2021.

Schweiger, Brittany R., Frey, Jennifer K., Cain III, James W.; "A case for multiscale habitat selection studies of small mammals", *Journal of Mammalogy,* Oct 2021, 102(5), pp. 1249-1265.

New Mexico Sky Islands and the Pleistocene

The limited habitat/resources available to the Organ Mountains Colorado Chipmunk portend bad times for this subspecies.

Perspective: It is assumed that the Organ Mountains Colorado Chipmunk population was isolated no earlier than 10,000 years ago, when the Wisconsin glaciation period ended (Patterson, see cite in previous article). Care needs to be exercised here, however, because we are mixing geologic and biologic timeframes.

The discovery of footprints at Lake Lucero (ancient Lake Otero) has created significant excitement in the world of archaeology and anthropology. The discovery of human footprints at the site, dating from about 22,000 years ago, has been met with glee by publishers as they envision the many new tracts which must now be issued.

We will dive a bit deeper into some specific topics associated with this site, with the end goal of using the information gathered at White Sands with that from other sites in the region, like Mammoth rub sites and sloth remains from Aden Crater.

We start with the graphic above. Sometimes a specific finding at a site

comes to define the site. There is much more going on at the White Sands site than human footprints. And, the findings from different layers tell different stories.

In Volume 3, Number 3 (July 2020) of this journal, Hannah Cantrell reported on the fossil record in the Black Range and her work with the Arctos Database. If you have an interest in the fossil record of southern New Mexico we heartily recommend her article: "Three Oreodonts From the Black Range Show the Importance of Shared and Accessible Data".

At one time, Lake Otero covered more area than the state of Rhode Island. The Tularosa Basin was very different during the late Pleistocene than it is today. At that time, the lake and its margins attracted many species, including charismatic species.

American Lions, *Panthera atrox*, used this site. A feline footprint from the site is shown at top center (NPS photo). There are no records of American Lions after ~11,000 years ago. Before that time, however, they roamed from Canada to Chiapas.

Ancient Camel footprints, *Camelops hesternus*, have been found at the site. An NPS photo, from this site, of one of these two-toed ungulates is shown at center. This species became extinct at the end of the Pleistocene.

Columbian Mammoth, *Mammuthus columbi,* tracks are the most common prints found at this site. See the NPS photo, from White Sands, at bottom center. This species became extinct at the end of the Pleistocene. This is not *Mammut raki*, the much older Mastodon named by Childs Frick in 1933 based on a specimen from Truth or Consequences. Mammoths and Mastodons are frequently confused. One of their distinguishing characteristics is their teeth, examples shown at the top right.

Harlan's Ground Sloth, *Paramylodon harlani*, was also found at this site. Its footprint is depicted in the NPS photo at center right. Note the crescent shape of the footprint. In, Volume 7, Number 2 of this journal, p. 77, we included an article about







Nothrotheriops shastensis. The remains of one of these giant ground sloths was found at Aden Crater. It is likely that this species was roaming the Lake Lucero area alongside Harlan's Ground Sloth. The distance separating the two sites is relatively insignificant and they roamed the earth at about the same time.



Teeth: Mammoth above Mastodon below







The NPS image directly above shows the eroding footprints of a Dire Wolf, *Canis dirus*. Dire Wolves and Gray Wolves coexisted during this period. The Dire Wolves were more massive and probably hunted in packs. They no longer live on the earth.

Tracks of Sabre-Toothed Cats, *Smilodon fatalis* and bear have also been found at this site. A site which is several square kilometers in size.

And of course those humans, *Homo sapiens*, were also present at this site. Many human footprints, made by



individuals of differing age and sex, have been found here. An example of the human footprints found at this site is shown above in an NPS image. Footprints like this have been dated to at least 23,000 years ago.



The NPS image above shows one of the excavation trenches which revealed human footprints.

In addition to the excellent series of images shown above, the National Park Service provides a substantial amount of (general) information about this site at the link above.

The videos the National Park Service provides at this link are extraordinary and well worth the time. The image at the lower right is a detail from one of these videos and shows a comparison of a modern human (shod) footprint and that of a Colombian Mammoth.

One of the most dramatic attributes of the prints at White Sands NP is the length of the footprint sequences (some prints cover more than a mile) and the interactions which can be interpreted because of the number of prints and the extended sequence of prints.

For instance, the apparent interaction between two species of megafauna, mammoth and ground sloth, is very different. The prints indicate that mammoth were not particularly concerned when they encountered humans (or at least human prints); they continued on their way. The Harlans' Ground Sloths, on the other hand, were seemingly very bothered by the encounters with humans (and/or their prints). The prints indicate that the Ground Sloths reacted to a predator very decisively, changing their immediate behavior/activity.

The fact that megafauna and humans coexisted at this site for at least two thousand years also changes the narrative about why the megafauna went extinct. Although humans may have been major agents in that extinction process, it was not something that happened overnight. Much more likely that human encroachment and predation were among several factors which caused the extinction of some species of large fauna.

As shown in the drawing at the beginning of this article, excavations at this site are multilayered and document thousands of years of human and megafauna interactions. In some places, mammoth prints have been found a meter above human prints.

Large numbers of high-resolution photos have been taken of the findings, and very detailed 3-D modeling has occurred using those images as a documenting resource. In this instance, documentation is very important because preservation is very difficult, perhaps nearly impossible. It does not take long for prints to vanish once they have been excavated.

Understanding of the site, including the aging of the tracks, has involved the development of precise stratigraphic sequencing, radiocarbon dating, and optically stimulated luminescence dating techniques. Ground penetrating radar has also been used effectively at the site (see below).



Footprints at the Lake Lucero site have been known for several decades. Ellis Wright discovered mammoth footprints there in 1932. However, no definitive work was done on them until 1981. Some of the earliest scientific study of the prints was documented in "Mammoth Footprints from the Upper Pleistocene of the



Tularosa Basin, Doña Ana County, New Mexico", Lucas et al., 2007, in *"Cenozoic Vertebrate Tracks and Traces", New Mexico Museum of Natural History and Science Bulletin 42*.

Other Times

The oldest fossil mammal bones found in Sierra County are those of *Duchesneodus uintensis*, from roughly 37 mya, found in the Rubio Peak Formation northeast of Winston (Black Range). The lower jaw of this species is shown below. The cited paper has a wealth of information about mammal fossils found in Sierra County, from the Cenozoic through the Pleistocene.

This detour is meant to illustrate how much things change over time and how our understanding is diminished when we focus on the depiction of an area during a specific era. When we do that we lose deep time context and all of that wonderful diversity.



Above: Oblique view of left face of *Duchesneodus uintensis* (CMNH 11759). From: Matthew C. Mihlbachler "Species Taxonomy, Phylogeny, and Biogeography of the Brontotheriidae (Mammalia: Perissodactyla)," *Bulletin of the American Museum of Natural History,* 2008(311), 1-475, (3 June 2008). This is, by far, the most definitive study of fossils of this and related species at White Sands.

Image below from: "Cenozoic vertebrates from Sierra County, southwestern New Mexico"; Gary Morgan and Spencer Lucas; in *Geology of the Warm Springs Region*, Lucas, Spencer G.; McLemore, Virginia T.; Lueth, Virgil W.; Spielmann, Justin A.; Krainer, Karl, New Mexico Geological Society 63 rd Annual Fall Field Conference Guidebook, 580 p. Other reference material can be found at: Spencer George Lucas and Robert M. Schoch: Taxonomy of Duchesneodus (Brontotheriidae) from the late Eocene of North America. In: Donald R. Prothero and Robert M. Schoch (Hrsg.): *The evolution of Perissodactyls*. New York and Oxford, 1989, p. 490–503 (493). (This is an unedited cite from the work and does not conform to our standards.)

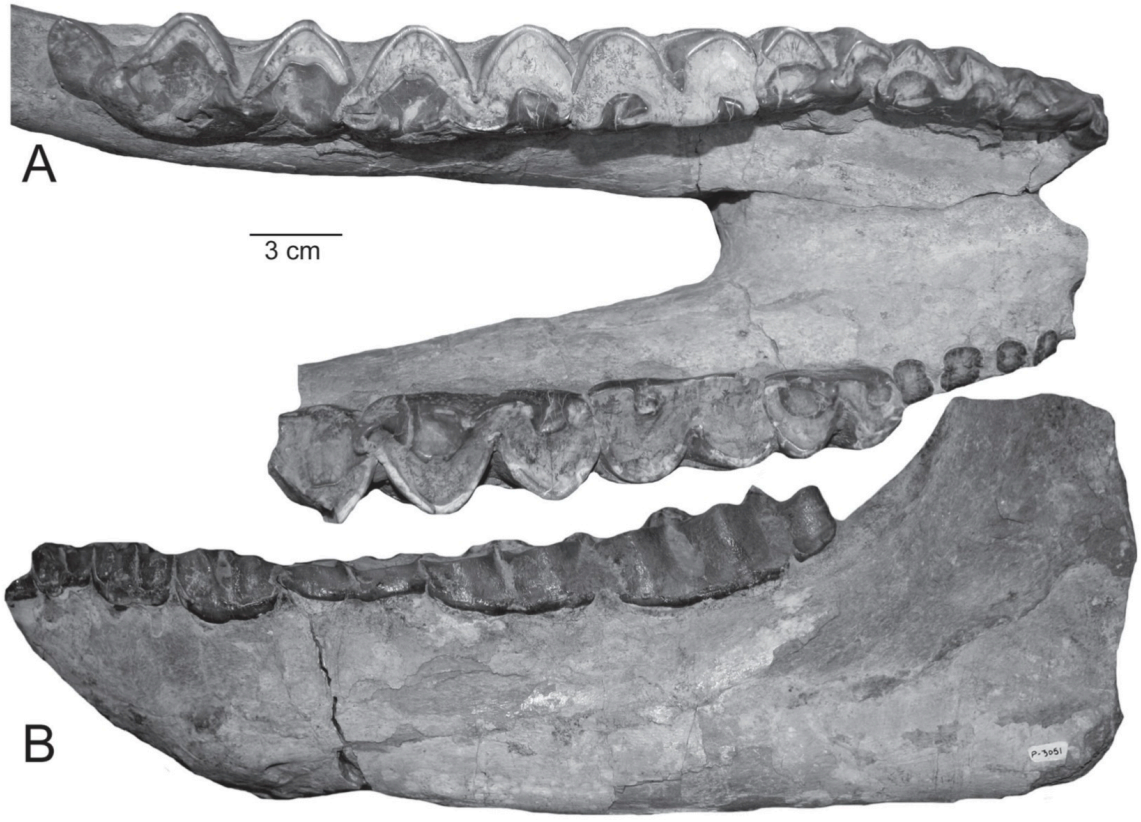


FIGURE 3. NMMNH 3051, lower jaw of *Duchesneodus uintensis* from the Rubio Peak Formation in the northern Black Range, in occlusal **(A)** and left lateral **(B)** views. Scale bar is 3cm.

Fireflies & The Black Range

Data about the fireflies of the Black Range is limited and the range of some species is conjectural. The following summary should be reviewed with that in mind.

Fireflies are often referred to as the *lampyrids*. They are in the family *Lampyridae* which includes over 2,000 described species worldwide.

NatureServe provides the following list of firefly species which may be found in New Mexico. Species are included based on known locations (fireflies seem to be "underreported') and habitat preferences (the habitat is right for the species). The lack of range granularity for firefly species is both an important caveat (the listed species may not actually be in the Black Range) and a significant opportunity for us to expand the knowledge base associated with the listed species.

Despite the common name of many of these species, which focuses on the bioluminescence they exhibit, not all fireflies (lightening bugs) exhibit the characteristic flashing which every outdoor kid in the eastern United States knows. The listing below has a "type" column which indicates the species which have adults which flash and those which do not ("day") - as well as those which "glow". As far as it is known,* all eggs, pupae, and larvae of fireflies are bioluminescent.[1]

The larvae of *lampyrids* feed on small insects, slugs, earthworms, snails, and any other small creature they encounter.

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* Remembering that with the *lampyrids*, a great deal is not known about their natural history.

1. *Beetles of Western North America* by Arthur V. Evans, Princeton University Press, 2021, p. 262

Possible Fireflies In New Mexico

Species name	Recent synonyms	Common name(s)	Taxonomic authority	Red List category	NatureServe global rank	Type	Flightless females
Bicellonycha wickershamorum piceum		Gila southwest spring firefly	Cicero, 1982	EN	G2 - T1 G3 - T2	Flash	No
Microphotus angustus		California pink glow-worm	LeConte, 1874	LC	G4	Glow	Yes
Microphotus octarthrus		Desert firefly	Fall, 1912	DD	GU	Glow	Yes
Microphotus pecosensis		Pecos desert firefly Mountain glow-worm	Fall, 1912	DD	GU	Glow	Yes
Photinus corruscus	Ellychnia corrusca Photinus corrusca	Winter firefly	Linnaeus, 1767	LC	G5	Day	No
Photinus flavicollis	Ellychnia flavicollis	Yellow-necked firefly Yellow-collared firefly	LeConte, 1868	DD	GU	Day	No
Photinus knulli		Southwest synchronous firefly	Green, 1956	VU	G2 G3	Flash	No
Photinus pyralis		Big dipper Common eastern firefly J-stroke firefly	Linnaeus, 1758	LC	G5	Flash	No
Pleotomus nigripennis		Black-winged firefly	LeConte, 1885	DD	GU	Glow	Yes
Pyractomena angulata		Say's firefly Candle firefly Angled firefly	Say, 1825	LC	G5	Flash	No
Pyropyga minuta		Flower elf	LeConte, 1852	LC	G5	Day	No
Pyropyga modesta		Modest elf	Green, 1961	DD	GU	Day	No
Pyropyga nigricans		Black-bordered elf	Say, 1823	LC	G5	Day	Sometimes

DD = Data Deficient (Insufficient data to make a determination.)

G2 = Imperiled – At high risk of extinction or collapse due to restricted range, few populations or occurrences, steep declines, severe threats, or other factors.

G3 = Vulnerable – At moderate risk of extinction or collapse due to a fairly restricted range, relatively few populations or occurrences, recent and widespread declines, threats, or other factors.

G4 = Apparently Secure – At fairly low risk of extinction or collapse due to an extensive range and/or many populations or occurrences, but with possible cause for some concern as a result of local recent declines, threats, or other factors.

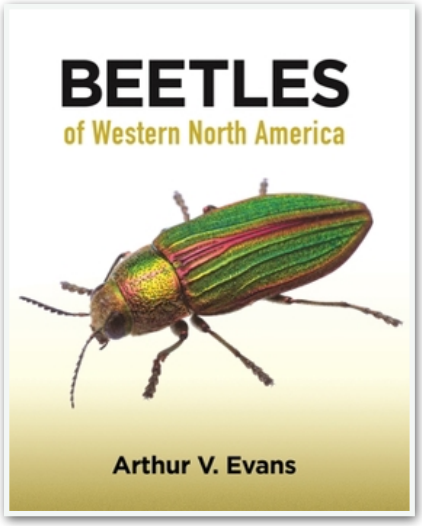
G5 - Secure – At very low risk or extinction or collapse due to a very extensive range, abundant populations or occurrences, and little to no concern from declines or threats.

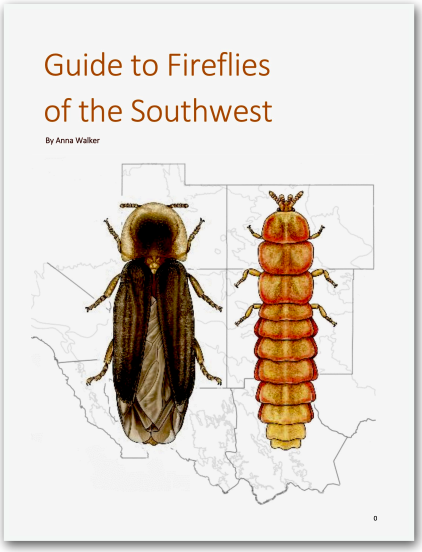
GU = Unrankable – Currently unrankable due to lack of information or due to substantially conflicting information about status or trends. NOTE: Whenever possible (when the range of uncertainty is three consecutive ranks or less), a range rank (e.g., G2G3) should be used to delineate the limits (range) of uncertainty.

T(with a number) = Infraspecific Taxon (trinomial) – The status of infraspecific taxa (subspecies or varieties) are indicated by a "T-rank" following the species' global rank. Rules for assigning T-ranks follow the same principles outlined above. For example, the global rank of a critically imperiled subspecies of an otherwise widespread and common species would be G5T1. A T subrank cannot imply the subspecies or variety is more abundant than the species, for example, a G1T2 subrank should not occur. A vertebrate animal population (e.g., listed under the U.S. Endangered Species Act or assigned candidate status) may be tracked as an infraspecific taxon and given a T rank; in such cases a Q is used after the T-rank to denote the taxon's informal taxonomic status.

Legend - IUCN Red List (Example)







Whether or not the female of the species flies is also used in the identification of individuals to species.

Many people focus on those flashing lights and much research has centered on the purpose of flashing and glowing in the natural history of the various *lampyrid* species. For instance, female members of species in the genus *Photuris* mimic females of other firefly species to attract the males of that species - and when the males are attracted the female *Photuris* eats them. We will not attempt to provide an extensive discussion of the natural history of the species which follow. Instead, we refer you to the following references:

***Lampyrid, The Journal of Bioluminescent Beetle Research*. (Volumes prior to 2023.)**

BugGuide (Website)

iNaturalist (Website)

***Field Guide to Western North American Fireflies*, Larry Buschman, March 2016 Draft.**

***Guide to Fireflies of the Southwest*, Anna Walker, 2024, New Mexico BioPark Society. Identification key at pp. 16-18. Referred to later as "*Fireflies of the Southwest*".**

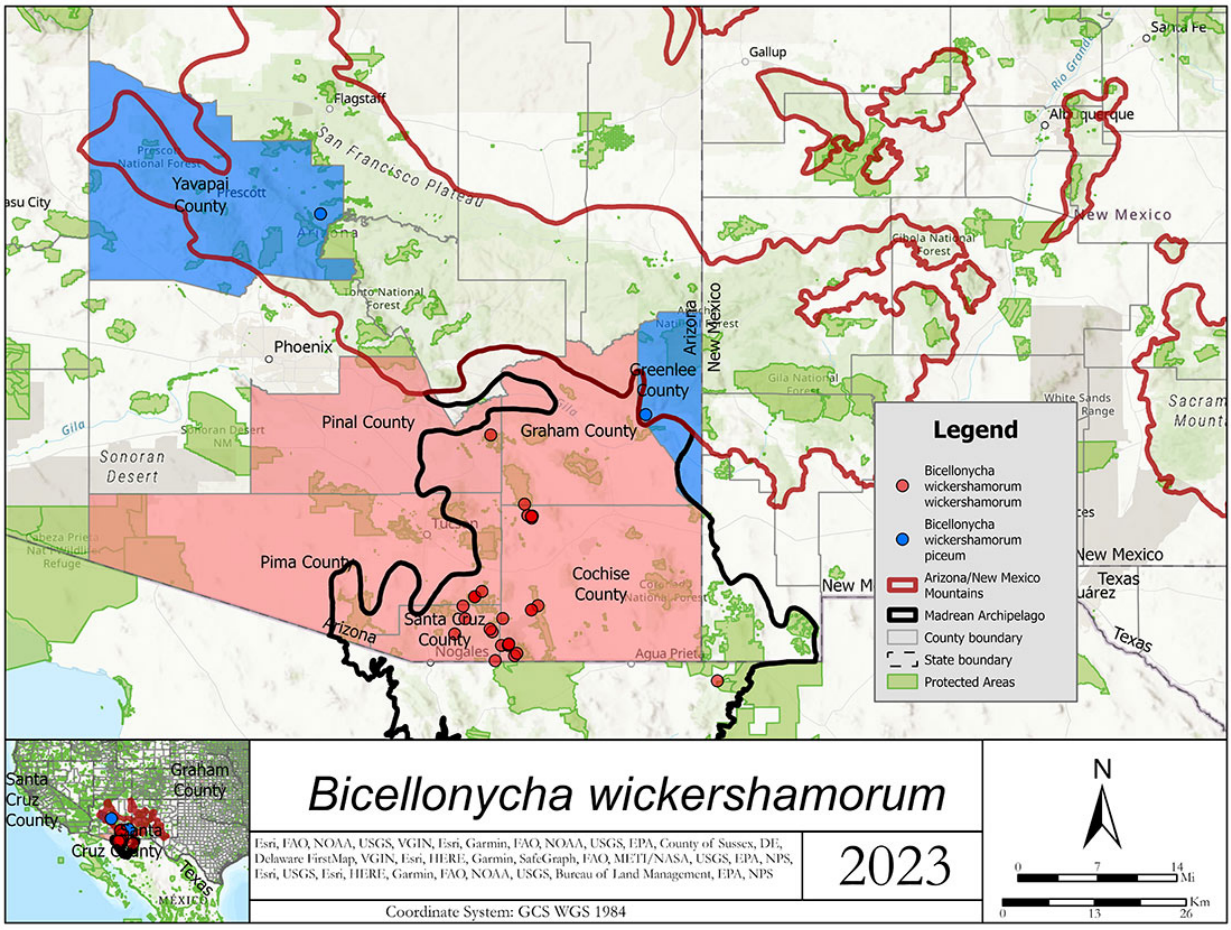
***Studies on the Flash Communication System in Photinus Fireflies*, James E. LLoyd, Museum of Zoology, University of Michigan, 1966. Dated, not much from the west, but otherwise a foundational resource.**

The Firefly Atlas (website), a project of the Xerces Society.

The following species survey utilizes the listing on the previous page as a primary source.



Remember that many of the firefly species listed here actually fly. They are not always sitting around waiting for a photographer. The image above is by Terry Priest and is shown under a Creative Commons license via Flickr. The individual is a *Photinus pyralis*, the Big Dipper Firefly or Common Eastern Firefly. It is one of the species you will find in the following summary of possible fireflies of the Black Range.



Bicellonycha wickershamorum piceum (Cicero, 1982)

***Bicellonycha wickershamorum piceum*, the Gila Southwest Spring Firefly is considered a Critically Imperiled Subspecies by NatureServe and is listed as Endangered on the IUCN Red List. This species is receiving a substantial amount of attention at the moment because it is a candidate for listing under the Endangered Species Act. The range map above is from the Xerces Society (follow all images marked with an arrow in an orange circle to the image source by clicking on the orange circle). The range map shows the range of the nominate subspecies (locations indicated by red circles) and the two locations (blue circles) where this subspecies (*B. w. piceum*) has been found. It also shows the Arizona/New Mexico Mountains within which this subspecies has been found, the assumption being that the subspecies may be found at other locations within the red lines - or at least within the large stretch of mountains at the upper center of the map, an area which encompasses the Black Range. The nominate form is also found in northwestern Sonora and there is no particular reason to believe that it would not be found to the north in New Mexico. See "*Fireflies of the Southwest*" pp. 38-39.**

The Xerces article on this species notes that threats abound and that "threats such as trampling by cattle, water and light pollution, declines in prey species, pesticide use, off-road vehicle use, and other intrusive recreational or tourist activities are also likely drivers of decline, and in fact have already led to the destruction of the *B. w. wickershamorum* type locality."

The breeding season for this species spans early June to late July during the summer monsoon. It is typically found in desert wetlands, but note the subspecies *B. w. piceum* is found in permanent streams in desert montane areas.

The species was originally described by J. M. Cicero in 1982 in "The genus *Bicellonycha* in the United States with descriptions of a new species and subspecies (Coleoptera: Lampyridae, Photurinae)", *The Coleopterists Bulletin* 36(2): 270-278.



The image of a *Bicellonycha w. wickershamorum* by Dylan Dorey shown at the bottom right on the previous page was taken during July 2021 at a site in southern Arizona. It is shown here under a Creative Commons license via iNaturalist. A detail (below) from that image shows the head shield which is typical of fireflies.



Males and females of this species communicate by a male flash and female response.

Microphotus sp.

A glowworm observation by Soraya on June 6, 2020, near Bayard on the west side of the Black Range, has not been resolved to species by the iNaturalist community, with *M. pecosensis, M. octarthrus*, and *M. angustus* being suggested at one time or another.

Microphotus angustus (LeConte, 1874)

The California Pink Glow-Worm, *Microphotus angustus*, is generally considered secure and a species of "Least Concern". In our area it is found to the southwest and to the northwest of the Black Range. See "*Fireflies of the Southwest*" p. 52.

The photograph of this species (top center/right), taken by Andrew Campos during June 2024, just across the state line from Mule Creek, New Mexico, updates the IUCN map above. This photograph is used here under a Creative Commons license via iNaturalist.

The center photo is by Ken-ichi Ueda (the co-founder of iNaturalist), shown here via Flickr under a Creative Commons 2.0 license. Both of the photographs above are of females; males look more like the "stereo-typical firefly" but are not bioluminescent.







California Pink Glow-Worm Microphotus angustus

This species is nocturnal and is often found in oak woodlands. Females of this species do not fly and "emit intermittent glows to attact males" using a large light organ at the end of the abdomen (see center photo).

Microphotus octarthrus (Fall, 1912)

A male Desert Firefly, *Microphotus octarthrus*, has been observed by Wendy McCrady near the Gila Cliff Dwellings Visitor Center (June 22, 2022). An enlargement of her photograph is shown at the top of the next page. See "*Fireflies of the Southwest*" p. 51.

On the IUCN map below, and others like it in this article, the purple area indicates the possible resident extant range of this species, while the orange circles indicate where it is resident based on observation.



Desert Firefly - Microphotus octarthrus

Flash Patterns

Fireflies are in the family *Lampyridae*. There are *lampyrids* which are not bioluminescent, there are those which glow, and there are those which flash (the rear of their body will light up). The pattern of flashes is useful in identifying an individual to species, but beware of mimics.

A "glow" will usually last for a few seconds and its intensity will increase and decrease gradually, while a "flash" will occur rapidly (~.25 second) but may last as long as two seconds and has no obvious ramp to its intensity.

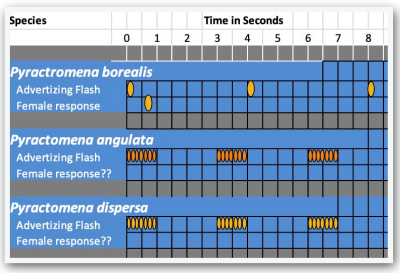
Flashes may be of different colors (yellow-orange, yellow-green . . .) but the use of this attribute is problematic because appearances can be influenced by a number of factors.

Whether a species flashes or not is a key to its behavior. Species which are not bioluminescent ("Day" in the initial table, "Dark" in other references) are active during the day but may be active at night when searching for a mate. Those which are bioluminescent are active at dusk and in the early evening.

All larvae in the family *Lampyridae* glow from oval organs near their tail.

Flashes and glows are created by a very efficient chemical reaction which produces virtually no heat.

When they occur, "flashes" and "glows" are part of the mating display, but they are not the only way that fireflies attract mates. Females may emit pheromones which attract males, allowing "dark" fireflies to find mates during the daylight hours or after dark. In other species (glow worms) the female has a large light organ which is bioluminescent when it is dark. This display may be used in addition to the release of pheromones. Males of these species are attracted to the glow. As shown below, flash patterns are mapped and used in the species identification process (below from Buschman - see References).



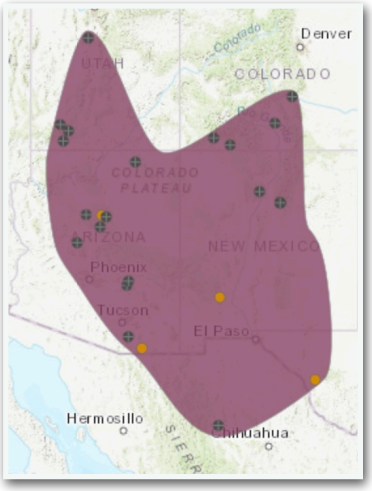


To quote NatureServe: "*Microphotus octarthrus* is a desert-dwelling firefly known from the desert Southwest in the US and north-central Mexico. Relatively little is known about its habitat and ecology. Larval and adult feeding behaviour is unknown, as is habitat preference. Females of this firefly species are larviform and flightless and glow at night to attract mates."

Microphotus pecosensis (Fall, 1912)

The female Pecos Desert Firefly, *Microphotus pecosensis*, is flightless and glows at night to attract a mate.

In Arizona they have been found up to 6,000 feet in elevation in mixed conifer forests. That mix of elevation and habitat type is infrequent in the Black Range. In 2006, this species was reported from the Gila National Forest. See "*Fireflies of the Southwest*", p. 54.



Pecos Desert Firefly or Mountain Glow-Worm - Microphotus pecosensis

The photograph below, by "gjelbri", was taken north of Santa Fe on June 21, 2023. It is shown here under a Creative Commons License via iNaturalist.



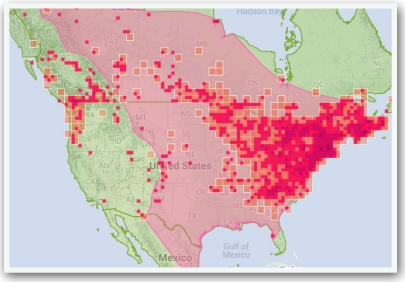
Ellychnia corrusca (Linnaeus, 1767) (*Photinus corruscus* on our table)

***Ellychnia corrusca*, Winter Firefly, was listed as *Photinus corruscus* in our original search of NatureServe with a synonym of *Ellychnia corrusca*. The latter latin binomial appears to be the accepted name at this point. Despite being one of the most studied species of firefly in North America, the taxonomic determinations associated with it remain in turmoil. It is possible that it is a species complex of many closely related species. See "*Fireflies of the Southwest*", p. 66.**

This species is one of the first seen in the spring, in part because adults spend the winter in trees, generally in large colonies.

The range map at the top left of the next page shows the iNaturalist observations as of 7/14/2024, of this

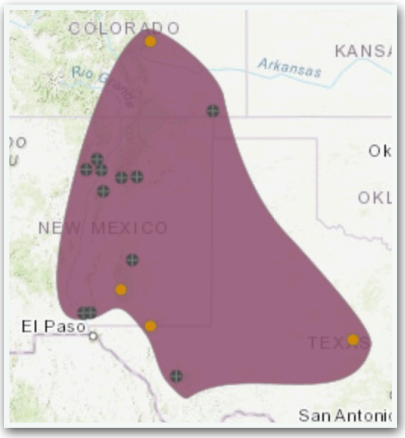
species, but be aware of the earlier comment that we may be dealing with a species complex.





The photograph directly above was taken by Sean C. in the Chiricahua Mountains of southeastern Arizona on March 23, 2022. The image is shown here under a Creative Commons license via iNaturalist. Be aware, however, that should this species be determined to be a species complex, those individuals found west of the Continental Divide are assumed to be the first to be split into a different species. Compare with *Pyropyga nigricans*, shown later.

Ellychnia (Photinus) flavicollis (LeConte, 1868)



Yellow-necked Firefly - Photinus (Ellychnia) flavicollis

NatureServe starts its entry with a warning that the taxonomic determinations of the *Ellychnia/ Photinus* groupings are in serious need of study. It goes on to summarize the known natural history of the species in a short paragraph, including, "*Ellychnia flavicollis* is a diurnal firefly described from Colorado, New Mexico, and Texas. Very little information has been published on this species. The larvae are unknown, as is the courtship behaviour of the adults. The habitat associated with *E. flavicollis* has not been well described, other than a note that it is found in moist areas or clinging to vegetation. It appears to be associated with montane areas." See "*Fireflies of the Southwest*", p. 67.

Joe Cicero, in a comment on BugGuide (29 August 2014) noted that this species is probably best known from the Organ Mountains in Doña Ana County.

J. Fine has an observation of this species (Yellow-necked Firefly) on iNaturalist from July 2, 2023 (Turkey Creek-Gila River).



Joshua C. deBaca took the image above of a specimen from south of Tijeras (southeast of Albuquerque) on July 8, 2023, (at 11:25 A.M.) It is shown here under a Creative Commons license via iNaturalist.

Photinus knulli (Green, 1956)

The Southwest Synchronous Firefly (a.k.a. Fall Southwest Firefly), *Photinus knulli*, has been found in the very southwestern part of the Boot-heel of New Mexico. Otherwise its general range is southeastern Arizona and northern Sonora. See "*Fireflies of the Southwest*", pp. 35-36.

What is known of its natural history is fascinating. For instance, the males of this synchronously flashing firefly



Southwest Synchronous Firefly Photinus knullii

gather at lekking sites. As might be expected, females of the species are present at these sites in significant numbers, as are larvae of the species. The concentration of individuals at lekking sites makes destruction of such sites especially problematic. (Bulldozing stream beds has been cited as the causal factor in the destruction of some sites in Arizona.) This is the only known firefly in North America to practice this lekking behavior. For those who are interested in how research is done on insects, please see, "Lek Assembly and Flash Synchrony in the Arizona Firefly Photinus knulli Green (Coleoptera: Lampyridae)", Joseph M. Cicero, *The Coleopterists Bulletin*, Vol. 37, No. 4 (Dec., 1983), pp. 318-342 (25 pages).

Although found in the xeric areas of the southwestern U. S. and northern Sonora, the species requires sites with permanent water. There are no New Mexico observations of this species, as of July 15, 2024, on the iNaturalist website. Tony Palmer has posted his observation (see below) from the Saguaro National Park Area near Tucson, Arizona. It is shown here under a Creative Commons license via iNaturalist.



Photinus pyralis (Linnaeus, 1767)

The Big Dipper Firefly, *Photinus pyralis*, is an abundant insect of eastern North America. NatureServe (July 15, 2024) does not indicate on its range map that it is present in New Mexico. Another common name for the species, the J-Stroke Firefly, describes its J-shaped flash pattern which is evident in the early evening in much of the East. NatureServe notes that the species was historically reported from as far west as Phoenix, Arizona, but that it is probably extirpated from the western United States. See *"Fireflies of the Southwest"*, pp. 33-34.

This species is found in open areas, woodlands, along streams and rivers, and even in disturbed habitats like city parks.

The sequence of its flash pattern is long and j-shaped, generally seen at about three or four feet above the ground. It is most often observed from mid June to early July.

iNaturalist records a few observations from the eastern part of New Mexico and shows Phoenix as part of its range (without observations).



The individual shown above was documented by Anna Walker on 1 July 2021 at Lake Summer, New Mexico (NE of Fort Sumner).

Pleotomus nigripennis (LeConte, 1885)

The Black-winged Firefly, *Pleotomus nigripennis*, is a glowworm species in which the female is flightless and ground-dwelling. Although NatureServe is unable to assess its vulnerability, it is considered rare. When it has been found it has been attracted to UV lights in the high mountains of arid regions (southern Arizona, New Mexico, and south-western Texas in the United States and Sonora in Mexico). See *"Fireflies of the Southwest"*, p. 58.



The female uses both her glow and pheromones to attract males. The photograph of a male's head (above) was taken by Mike Quinn on May 21, 2005, near Valentine, Texas. It is shown here under a Creative Commons license via BugGuide.

Lauren Leach posted the image of a larva of this species, below, to iNaturalist on September 25, 2019, having photographed it the day before. Anna Walker thought that this individual might be the first state record. Ms. Leach was a student of Furman University's "Wild Semester" at the time she took this photo, at Hermosa on the east slope of the Black Range. It is shown here with permission and under a Creative Commons license via iNaturalist.



Pyractomena angulata (Say, 1825)

Say's Firefly, *Pyractomena angulata*, is not shown on the NatureServe range map for New Mexico. Males exhibit quick orange flickers as part of their display. NatureServe notes that there are records from New Mexico but attributes them to misidentification or mislabeling. See *Fireflies of the Southwest,* pp. 26-27.

iNaturalist does not have any listed observations from New Mexico (15 July 2024).



Given the lack of records from this area we have had to go far afield to present this image by Kevin under a Creative Commons license via iNaturalist.

Pyropyga minuta (LeConte, 1852)

The Flower Elf, *Pyropyga minuta*, is found in the southern United States, west to New Mexico and southward to Honduras. It is a day-flying dark firefly which is often found on milk-weed and willows. See *"Fireflies of the Southwest"*, p. 74.

There are no iNaturalist observations from our general area. Tony Palmer's observation of a specimen photo-graphed in Tucson on April 23, 2016, is shown at the top of the following page.



Pyropyga modesta (Green, 1961)

The Modest Elf, *Pyropyga modesta*, was described by J. W. Green in 1961 ("Revision of the species of Pyropyga (Lampyridae)". *The Coleopterists Bulletin* 15:65-74). See *"Fireflies of the Southwest"*, p. 76.

This is a day-flying dark firefly which is found in the "lower Midwest and southwestern United States and much of Mexico." Not much is known about its natural history.

As of July 15, 2024, the only iNaturalist observation was by Annika Lindqvist from Tamaulipas, Mexico. That observation is shown below under a Creative Commons license via iNaturalist.



Pyropyga nigricans (Say, 1823)

The Black-bordered Elf, *Pyropyga nigricans*, has a wide distribution, but there are no iNaturalist observations from our immediate area. The observation posted at the top of the next column is from the crest of the Chiricahua Mountains in southeastern Arizona, by Rosario, on September 8, 2021. See *"Fireflies of the Southwest"*, p. 75.

BugGuide gives its length as 4.2 - 8.5 mm. This is one of the dark fireflies and is different from most North American firefly species by being more common in the west than in the east.





The photograph directly above is an observation by Wendy McCrady, from June 17, 2023. She made this observation at or near Iron Creek Campground on NM-152 on the west side of the Black Range. This observation has not been commented on by iNaturalist users. McCrady felt the individual was in the Genus *Ellychnia, noting that it was found in* "similar habitat as that of *E. alexandri* and *E. irrorata* observations in SE Arizona." (Compare this observation to the observation for Ellychnia corrusca [Linnaeus, 1767], Photinus corruscus on our table above.) This observation is shown under a Creative Commons license.

Colin McKenzie made an observation of a similar looking individual at roughly the same location on July 3, 2023.

Study Possibilities

This group of insects presents us with some significant study possibilities. The overall range of several of the species would appear to encompass the Black Range, but there are painfully few observations from this area. It is quite possible that we can expand (or improve the "saturation" of) the range of several species.

Although at first blush habitat restrictions would appear to limit our observational opportunities, there are several sites where observations would be fruitful. In addition, the various species have elevational preferences ranging from the foothills to the crest of the range.

Whatever we do is likely to add to the record of these species in a significant manner. In addition to the observational history, very little is known about the natural history of many of these insects, and whatever observations (or even structured studies) which we make are likely to be additive to the common knowledge.

Scarabaeinae (Dung Beetle)

Our own brand of Sisyphus was photographed and videoed on July 27, 2024, just east of Hillsboro. See photographs below and at the top of the next page, video at the link below. When editing the video I really wanted to add an audio track of







Jim Nabors singing "The Impossible Dream". It seemed perfect for video of a dung beetle pushing a ball of cow crap up a steep little hill. But, alas, my sense of morality and a bit of legal angst prevented that from happening. But if you happen to watch the video, play "The Impossible Dream" in the background, it just seems so right.

This may be an individual in the genus *Canthon*, the Tumblebugs.

My Favorite Stock Pond

by Bob Barnes





If you live in the American Southwest, you should have one.

This one is east of Hillsboro. Most of the year it is dry. When it has water it smells; it is generally full of cow manure; it is bordered by slimy slippery mud; and there are usually mosquitoes. It can be glorious. If you live in the dry, water, any water, is beautiful, and after the rains "my" stock pond can have water - as evidenced by the two photos to the right.

I don't wish to demean your favorite stock pond, but let me tell you about mine. On July 28, 2024, I took a walk to the pond because I could see from NM-152 that this was a day when it had water. I had photographed *Triops* (Long-tailed Tadpole Shrimp) in the

pond on previous occasions and was hopeful that they would be swimming about on this day.

The photos on this page, of a *Triops* (right) and a school of *Anostraca*, fairy shrimp (below), and the pond, were all taken here on September 28, 2014.

On July 28 there were no *Triops* and no fairy shrimp, the mud was not too bad, there was hardly any smell, and the cow pies were not that deep.

Putting aside my disappointment, I concentrated on the dragonflies and





damselflies which were swarming the shoreline. On this day I managed no decent photographs of dragonflies but did take some acceptable photos of Familiar Bluet, *Enallagma civile* (photo immediately below and those on the following page).













Before I stopped at the Seep Willows growing in and along the edge of the pond, I took time to photograph (above) a Mayfly, *Ephemeroptera*, floating by in the process of being eaten by another creature.



The Seep Willows, *Baccharis salicifolia* (photos right), were blooming nicely. In a year when nothing seemed to be blooming, this was a treat.

On the ridge above the pond I found three species of cactus in short order. One of these was *Mammillaria heyderi;* it was not in bloom. However, on March 30, 2017, I had found one nearby, in bloom (photograph below). Neither of the other two species, a Fendler's Hedgehog Cactus, *Echinocereus fendleri,* and a Chihuahua Pineapple Cactus, *Echinocactus intertextus*, was in bloom but each promised more later.









The last thing I noted before walking back to the road was the Cactus Wren nest shown above and at the left. I did not see the bird on this occasion, but nest building continues for a long period.

No mosquitoes today, the mud was not too bad, the manure did not overwhelm, and I was back at the car by 6:40 a.m.

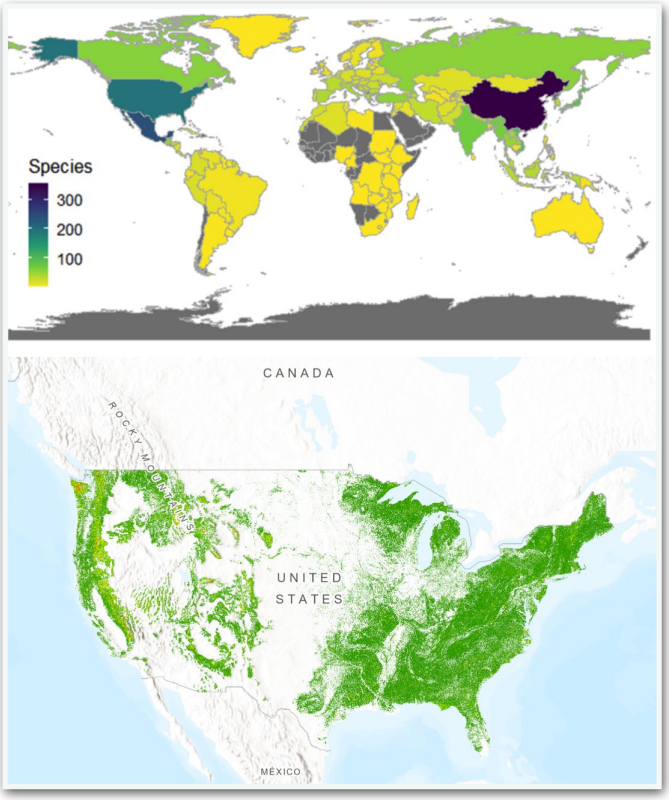
Follow up and tidbits

Wood Microbiome

The world is immensely more complicated than humans realize. In a preprint entitled "A diverse and distinct microbiome inside living trees", Arnold Wyatt et al. share their findings of the microbiome found in a variety of tree species.

Most of us are aware of the microbiome which exists in our own bodies. That concept and the findings of various studies have been described in numerous popular publications.

The authors studied the microbiome which existed in a number of tree species. They found that microbiomes differed with tree species ("We observed that the composition of microbial communities in the tissues of living trees varied significantly with tree species, suggesting that microbial communities within wood adapt and diversify in response to biochemical and physical variations among hosts.") and that it is very large and very complicated ("We demonstrate that a single tree can host approximately a trillion microbes in its above ground internal tissues, with microbial communities partitioned between heartwood and



Above: Figure 1 of the supplemental information included with this study. The species included in this survey represent 11 genera which have A) a global distribution, with the map colorized by the number of species within this set of genera native to each country. Within B) the United States, the genera studied herein have a distribution that spans much of the East Coast and Midwest, and extends sporadically through to the West Coast (from US Forest Service Individual Tree Species Parameter Maps).

sapwood, each maintaining a distinct microbiome with minimal similarity to other plant tissues or nearby ecosystem components. Notably, the heartwood microbiome emerges as a unique ecological niche, distinguished in part by endemic archaea and anaerobic bacteria that drive consequential biogeochemical processes.")

The degree to which the microbiome varies between individuals of a species is unclear, but given how it varies in animal species there is no particular reason to doubt that the microbiome of an individual tree will vary from its kin depending on environmental and cultural conditions.

The authors state that "Our research supports the emerging idea of a plant as a 'holobiont' – a single ecological unit comprising host and associated microorganisms – and parallels human microbiome research in its implications for host health, disease, and functionality. By mapping the structure, composition, and potential sources and functions of the tree internal microbiome, our findings pave the way for novel insights into tree physiology and forest ecology, and establish a new frontier in environmental micro-biology."

The complexity of the natural world is hierarchical in nature with each layer of assessment having relationships with other layers and conglomerates of components which can change based on modifications to its components. This natural complexity is more than a listing of the individual components which make up a community, it is functionally integrated, with changes in any one part potentially affecting the whole.

Barred Tiger Salamander
Ambystoma mavortium

In two decades of observation in the Black Range I had not seen a salamander (a serious gap). Imagine my surprise on the morning of 20 October 2024 when a Barred Tiger Salamander walked into my field of view while I was studying House Sparrows in the yard. This species, which is also known as the Western Tiger Salamander, is a mole salamander which is found from the southern parts of western Canada southward to northern Mexico. It is generally nocturnal in habit. Many of the observations of this species, in the Black Range, are of earlier life stages - like the observation of Ian Meloni at this link.



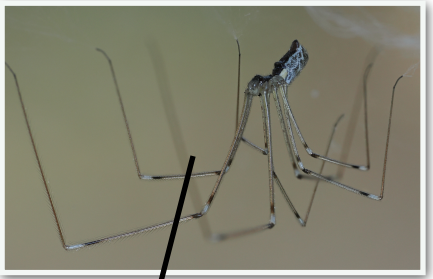


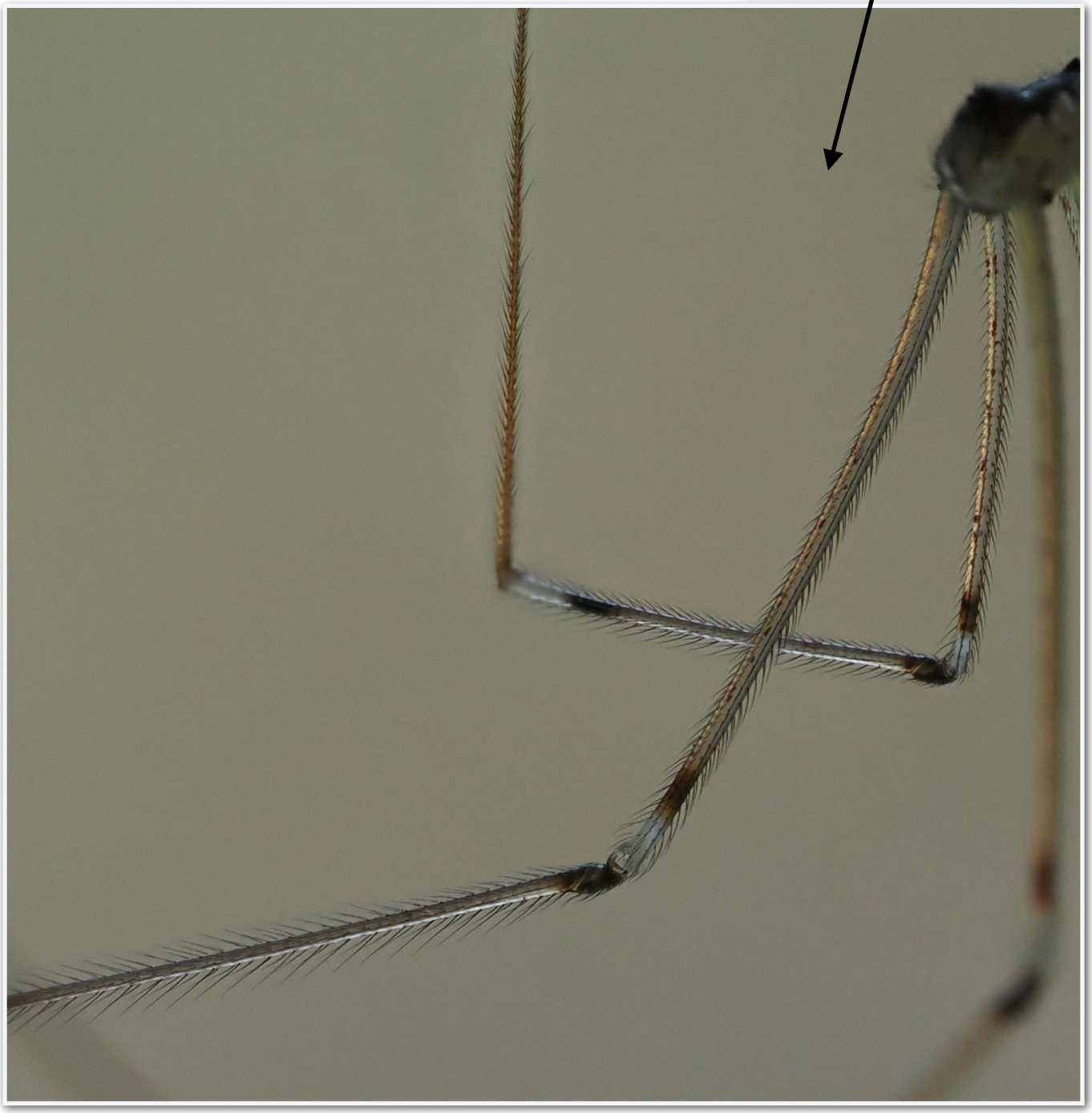
Spider "Hearing"

Here we follow up two entries from previous issues of this journal. The images on this page are of the same individual featured in our last issue, of *Holocnemus pluchei*. That species is a "true spider", having a readily identifiable head and body (as opposed to the other group of creatures called daddy longlegs, the *Opiliones*, which have heads and body fused into one apparent sphere). Our July 2021 issue included an article entitled "Do You Hear What I Hear? - Red-backed Jumping Spider". That article discussed the sensory system in that species which is associated with the hairs on its legs, noting that "Understanding the sensing of airborne stimuli by hairs, as in this study, is not, in itself, great insight. Many species use sensory hairs to understand their environment."

While considering recent photographs of *Holocnemus pluchei* it occurred to us that an image of what spider leg hairs look like might be of interest to some readers.

Extrapolation of capabilities from one individual to another can be problematic, jumping from one species to another can be a leap in inappropriate faith, and from one family to another - well all bets are off. That said, it is not unrealistic to assume that the hairs on the legs of the cellar spider shown here are part of a sophisticated sensory system.









Giant Crab Spider

In *The Black Range Naturalist*, Volume 5, Number 4 - October 3, 2022, we described a few of the spider species found in the Black Range. Here we add the Giant Crab Spider, *Olios giganteus*, in a photograph (upper left) from Tom Lander of Kingston (May 1, 2024).

Other observations of Giant Crab Spider from this area include a photograph by Andrew Cannizzaro from along Palomas Creek on July 30, 2020 (above) and a photograph from Hillsboro (below left) on April 26, 2020, by Jessica Griffin.



Wolves - Facial Expressions

Communication in animals can be very complex and amazingly subtle. Talk to your neighbor about that fence if you would like an illustration of this fact.

In Wolves, like humans, facial expressions play a key role in non-verbal communication. Veronica Maglieri et al., in "Tell-tale signals: faces reveal playful and aggressive mood in wolves", *Animal Behavior*, Vol. 214, August 2024, pp. 1-9, share their research findings about how wolves communicate their mood. Specifically, they found that: "1) Wolf facial displays differ strongly in playful and aggressive contexts; 2) During aggression three different threatening faces can be present; 3) Wolves display two different playful facial displays; 4) Playful and aggressive facial displays always differ in the same key elements; and 5) Play and aggressive facial displays were consistent across three wolf groups.

"The analyses revealed the presence of three different threatening faces . . . mainly performed during aggressive encounters, which differed in the degree of mouth opening and lip stretching. We also identified two different relaxed open mouth facial expressions exclusively performed during play and possibly signaling different levels of playful arousal. Interestingly, facial expressions did not differ between groups thus suggesting a hard-wired facial communication system at least in these two domains." No pictures but an interesting read.

The Giant Skippers of The Black Range

There are seven species called Giant Skipper which are found in New Mexico. There are three species of Giant Skipper (*Megathymus*) found in New Mexico and four species of Giant Skipper (*Agathymus*). None are frequently seen, or at least none are frequently reported. Please visit Steve Cary and Michael Toliver's listing at the Pajarito Environmental Education Center website for an extensive discussion of all of these species.

Species in the genus *Megathymus* use yuccas as host plants while those in the genus *Agathymus* use agaves.

Only one of the New Mexico species of *Agathymus* are found in the Black Range.

The Arizona Giant-Skipper, *A. aryxna* (Dyar, 1905 - Hodges #4132), is found as close as the area north of Pinos Altos and just west of Deming.

The Orange Giant-Skipper, *Agathymus neumoegeni neumoegeni* (W. H. Edwards, 1882 - Hodges #4125) shown at the upper right was photographed in Hadley Draw at Cooke's Peak on October 9, 1995, by Steve Cary. Danny Tipton photographed the Orange Giant-Skipper shown at the center right on October 1, 2020, north of Pinos Altos (shown here under a Creative Commons license via iNaturalist). Parry's Agave, *Agave parryi*, is the typical larval host plant for this species. Its wingspan can reach 2.4 inches (6.1 cm). This species is considered "threatened".

Poling's Giant-Skipper, *Agathymus polingi* (Skinner, 1905 - Hodges #4143) is apparently found no closer than the Boothill of the state - but there is an unconfirmed sighting from the Silver City area.

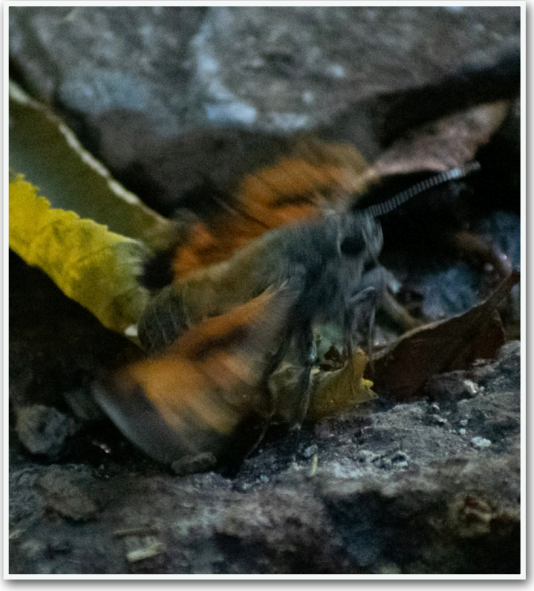
***Agathymus mariae* (W. Barnes & Benjamin, 1924 - Hodges #4136) the Lechugillia Giant Skipper is a species of southeastern New Mexico.**

Two of the New Mexico species of *Megathymus* are found in the Black Range.

There are several reports of *Megathymus yuccae ssp. navajo*, the Yucca Giant-Skipper (Boisduval & LeConte, 1837 [subspecies: Skinner 1911] - Hodges #4145) from the Black Range. Steve Cary took the photograph at the bottom right on April 4, 2016. In the San Andres Mountains, another subspecies - "Reuben's" Yucca Giant Skipper, *M. y. reubeni*, is found.

The Ursine Giant-Skipper, *Megathymus ursus* (Poling, 1902 - Hodges #4151) is rarely depicted





In the Black Range look for the:

- **Orange Giant-Skipper (above and left);**
- **Yucca Giant-Sipper (below), and**
- **Ursine Giant-Skipper on the following page.**



in most references. The wingspan of this species can reach 3 inches. As with others in this genus, the males do not feed but will take water from mud. One of the common larva host plants for this species, in our area, is *Yucca baccata*, the Banana Yucca. The photographs of Banana Yucca, in fruit and with fruit opened/seeds exposed shown here, were taken along the Hillsboro Peak Trail, in September 2023, not far from where the photograph at the bottom was taken. At the arrow, there may be a larva, perhaps of this species.

Megathymus violae (D. Stallings and Turner, 1956), Viola's Giant-Skipper, was once considered a subspecies of the Ursine Giant-Skipper. It is generally assumed to range east of the Rio Grande rift (Butterflies of America).



Jessica Murphy (Griffin) photographed the individual shown below on July 27, 2023, near Hillsboro Peak. There is some disagreement about whether this individual is *M. violae* (Viola's Giant-Skipper) or *M. ursus* (Ursine Giant-Skipper).





Bulia deducta/ similaris

The wingspan of the moth to the right is about 3 cm (1.2 inches). The body length is just over half that. This is a small moth, not tiny, but small.

The genus was first described by Francis Walker in 1858. Walker was born and worked in England. Some authorities would consider him notorious, rather than noteworthy, because he was, even in his lifetime, considered a bit casual in his taxonomic determinations.

There are three species of Bulia in the United States (five worldwide). One (*Bulia schausi*) has been reported only from Arizona. The other two have a more widespread distribution, mostly in the west, and both are found in New Mexico.

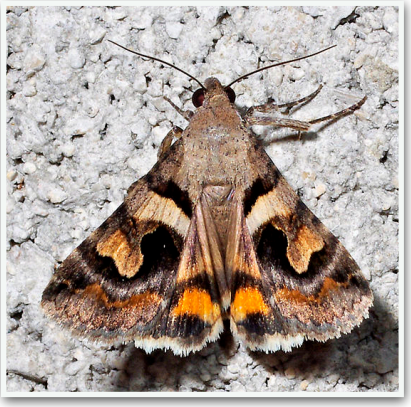
The three species found in the United States can not be distinguished from each other "without dissection or DNA sequencing". Thus, the title of this article.

Mesquite are the caterpillar host plants of these species.

The individual shown at the right was photographed in Hillsboro on July 6, 2024. It is rather drab in appearance, but not all individuals are - some are quite colorful. This can be seen in the image below by Dave Barker, shown here under a Creative Commons license. How do you get to an identification which encompasses all of the images on this page? Patience.







Billie-Bob Bacon-Grease
(BBBG - pronounced b. b. bag)

For the first time, we deviate from our policy of no ads to announce the April 1, 2025, release of Billie-Bob Bacon-Grease's new hit on "Spot the Fly".

b. b. bag has been called the harbinger of the future, the voice of logic, and the insight that we all lack. Their new release has been heard by millions but the only known copies are found here on this page, presented for your enjoyment by the folk at The Black Range Naturalist. Follow the links below or visit their homepage.

Lost in the Black Range

Physically it can be very difficult to get lost in the Black Range. Everything is up or down and the down always leads to the Gila, the Mimbres, or the Rio Grande. But if you exist in your own head, getting lost in the Black Range is easy enough to do.

Black Range Fluorite

More than silver and gold were mined in the Black Range. Near Cooke's Peak (we always insist that "Cooke's Range" is really part of the Black Range) there was lots of fluorite to be had.

Born in the Black Range
Where the shadows dance
Earth whispers secrets
Takin' every chance
Fluorite veins runnin' deep
'neath our feet
Banjo strums
Telling tales bittersweet

She plays the flute while I swing the pick
Lost in her notes
Time's slow tick
Miner's sweat mixin' with mountain mist
Her melody's kiss
On lips lightly kissed

Oh
Black Range treasures
Under morning' light
Diggin' dreams
in that fluorite
Banjo and flute in harmony found
Echos of love
in that hollowed-out ground

Mountain Lion Research

They roam the hills, both lions and researchers.

Out in the wild, where the mountains touch the sky
There's a creature that roams, with a watchful eye
Mountain lion, sleek and sly
In the shadows, you might see him passin' by

Mountain lion, runnin' free
In the great outdoors, where he's meant to be
Researchers study his every move
To learn about his way of life, how he grooves

Trail cameras set up, in the dark of night
Capture his image, under the moonlight
Studying his habits, his territory
To protect his home, and ensure his glory

Mountain lion, runnin' free
In the great outdoors, where he's meant to be
Researchers study his every move
To learn about his way of life, how he grooves

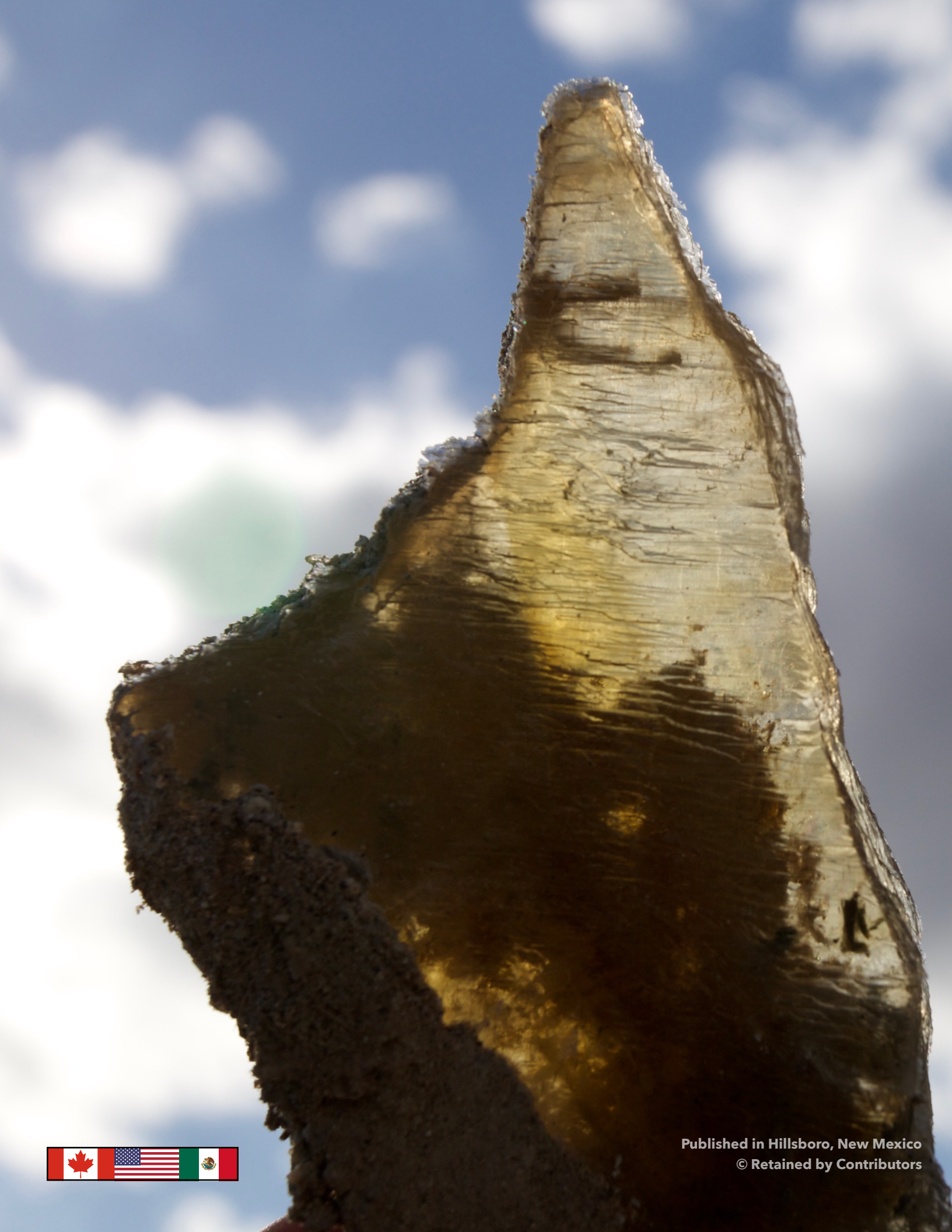


Billie-Bob Bacon-Grease enjoy field research in between gigs.



b. b. bag is a creation of the Black Range Naturalist, with support from various large language model AI programs, as is their music. No attempt has been made to make it good. Any chimp can write Shakespeare with the right algorithm and that, my friends, is the root of our hope and fear.

Billie-Bob Bacon-Grease
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Published in Hillsboro, New Mexico
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