THE

SAN LUIS VALLEY HISTORIAN

VOLUME XXII NUMBER 3, 1990

Great Sand Dunes National Monument

THE

SAN LUIS VALLEY HISTORIAN

VOLUME XXII NUMBER 3, 1990

Published by

THE SAN LUIS VALLEY HISTORICAL SOCIETY

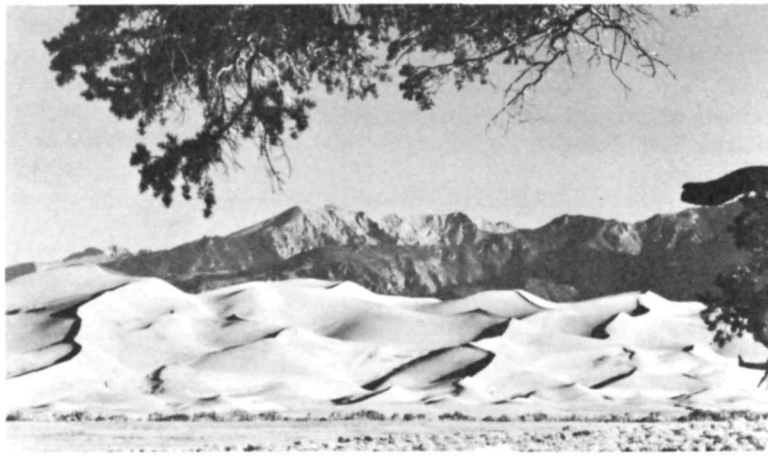
Annual memberships in the San Luis Valley Historical Society are $12.00 Single issues of the quarterly issue are $4.00; four issues ordered at once are $12.00 plus $2.00 postage and handling. Requests for memberships, orders for back issues of THE HISTORIAN, and other correspondence may be sent to;

THE SAN LUIS VALLEY HISTORICAL SOCIETY, INC.
P.O. Box 982
Alamosa, Colorado 81101

Printed by
O&V PRINTING, INC.
Alamosa, Colorado

Contents

Illustrations



View of the Dunes by Dodge, Aug. 31, 1944.
Courtesy National Park Service

Natural History of the Great Sand Dunes

BY LIBBIE LANDRETH

Gracing the southern Colorado skyline are North America's tallest dunes, the Great Sand Dunes. The highest dunes rise 700 feet above the San Luis Valley floor. The dune field covers approximately 55 square miles. Situated between two mountain ranges, the dunes nestle in a pocket of the Sangre de Cristo Mountains. Both the San Juan mountain range 60 miles west and the Sangre de Cristo mountain range to the east contributed to dune formation. Although appearance is barren, the dunes and surrounding environment provide habitat to a variety of plants and animals.

The major stream which brought sand and other sediments into the San Luis Valley was the Rio Grande, headwaters of which are in the San Juan Mountains. Glacial action also contributed to sand deposition. Prevailing southwesterly winds pick up the finer sediments and carry them toward the formidable Sangre de Cristo Mountains. The winds surge upward through three mountain passes — Mosca, Medano, and Music passes. As the wind climbs over these passes it loses

energy and dumps the sand at the foot of the mountains.

The Great Sand Dunes are a dynamically stable system. Even though there is considerable sand movement each time the wind blows, the major dunes remain relatively unchanged. While the exact mechanism controlling dune size and stability is not well understood, current theories credit a combination of the high water table that creates moist and stable dunes, the sand trap effect of the surrounding mountains, the limiting effect of Medano Creek on sand migration, and the reverse winds that periodically blow from the northeast.

There are several kinds of sand in the dune field. The smaller a sand grain is, the more it has been bounced and battered. The finer sand particles are probably from the San Juan Mountains, having travelled a greater distance. The most likely source for the coarse-grained sand is the adjacent Sangre de Cristo range.

Sand is comprised of various minerals. The black residue in the sand is magnetite or iron oxide, a heavier mineral appearing in patches on the surface of the dunes. A large percentage of the sand is quartz, a colorless white mineral.

To walk out on the dunes during early spring and summer visitors must cross Medano Creek. "Medano" is Spanish for "sand dune." This creek exhibits a peculiar phenomenon called "surge flow." The water mirrors the sandy stream bed. Its "surging flow" results from sand ridges built up by the swift shallow flow. Water held back by these ridges surges forward when the ridges collapse due to oversteepening. This cycle of ridges forming plus waves breaking and surging flow repeats itself approximately every 15 seconds.

Although the dunes appear lifeless and sterile, close inspection reveals the existence of both plants and animals. Life in the dunes must be adapted for repeated extremes of heat, cold, wind, sun, and dryness. Few plants and animals actually live in the dunes, but there are some exceptions.

Two grasses, blowout grass and Indian rice grass, thrive in the sand. Strong root systems and the ability to resprout when covered by shifting sands allow the grasses to endure. Scurfpea survives in the shifting sands by means of long horizontal stems called "rhizomes." New plants sprout from these stems when a plant becomes buried by sand. In moist years the prairie sunflower is conspicuous in the sand, but growing conditions are thwarted in dry years.

Most animal life in the dunes goes unnoticed; however, tracks in the sand leave telltale signs of animal visits. Tracks of the coyote, bobcat, rabbit, and mule deer (most numerous large mammal at the dunes) in the sand testify to busy night life.

The dunes community includes insects and a few small rodents. Many of the insects active during the day are strong fliers. They rest on blades of grass or flower stalks and fly from perch to perch avoiding the blistering heat of bare sand. On sunny days ground-dwelling insects generally rest in the shade or in the shelter of burrows. Three types of insects found nowhere else in the world reside here — the Great Sand Dunes tiger beetle, the giant sand treader camel cricket, and a specific variety of circus beetle. The nocturnal kangaroo rat resides in dens in the vegetated areas within the dune field and near the base of the dunes.

The possibly thousands-years-old Great Sand Dunes are remarkably complex with secrets yet to unfold on landscape created from wind and sand.

Cultural History of the Great Sand Dunes

BY C. JOE CARTER

People enjoy visiting the San Luis Valley of Colorado and the Great Sand Dunes today just as others have for thousands of years. Folsom Indians (10-15,000 years ago) hunted and camped near the dunes and undoubtedly walked among them for pleasure. Later Indians also enjoyed the area as indicated by the campsites and artifacts left behind.

Spanish Conquistadores were in the San Luis Valley (hereafter printed as SLV in this story) by 1599 when Juan de Zaldivar came north from New Mexico. Juan de Onate's group undoubtedly followed the Rio Grande into what is now Colorado in the 17th century. After the 1680 Pueblo revolt and reconquest of New Mexico, Governor Don Diego de Vargas led an expedition into the SLV in 1694, but his records made no special note of the Sand Dunes. In late summer of 1779 Juan

Bautista de Anza came through the SLV on an expedition against unfriendly Indians. They and unknown explorer-soldiers named many of the mountains, creeks, rivers, and valleys during their travels.[1]

Early in the 1800s the first American explorer entered the SLV on Jan. 27, 1807. Zebulon Montgomery Pike glimpsed the Sand Dunes as he descended Mosca Pass and described them in his *Journal.*[2]

> 28th, Jan., Wednesday. — Followed down the ravine and discovered after some time that there had been a road cut out and on many trees were various hieroglyphicks painted; after marching some miles, we discovered, through the lengthy vista at a distance, another chain of mountains and nearer by at the foot of the White mountains, which we were then descending, sandy hills. We marched on the outlet of the mountains, and left the sandy desert to our right; kept down between it and the mountain. When we encamped, ascended one of the largest hills of sand, and with my glass could discover a large river, flowing nearly north by west, and south by east, through the plain which came of the third chain of mountains, about N. 75° W. the prairie between the two mountains bore nearly north and south. I returned to camp with the news of my discovery. The sand hills extended up and down at the foot of the White mountains, about fifteen miles and appeared to be about five miles in width.
>
> Their appearance was exactly that of a sea in a storm (except for color) not the least sign of vegetation existing thereon. Distance 15 miles.

Pike observed the route across Mosca pass served the Indians as an outlet to the Plains[3] and generally has much less snow during winter than those to the north and south. [Ed. Note: Some historians believe Pike came through Medano Pass. A group of hikers reenact the Pike Hike every year on Jan. 27.] Pike and his men found Mosca pass the most convenient in 1807 and most people crossed the Sangre de Cristo mountains by this route. Pike's *Journal* provided good information about the Colorado Rockies for increasing numbers who headed west to trap fur-bearing animals.

Mountain men blazed good trails across the SLV. One route turning south around Mt. Blanca and providing a link with the Taos route was known as the Trappers' Trail. Mountain men were colorful characters who continue to fascinate western history readers. The more popular trappers who worked in the SLV during the 1820s include: James Pursley, Joseph Philbert, William Becknell, John McKnight, Thomas James, Hugh Glenn, Jacob Fowler, Nathaniel M. Pryor, Antoine Rubidoux and many others.[4] Joseph Williams trapped in the area for

many years. His journal[5] recorded on Aug. 20, 1842, "We are now on the waters of the Del Norte River . . . This is a beautiful valley, about eighty or a hundred miles long. We remain some time in this valley, encamped by some beautiful streams of water." The most famous of all mountain men, Kit Carson, stayed in the area and later commanded Fort Garland. Moses Carson, Aaron B. Lewis, Dick Wooten, Ceran St. Vrain and Carlos H. Beaubien also worked here. Folk hero Tom Tobin arrived in the 1830s and remained the rest of his life. Two Hispanic mountain men of prominence were Domingo Lamelas and Mariano Medina.[6]

Because of the declining fur trade in the early 1840s, few people entered the SLV; however, Captain John Charles Fremont, arriving on his fourth western expedition in the winter of 1848, was looking for a railroad route. Against good advice he attempted to cross the Valley and the San Juan mountains in December and met disaster.[7]

In 1851 the U.S. Government assigned troops to police the newly acquired territory. Settlement in the SLV was less risky with soldiers around and several permanent villages were founded in the southern river valleys. Travel increased with military aiding the maintenance of roads and trails, especially south and east of Ft. Massachusetts which was established in 1852. This army post soon became a popular stopping-off place for travelers. Captain John W. Gunnison, seeking a railroad route, rested there for a time in 1853.[8] Gwin Harris Heap, traveling in the Valley in June 1853, noted that Mosca pass would probably make the best wagon road into the Valley.[9]

Ft. Garland replaced Ft. Massachusetts in 1858 and soon became the center of activity in the Valley. Prospectors from the gold fields purchased supplies there in 1859 and previewed potential areas of the Valley for later prospecting. Hayden's surveying teams arrived in the 1870s[10] and General William Jackson Palmer's Denver and Rio Grande Western Railroad crossed the Sangre de Cristos and connected the SLV with the rest of the world.[11] By this time William Gilpin, William Blackmore and others began land speculating which still flourishes.[12]

Roads

In 1871, only a decade after establishment of the Colorado Territory, Frank Hastings received a charter from the

legislature to build and maintain a toll road over Mosca pass. An early gatekeeper known only as "English Billy" impressed travelers with his team of elk that were broken to harness.[13] Some business for the road came from the famous Medano ranch. The Dickey brothers consolidated numerous small holdings into a 130,000-acre operation by 1882 when they sold it to Adee and Durkee, a brother-in-law of Hastings.[14]

T. B. Seely and Doug Holly bought the toll road charter after a few years. Holly's brother Charles operated the road and supervised routine maintenance and repairs. In the 1890s, Will and Coley King purchased the charter and hired Linnie King as gatekeeper with Ike Denton in charge of maintenance. Rates posted for passage by the Kings were: $2 per wagon, $1 for horse and rider, 50¢ a head for cattle and sheep.[15] Around the turn of the century the kings sold the road to the State of Colorado. Traffic increased to 30-40 wagons a day and public pressure demanded opening the popular passage as a public road. The state had more resources to keep the road in good repair which became expensive when periodic floods destroyed portions of it such as in 1880 and 1905.[16]

By 1911 the road was totally destroyed. Parly Liggie managed to pick his way down the west side into the Valley before the road was completely washed out.[17] With the Mosca pass route closed, travelers used the old D.& R.G. railroad over La Veta pass and when the railroad moved farther south with installation of standard gauge track about 1890. As new roads were being designed in the 1920s, the Mosca pass route was often suggested.[18]

The lack of a through route did not hinder the visitation at the Sand Dunes. In 1926 the Alamosa Chamber of Commerce erected markers to direct tourists.[19] Interest in that area as a special tourist spot increased when the U. S. Government withdrew the dunes from homesteading in 1930.[20]

In 1932, while awaiting notification of national monument designation, efforts to improve the road began. Alamosa County appropriated the funds and county road superintendent Bert McKee supervised the work. He urged heavily loaded vehicles to seek an alternate route to facilitate construction. Alamosa general contractor Nick Ortega kept 12 men busy. Ortega and McKee urged people to postpone trips to the dunes until the new road opened to regular traffic on March 27, 1932.[21]

For almost 20 years the best approach to the Great Sand Dunes National Monument was east from State Highway 17 at Mosca. Chamber of Commerce secretary Wilbur Foshay exaggerated a little to potential visitors when describing the route.[22] Valley people knew that they faced over 20 miles of "poor road with plenty of dust and many rough spots."[23] In 1959 the Colorado State Highway Department paved the road from Mosca and designated it State Highway 150. With this encouragement some groups urged the reconstruction of the Mosca pass road as a good alternative to the Plains route. A feasibility study by the State Highway Department in 1960 revealed cost and traffic problems and potential environmental damage which were unacceptable. However, Medano pass road, maintained by the U. S. Forest Service, remained available to people with four-wheel drive vehicles.[24]

When tourists arrived in the Valley in 1973 they found a new route open to the Sand Dunes. The State Highway Department improved and paved the southern approach north from Highway 160 at a cost of $350,000, according to Engineer Don Knapp. This was designated the new State Highway 150 and the old road from Mosca reverted to the jurisdiction of Alamosa County. Robert Dudley, State Highway Engineer who did much of the planning for the new road, was honored upon his retirement by designation of the northern-most portion as "Dudley Drive."[25]

The Monument

The Monte Vista Chapter V, P. E. O. sisterhood held their regular meeting in June 1930. This meeting started the ball rolling for the benefit and enjoyment for people in many years to follow.

Mrs. Elizabeth Spencer gave the program that day. She directed her prepared remarks to the issue of having the SLV Sand Dunes designated a National Monument. She suggested the local P. E. O. Chapter assume primary responsibility for leading the monument effort.[26]

Her recommendation was warmly accepted by the group. P. E. O. President Mrs. Ward Darley appointed Mrs. Spencer to chair the Sand Dunes committee. Mrs. Jean Corlett and Mrs. Myrtle C. Woods were also appointed to serve. Recognizing the size of the effort, the group invited the other P. E. O. Chapters to join in the work. Del Norte appointed Mrs. Nina M. Weiss

as chairman of their group, assisted by Daisy D. Dannen and Nell B. Meyer. Alamosa Chapter A. E. President Millicent Holbrook Velhagen accepted chairmanship and asked Mrs. Caroline A. Platt, Ayne H. Shull and Jessie B. Hamman to serve with her. Organizational details were soon completed and this group of leaders began work to accomplish their announced goal.[27]

The final decision would be made in Washington, D. C. To emphasize local support for the project, the P. E. O. sisterhood enlisted the aid of every possible organization and individual. Prominent citizens were urged to write to Colorado congressional incumbents. Photographs of the Sand Dunes were included in the material sent to Washington. Articles from the local newspapers and other sources increased the portfolio. A petition in support of the monument designation, drawn up by Monte Vista attorney and former Lieutenant Governor George Corlett, was introduced by Democratic Senator A. Elmer Headlee of Monte Vista and passed by the Colorado General Assembly. Armed with great support from the people and the assurance of politicians in Colorado, Republican First District Congressman William R. Eaton assisted in drafting the bill he personally carried to Washington. Republican Third District Congressman Guy U. Hardy accepted the challenge and worked diligently on the issue. Keeping the SLV committees informed of progress, he advised them on their next course of action and maintained a sincere interest in the work.[28]

It seemed an eternity to the P. E. O. Committee, but it was only six months from inception to when Republican U. S. Senator Lawrence Phipps notified the SLV group of the appropriation of funds for an official inspection of the Sand Dunes area. On Feb. 14-15, 1931, Supt. Roger Toll, Yellowstone National Park, toured the area and visited with people working toward the national monument designation.[29] The report presented to the National Park Service by Toll was not entirely favorable but proved to be only a minor setback for the sincere and dedicated women.[30]

The P. E. O. Chapters received their reward on March 17, 1932, when President Herbert Hoover signed the proclamation creating the Great Sand Dunes National Monument. It was the 36th National Monument in the U. S. and the second one in the SLV. (Wheeler National Monument

Ridges of Wind and Erosion by Bob Haugen, June 1961.
Courtesy National Park Service

was so proclaimed in 1908. Never developed, the area reverted to the National Forest Service in 1950 and redesignated the Wheeler Geologic Area.) Knowing that the Sand Dunes had competed with many other projects in Washington, Mrs. Ward Darley commented: "In view of the fact that there were ninety like projects to be considered by the National Park officials and the President of the United States, the P. E. O. Sisterhood of the Valley is proud and happy to have accomplished this lasting benefit to the SLV, Colorado and the entire nation."[31]

A local paper headlined the event with enthusiasm, giving special credit for the work to the P. E. O. Chapters. Identical telegrams received by Millie Velhagen, Elizabeth Spencer and others from Representative Hardy said: "I think the National Park Service will tell the newspapers tomorrow (March 19, 1932) that the President has signed a proclamation creating the Great Sand Dunes National Monument."[32]

The reporter noted that Congressman Hardy usually acted conservatively. The "official word" spread throughout the Valley quickly and everyone knew that President Hoover had signed the proclamation and it would be enacted soon. Congressman Hardy received generous praise for his role in the monument designation. The *Daily Courier* speculated the outcome had been obvious for some time, i.e., "ultimate designation of the area as a national monument, but it was not expected that the objective would be achieved so soon. Creation of the newest national monument climaxes a long and

consistent campaign by local interests and Mr. Hardy to obtain the needed action."[33]

The proclamation arrived in the Valley about a week later. Word also came that Congressman Hardy had spent a great deal of time conferring with the Director of the National Park Service, Horace M. Albright. He also worked closely with the NPS Senior Assistant Director A. E. Demaray.[34]

The grandeur of the new monument received favorable publicity in the local and regional press. The Colorado Chamber of Commerce President F. H. Reid praised the efforts and publicized the great fun a visit to the Sand Dunes offered everyone.[35] An editorial in the local newspaper by Robert H. Berkov entitled, "SUCCESSFUL AT LAST" reflected Valley people's feelings.[36]

> The long-awaited creation of a national monument for the famous San Luis Valley Sand Dunes seems to be at hand, climaxing a long and earnest campaign by those interested in the project. Congressman Guy U. Hardy, who has pushed the matter relentlessly in official circles; Mrs. Millicent Velhagen and the Monte Vista and Alamosa P. E. O. Chapters at the behest of Mrs. Frank C. Spencer, who have all been active in an unofficial capacity, are to be congratulated on the successful termination of their efforts.

Berkov went on to extol the beauty of the natural phenomenon, its uniqueness and what designation as a national monument would mean to the people. He cited the value of publicity to the progress and improvement of the site. In another editorial headlined, "FINE PUBLICITY,"[37] Berkov praised efforts by Alamosa businessmen to publicize the Sand Dunes and advertise the SLV by means of windshield stickers on the cars of each and every visitor to the Dunes.

In the same time frame of accomplishing national monument status for the Sand Dunes, work was ongoing to get the same designation for Pike's Stockade on the Conejos River; but when the Sand Dunes proclamation was signed, efforts diminished regarding Pike's Stockade and it was soon forgotten. The site had become a State Historical Monument in 1925.[38]

Development of the Sand Dunes

When the Great Sand Dunes National Monument began operations in March 1932 quick development was found to be unreasonable. The Great Depression enveloped the country

and government spending for projects like this one ranked low on the list of priorities. However, some activity did begin.[39]

Glen King became the first employee and gathered data on the number of visitors. His work station was immediately north of the Zapata Ranch where he would count the automobiles that turned north into the monument area.[40] Recording the license plate numbers, King was able to estimate the number of visitors. Russell Dunn was caretaker of the monument. Administrative authority for operations came from Mesa Verde National Park and rangers were temporarily assigned to the Valley. These included Woodrow Peppers and Kenneth Wallace.[41]

With the economy strengthening, the long-awaited development began. Late in 1938 plans were announced for roads within the monument and a picnic area with sanitation facilities and fireplaces plus custodial services.[42] Supt. Jesse L. Nusbaum of Mesa Verde Park presented the plans in Alamosa on Dec. 9, 1938. The road would be improved from the monument boundary to the foot of Mosca pass. All the arrangements were to be made and construction to start on Dec. 16, 1938. Per local newspaper comment: "The work...will mark the realization of the hopes of Alamosa leaders for years."[43]

An engineer from Alamosa supervising much of the early work, Howard Reins[44] coordinated the different projects of the Works Projects Administration and the Civilization Conservation Corps.[45] In 1939 Mesa Verde Supt. Paul Franks announced plans for a superintendent's residence and a combined headquarters-entrance station. Work began Sept. 18, 1940, on the adobe-type construction which blended with the terrain. Howard S. Rines became the first resident ranger.[46] During the war building stopped and visits decreased. Former Hooper H.S. Supt. Bert Clarke became ranger/acting custodian from May 1942 to May 1946.[47]

Ted Sowers became Superintendent in 1946. Valley native Jack Williams began a long and distinguished career with the National Park Service there about this time.[48] The Monument operated under Mesa Verde National Park control for several years and under administrative control of the Southwest National Monument Group which lasted for a brief time. This was followed by unit status in 1946 answering to the Santa Fe office. The monument now operates under direction of the

Rocky Mountain Regional office in Denver.[49]

Long-time SLV resident, Glen Bean, worked at the Sand Dunes in 1946, returning as Superintendent in May 1950 and remaining until November 1953. After serving 30 years in the Park Service he retired to the Valley and has stayed involved with the dunes. He has been on the boards of Southwest Parks and Monuments Association that has operated the visitor center bookstore since 1949. He was also instrumental in establishing the Friends of the Dunes in 1989.

Starting in the 1960s, visits to the Sand Dunes increased steadily due to the new road. Facilities grew to serve the public and make their visits more comfortable. The major growth in facilities was accomplished by the "Mission 66" program. Construction of the visitors' center began in the summer of 1961 and moved the Great Sand Dunes into the class of a modern facility. Monument roads were rebuilt and the Pinyon Flats campground opened in 1964.[50] The amphitheatre opened in 1966 and provided facilities for special presentations and programs. As "Mission 66" ended, the Sand Dunes had adequate housing for rangers along with a well equipped maintenance shop. Supervising much of this work was longtime Superintendent Harold Schafsma who served from 1953 to 1968 and was reassigned to Tonto National Monument.[51] More recent superintendents have been Jim Carrico 1969-75, Dennis Huffman 1975-80, Robert Reynolds 1980-83, Robert Reyes 1983-88, and Bill Wellman 1988-present.

The original park residence was converted to monument headquarters in 1988 and a hiking trail from Pinyon Flats Campground to Little Medano Creek was opened in 1990. Future plans call for extending the hiking trail to Sand Creek in the northwest corner of the monument and expansion of the visitor center to include an auditorium and additional exhibits.

The monument's boundary has changed over the past half-century. Several parcels of land were added to consolidate the dune mass within the boundaries. Important acquisitions were the inholdings of Ron Jousma and Mr. and Mrs. Howard W. Shockey. Three inholdings are still to be acquired.

The vision of Elizabeth Spencer and the women of the P. E. O. sisterhood for the Sand Dunes worked much as they thought it would. Some of these women continued their support of the Monument for many years. An additional reason

for the Great Sand Dunes National Monument being one of the most enjoyable parks in the entire system has been the outstanding personnel of the National Park Service who have served this area for over fifty years. Today, the citizens of the San Luis Valley continue to support the monument. Friends of the Dunes, a citizens' support group, was formed in 1989 to assist the Monument in improving facilities, research and sponsoring special activities.

References

1. Luther E. Bean, LAND OF THE BLUE SKY PEOPLE (Alamosa, 1964), 24-25, and Virginia McConnell Simmons, THE SAN LUIS VALLEY: LAND OF THE SIX-ARMED CROSS (Boulder, 1979), 14-16.
2. Carrol Joe Carter, PIKE IN COLORADO (Ft. Collins, 1978), 17-18, see also Harvey L. Carter, ZEBULON MONTGOMERY PIKE (Colorado Springs, 1956), 16, and Donald Jackson, THE JOURNALS OF ZEBULON MONTGOMERY PIKE (Norman, 1966).
3. Carrol Joe Carter, PIKE IN COLORADO (Ft. Collins, 1978), 17-18, and Harvey L. Carter, ZEBULON MONTGOMERY PIKE (Colorado Springs, 1956), 16.
4. See especially articles by Harvey L. Carter et. al. on many of the mountain men in LeRoy R. Hafen (ed.), MOUNTAIN MEN AND THE FUR TRADE (Glendale, 1965-1972), 10 volumes.
5. William S. Wallace, "Antoine Robidoux," IBID., IV, 266-67.
6. Hafen, IBID.
7. Simmons, IBID.
8. Simmons & Bean, IBID.
9. Gwinn Harris Heap, CENTRAL ROUTE TO THE PACIFIC FROM THE VALLEY OF THE MISSISSIPPI TO CALIFORNIA (Philadelphia, 1954), 30.
10. F. V. Hayden, GEOLOGICAL AND GEOGRAPHICAL ATLAS OF COLORADO (n.p., 1881).
11. Simmons, IBID., 85-86, and Bean, IBID., 57.
12. William Blackmore, COLORADO: ITS RESOURCES, PARKS AND PROSPECTS AS A NEW FIELD FOR EMIGRATION (London, 1869).
13. Frank C. Spencer, THE STORY OF THE SAN LUIS VALLEY (Alamosa, 1925 & 1975), 57.
14. Luther E. Bean, ONCE UPON A TIME (Alamosa, 1975), and Simmons, IBID., 129.
15. Cuvier H. Jones, "The Herard Family," SAN LUIS VALLEY HISTORIAN, XI No. 2, 7-13, and manuscript in Adams State College Archives.
16. ALAMOSA COURIER, May 6, 1905 and CENTER DISPATCH, June 9, 1905.
17. Jones, IBID.
18. ALAMOSA JOURNAL, January 15, 1925, and February 15, 1925, DENVER POST, April 15, 1930.
19. ALAMOSA JOURNAL, July 1, 1926.
20. DENVER POST, January 15, 1930.
21. DAILY COURIER, March 19 & 23, 1932.
22. DAILY COURIER, May 13, 1950.
23. DAILY COURIER, June 6, 1950.
24. National Park Service, MASTER PLAN - GREAT SAND DUNES NATIONAL MONUMENT, (Denver, 1977).
25. PUEBLO STAR JOURNAL, June 17, 1971, and DAILY COURIER, March 30, 1973.
26. Pauline Day, P.E.O. Manuscript, Adams State College Archives.
27. IBID.
28. IBID.
29. ALAMOSA JOURNAL, March 22, 1932.
30. Luther E. Bean (ed.), FOLKS AND FORTUNES (Monte Vista, 1949), 25.
31. Day, IBID.
32. DAILY COURIER, March 19, 1932.
33. IBID.
34. DAILY COURIER, March 29 & 30, 1932, and ALAMOSA JOURNAL, April 1, 1932.
35. ALAMOSA JOURNAL, March 29, 1932.
36. DAILY COURIER, March 19, 1932.
37. DAILY COURIER, March 21, 1932.

38. Adams State College Archives.
39. Bean, IBID.
40. Jones, IBID.
41. IBID.
42. DAILY COURIER, December 11, 1938.
43. IBID., December 10, 1938.
44. Jones, IBID.
45. IBID.
46. DAILY COURIER, March 15, 1960.
47. Jones, IBID.
48. DAILY COURIER, November 28, 1950.
49. IBID., March 15, 1960.
50. IBID., November 14, 1964.
51. PUEBLO STAR JOURNAL, February 23, 1969, and EMPIRE MAGAZINE (DENVER POST), November 22, 1970.

The Herard Family

Among the early settlers who came into the San Luis Valley was the Herard family. These hearty pioneers became a legend to those in the eastern part of the Valley who knew them.

Jean Francis Herard was born in France in January 1833. His wife Julia Babey was born in Switzerland in April 1841. They died in May 1892 and September 1897, respectively. Both were buried in Medano Canyon until a subsequent law required burial in a legal cemetery, therefore they were moved to Alamosa Cemetery.

Ulysses (better known as Ulus) Herard, at age 13, came to the San Luis Valley with his father, mother and sister from Kansas in the Spring of 1872. The family settled north of Pole Creek in the area of Deadman Gulch. They were there three years when authorities from the Baca Grant informed them that they could not obtain a clear title to the land as it was on grant property. So in 1876 they relocated and homesteaded in Medano Park. Their first cabin was constructed of hand-hewn logs cut from the abundant timber in the area.

When Ulus was about twenty years old he was kicked in the jaw by a horse, breaking both eardrums and making him practically deaf in both ears. He used a large hollowed-out cow horn for people to speak into, as well as a pad and pencil for friends and neighbors to write on.

About 1890 the French family of Herard established a fish hatchery and stocked the ponds with rainbow trout. After the elder Herard died in 1892, Ulus stocked the ranch with

Ulysses Herard, "Frenchman."

thoroughbred horses, and it is presumed their offspring were part of the herd of wild horses that roamed the Sand Dunes area for years. Ulus also started a small herd of Hereford cattle. There were no fences in the area so he had a wide range for cattle grazing. It was reported after his death in 1940 that about 1,500 head of cattle were rounded up.

Ulus' wife, Mary Frances Dickerson, was appointed postmistress at the Herard Post Office on November 13, 1905. This was an extension of the Hooper-Liberty route and was located in the family home on Medano Creek. When the office was closed on December 15, 1912, the records were moved to the Liberty office eight miles away.

After Mary Frances left him, Ulus lived alone for many years in the old homestead. He trapped more than one hundred mountain lions, but he is probably better known for his encounter with a black bear. He was on his way to round up cattle on Medano Pass and as he rounded a turn in the trail he was met by two bear cubs who let out loud and terrified squalls, bringing the mother bear running to rescue her cubs. His horse bolted, leaving Herard afoot. Ulus went for his gun which he carried at all times, but it jammed and he was left with only a handaxe carried in his belt. He used this to kill the bear.

Ulus Herard never thought of cheating anyone and would not have tolerated anyone attempting to cheat him, either. His cabin door was never locked and visitors were always welcome.

The only considerations were those of common courtesy, i.e., clean up, wash the dishes and refill the woodbox from the huge stockpile outside. The "Frenchman" was a good neighbor and expected the same treatment from others. Ulysses (Ulus) Virgil Herard died in September 1940 and was buried at Canon City, Colorado.

In remembrance of the Herard family, the Board of Geographic Names approved for federal use the name Mount Herard in 1984. This mountain, 13,297 feet in elevation, is located in the Sangre de Cristo Range 3.5 miles west of Medano Pass and 22 miles east northeast of Hooper, Colorado. On its slopes the Herard family first homesteaded property in 1876 and maintained a ranch there until 1948.

A Legend of the Sand Dunes*

Since early times a story has persisted about a young couple settling on the Huerfano headwaters but no one knew their origins. It was rumored they originated in the San Luis Valley but their migration was unknown. An explanation, as offered by a very old resident of the Valley, follows in condensed form.

Soon after the fort was established at the foot of Sierra Blanca, a poor Spanish-speaking family from near Taos settled at the mouth of a small creek near the military reservation. The father cultivated a small acreage and with his only child, a son, tended a small flock of sheep which belonged to his miserly rich older brother to whom the poor people were deeply in debt.

One day a Ute chief appeared at the home of the farmer. He had with him a girl he said was stolen from the Navajos and he wished to sell. The girl, too young to talk well, did not appear to be Navajo or an Indian. The farmer remembered there had been a recent ambush on a white family on the Huerfano. Apparently the whole family was killed except for the girl. The farmer borrowed more money from his miserly brother and bought the orphan. They called her Paulita and it was not long before she was helping their son, Benito, tend the flock.

*A condensed version of the reprint with permission from Luther E. Bean, LAND OF THE BLUE SKY PEOPLE, (Alamosa, 1972), pp. 95-97, printed in the San Luis Valley Historian: Vol. XIV No. 2, 1982, pp. 16-17.

Years flew by, the children soon matured, and the girl had grown to be a beauty. The old Chief looked on her with longing eyes and hinted that he'd like to take her back. The old miser also had designs on her as a wife and the poor parents were sure that some day he would demand her as a portion of their debt to him. As fate would have it, that spring the weather had been very cold and dry with the only place in the Valley with grass being at the Sand Dunes, so the miser ordered Benito to drive the sheep to the Dunes for feed. He obeyed.

Paulita was very sorry since she and Benito had grown very fond of one another. She knew it was also the time of year when there were often fierce storms at the Sand Dunes that could suffocate people and flocks. She would frequently climb the ridge back of their home to watch Benito's progress to the Dunes all the while checking the clouds on the San Juans where the storms brewed. Two days after Benito's departure, the wily Chief appeared and inquired for Paulita and seemed determined to take the girl. Since she had gone up the hill to watch, the father told him she was gone and would return in the morning.

When she returned that evening, her father told her of the Indian and his own fears. Immediately she seized a bearskin coat, hurried to the corral, took the Chief's horse, and rushed away after Benito. Next morning the brave awoke and saw his steed gone, soon discovering the girl had taken it and he was very angry. He threw a blanket on an old pack animal and raced after Paulita. He was hardly out of sight when the miserly brother appeared and inquired about the sheep, Benito, and especially Paulita. He heard the whole story and was furious when he found the Indian was going after her. Throwing his saddle on a big bronco, he was immediately bucked off. Soon he was successful in mounting the bronco and getting it headed in the right direction and he was off after the girl who was being chased by the Indian.

The storm developing the day before in the San Juans broke in fierce fury on the Valley. The three raced on with Paulita much in the lead, followed by the Indian on the old pack horse who was being overtaken by the miser on his bronco. The storm by now was surging and the men could not see each other. Soon after they reached the edge of the Sand Dunes, the bronco overtook the plodding pack animal. The Indian turned, drew his bow and arrow, and shot the miser — but as the rascal

fell from his steed he pulled his pistol and fired a random but fatal shot at the brave. The storm covered their bodies with sand and it was years after that the winds exposed their bones and told the gory story.

Benito was crossing the Sand Dunes when the storm broke and rushed to some cottonwoods near the edge. His pack burros lay down behind the trees and held their noses close to the ground so they would not suffocate. Benito crawled between the two animals and covered himself with a blanket. As the fury of the storm abated slightly, he thought he heard the whinny of a horse. Again he heard the sound and soon Paulita appeared on a worn mount and crawled under the blanket to await the storm's end.

They emerged from the shelter and discovered the horse, two burros, and several sheep survived. Without delay the couple approached the mountains and traveled over the pass to settle on the headwaters of the Huerfano. They prospered but never divulged their history to anyone. Some say they are the ancestors of people who now live in the area.

Climatic Change in the San Luis Valley

BY JOHN A. MANGIMELLI

Throughout history the human race has been vulnerable to changes in climate. In places where agriculture is marginal under "normal" climatic conditions such as semi-arid areas or areas with long winters and short growing seasons, this vulnerability to climatic change is particularly great. Anyone who lived on the High Plains during the "Dust Bowl" years knows how climatic change can influence the economic and social history of a region. Attempts to understand the history of the San Luis Valley must also take into account the effect of climatic fluctuation on the natural environment and on human activity of the area.

In order to determine the nature of the climate of the San Luis Valley in the period prior to meterological

instrumentation, other evidence of climatic change must be sought. While indirect and less precise than modern meterological measurements, such "proxy evidence" can allow for useful estimate of past climatic variables. One technique of acquiring proxy data that has been used successfully for climatic reconstruction in the western United States has been tree-ring analysis. Certain species of western conifers growing on arid sites have proven to be very sensitive to changes in precipitation and, to a lesser degree, temperature. Tree-ring chronologies developed from such species have been used to reconstruct these climatic variables over the lifetime of the tree.[1]

Because of the aridity of the San Luis Valley, a climatologically-determined limit to tree growth occurs at the base of the mountains surrounding the Valley. Within the boundaries of the Great Sand Dunes National Monument, for example, the lower limit to tree growth in the Sangre de Cristo Mountains occurs at approximately 8200 feet, with the exception of trees growing along stream courses. This arid tree-line corresponds roughly to the 11-inch precipitation line.

In the southeastern corner of the Monument, I selected a group of large pinyon pinus (Pinus edulis) near the tree-line. From each tree two cores were extracted, measured, and analyzed according to standard dendrochronological techniques.[2] A total of 24 cores (2 each from 12 trees) averaging 391 years of age were used in this study. The pattern of wide and narrow rings was very similar for all of the cores.[3] This high correlation among all the trees at the site indicates that some external factor — presumably climate — has affected all the trees at the site in a similar fashion over their lifetime.

This study indicated that the growth of pinyon pines at this site was directly related to precipitation and inversely related to temperature; that is, low temperatures and high precipitation over the twelve-month period preceding the development of the ring (July through June) would lead to the production of a narrow ring.[4] Those periods that show growth consistently above the mean (the horizontal line labeled "1.00") are interpreted as times when cool and moist climatic conditions prevailed, while below-average growth is indicative of warm, dry climate.

In order to verify the climatic reconstruction based on the filtered pinyon pine chronology, the chronology was compared

to two other types of climatic data from the San Luis Valley. First, sporadic instrumental records dating back nearly 100 years are available for a few parts of the Valley. Saguache has intermittent temperature and precipitation data dating back to 1891, while Manassa has continuous precipitation data from 1906 to present. Considering the 40-mile distance of each town from the Great Sand Dunes, the correspondence between the precipitation data and tree-growth is significant and appears to indicate that the growth of pinyon pine is a reasonably good indicator of local precipitation over the period involved.

Prior to meterological records, historical, noninstrumental weather observations were recorded at Fort Garland from 1866-1880. Bradley analyzes and summarizes these records and concludes that annual precipitation for this 15-year period was significantly higher than the modern (1940-1970) normals.[5] The master chronology indicates that pinyon pine growth during this same fifteen-year period was also greater than growth during the 1940-1970 period.

In the follow-up study a group of ponderosa pine trees, located within the park about five miles north of the pinyon pine sampled earlier, were also cored, measured, and analyzed. Both the ponderosa pine and pinyon pine chronologies indicate that they are responding in like fashion to similar climatic variables; namely, cool-wet weather, particularly in the previous fall and spring, stimulates greater tree growth and wider rings.

Climatic Reconstruction

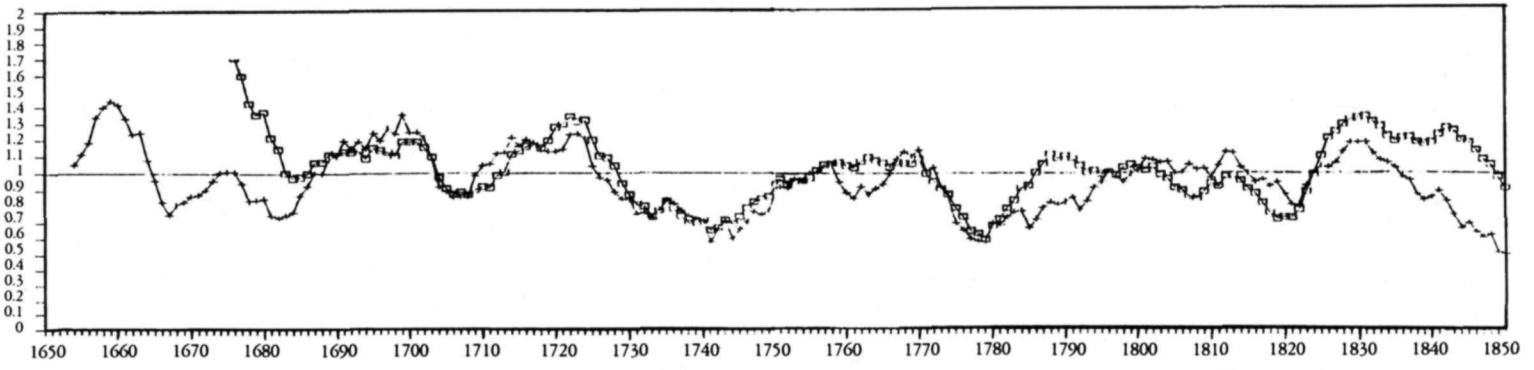
The high correlation between the pinyon and ponderosa chronologies allows for a tree-ring chronologies chart to be used to reconstruct climatic variables for the Great Sand Dunes vicinity over the past 300 years.

Reconstructions based on the filtered chronologies will be qualitative inferences only. Due to smoothing of the chronology and the highly variable nature of precipitation in the San Luis Valley it is inappropriate to attempt to estimate climatic variables for any individual year using the filtered chronologies.

Significant intervals of abnormally cool-moist conditions occurred in the San Luis Valley vicinity during the following periods: 1690-1702, 1715-1725, 1825-1835, 1885-1898, 1901-1924, 1935-1940, and 1970-1975. Significant intervals of

(Low Pugg Filter - 9 Yr. Unweighted Mean)

GRSA Tree-Ring Chronologies 1650-1850.

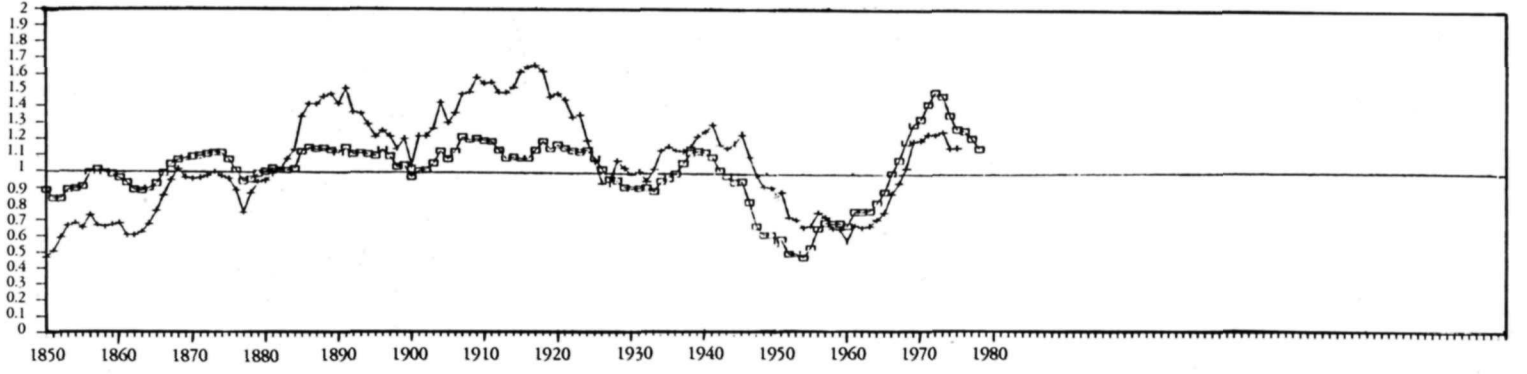


Time in Years

+=Pinyon Pine

□=Ponderosa Pine

GRSA Tree-Ring Chronologies 1850-1980.



abnormally warm-dry conditions occurred during the following periods: 1730-1750, 1775-1785, 1815-1822, 1850-1855, and 1950-1965.

Dune Movement

At the end of the Escape Dunes Nature Trail, frequently used for ranger-guided walks, is an actively-advancing barchan dune that has escaped from the main dune mass to the west and moved across Medano Creek. The dune has advanced into an area of ponderosa pines and has smothered a number of trees. Twelve of these dune-killed trees had been sufficiently re-exposed, after the passing of the dune, to allow for coring. Of the twelve, four trees had rotted to the point where coring and/or determination of a datable ring series was impossible. Eight trees were cored and successfully cross-dated with the ponderosa pine master chronology developed from nearby living trees.

All of the dune-smothered trees that were successfully dated died surprisingly recently, indicating a relatively rapid rate of dune movement averaging approximately 17 feet per year. Due to fluctuating wind and precipitation patterns, however, it is likely that there is considerable variability in the year-to-year dune movement.

Conclusion

The climate of the San Luis Valley is not static. Over the last 330 years it has fluctuated significantly and such climatic fluctuation should be taken into account by students of human history and environmental change in the San Luis Valley. And if the past is any guide to the future, then we must conclude that climatic variability will continue to be a factor in the history of the San Luis Valley and that long-term economic and political decisions might well be made with such fluctuations in mind.

References

1. H. C. Fritts, TREE RINGS AND CLIMATE (London: Academic Press, 1976).
2. M. A. Stokes and T. L. Smiley, AN INTRODUCTION TO TREE-RING DATING (Chicago: University of Chicago Press, 1968).
3. A cross-correlation coefficient of approximately .7.

4. The correlation coefficient between annual ring-growth and Rio Grande division total annual precipitation (July-June, 1941-79) is .63. The correlation coefficient between annual ring-growth and Rio Grande division mean annual temperature (July-June, 1941-79) is -.49.
5. R. S. Bradley, PRECIPITATION HISTORY OF THE ROCKY MOUNTAIN STATES (Boulder: Westview Press, 1976).

Culturally Peeled Ponderosa Pine Trees
Great Sand Dunes National Monument

BY MARILYN A. MARTORANO

Numerous ponderosa pine trees exhibiting large scars exist in several areas of the Western United States including the San Luis Valley, Colorado (Figure 1). Research has shown that these trees are living artifacts reflecting Native American utilization of bark during the late 18th to the early 20th centuries. The largest known group of culturally peeled ponderosa pine trees in all of Colorado exists at the Great Sand Dunes National Monument. As of 1990 nearly 100 scarred trees have been identified within the Monument boundaries, and many more may exist that have not yet been documented.

Figure 1. Peeled ponderosa pine tree located at the Great Sand Dunes. Scar, 4 feet wide and 7 feet long. Yields about 5 pounds of inner bark from scar.

Courtesy M. Martorano

Tree bark and bark substances are known to have been utilized by various Native American groups for a variety of functions. The outer bark of trees was utilized aboriginally to construct trays, baskets, and cradleboards, and was used as a building material for roofs and walls of structures. Resin and pitch from the peeled areas of trees were used as adhesives and as waterproofing agents for baskets and other objects. Medicinally, the inner bark and sap were used as a poultice or drink for many types of disorders such as tuberculosis, stomach troubles, cuts, infections, rheumatism, heart troubles, gonorrhea, and colds. The inner bark of most varieties of pine has also been used by Native Americans as a delicacy or sweet food and as an emergency food in cases of starvation.

The inner bark consists of the phloem, a layer of cells just beneath the outer bark that transports the food reserves manufactured by the tree. When the outer bark is removed from a ponderosa pine tree, this layer of phloem is attached but can easily be separated (Figure 3). Nutritional analysis of ponderosa pine inner bark has shown that it is very high in calcium (one pound of inner bark has as much calcium as nine glasses of milk), and it contains significant amounts of carbohydrates, iron, magnesium, zinc, and other potentially nutritional substances.

The inner bark was often prepared by Native Americans for eating by thoroughly pounding, boiling, baking, and/or smoking it. In addition to use as an emergency food, bark substances were employed as a regular food source by several Native American groups. Certain Alonquin tribes of Canada were even given the name Adirondack, meaning "they eat trees," because of their custom of eating bark. While on their journey to the Pacific Ocean in 1805, Lewis and Clark were told by Sacajawea that the Shoshone peeled the bark from the trees and ate the inner layer for food. William Clark noted the following in his journal on September 12, 1805. "I mad(e) camp at 8 on this roade and particularly on this Creek. The Indians have peeled a number of Pine for the under bark which they eate at certain Seasons of the year, I am told in the spring they make use of this bark..." (Thwaites 1905-63).

The most detailed description of inner bark utilization and procurement methods based on information from Native American informants is a paper by Thain White (1954) entitled, "Scarred Trees in Western Montana". White's

Figure 2. Replicating bark peeling by debarking stick.

Photos courtesy M. Martorano

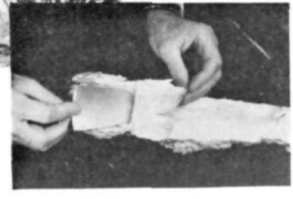


Figure 3. Using metal scraper to separate inner from outer bark.

information was collected from Kutenai Indians who remembered how the inner bark was harvested. According to his informants the tree peeling process took place as follows: 1) a tree was selected for peeling; 2) bark from a vertical notch 6-8 inches long was removed from the tree and the inner bark was sampled; 3) if it was considered "good", an area was selected for removing a larger section of bark; 4) a horizontal cut was made through the outer bark with an ax, and 5) a sharpened branch or pole called a "debarking stick" was inserted under the cut and used to loosen and pry the outer bark from the tree with an upward motion (Figure 2). At times the strips of outer bark were also pulled downward from the trunk as well as upward.

The inner bark was then removed from the outer bark slabs with a scraper (see Figure 3). In the early 1900s the Kutenai reportedly used a scraper made from a metal baking powder can and prior to that, a scraper was made from a mountain sheep horn. The scraping of the inner bark was completed in the vicinity of the stripped trees because the slabs of outer bark were too bulky and heavy to be taken back to camp. Once removed from the outer bark the inner strips were then prepared for storage and consumption. They could be cut into small strips and rolled into balls or tied into knots and packed

in green leaves to prevent drying out.

The peeling process was undertaken primarily by women and was usually done near a campsite. The trees were peeled in the spring, usually in May, when the sap in the tree was running and bark was easiest to remove. Inner bark utilization in this case was apparently a seasonal event and not necessarily an emergency measure. However, late winter and early spring were seasons when the possibility of food shortage was highest among Native Americans, and these seasons may also account for bark eating because of starvation.

Scars resulting from cultural peeling of trees for the purpose of bark utilization can be distinguished from other types of natural and cultural scars. For example, lightning scars are usually long and thin, often extend the entire height of the tree, and sometimes spiral around the tree trunk. Fires can also cause scarring, but this type of scar usually begins at the base of the tree and is triangular in shape with the wide edge along the bottom. Many of the culturally peeled trees exhibit evidence of burning, but this is due to the pitch on the scar surface which makes the tree especially vulnerable to ground fires.

Several species of animals, such as porcupine, bear, elk, and deer produce scars on trees, but these scars are usually irregular in shape and patchy, and teeth, claw, or antler marks are often visible on the scar surface. Trail blazes are human-produced but are usually small strips and/or patches cut out with an ax. Blazes often occur on two sides of a tree along a trail or road. A survey or witness tree is also culturally produced, but it usually exhibits a rounded or rectangular-shaped scarred area with numbers, dates, or other information carved into it.

The scars of trees peeled for cultural use of bark substances vary in size and shape but have several distinguishing features. They are usually oval or rectangular in shape with one or more points. The bottom of the scar is usually 1-3 feet above the ground, the top of the scar can extend to over 10 feet above ground level. Many of the scars exhibit cut lines which are very even and straight, 3-4 inches in length across the lower end of the scar. This evidence suggests the cut lines are the result of ax cuts. Other cut marks are jagged, which would indicate perhaps the cutting was done with a sharpened stone rather than a metal tool.

Based on a sample of 84 culturally peeled trees exhibiting 101 scars located in the Great Sand Dunes National Monument

and the Rio Grande and Pike National Forests, the width and length of the scars are quite variable (Martorano 1981). The scars range from 1/2 inch to 5 feet in width, the latter extending around the entire circumference of the tree except for a narrow strip. The length of the scars varies from 4 inches to one that is 9 feet long. Of this sample the average-sized scar is 17 inches wide and 4 feet long. A study replicating the bark peeling process indicates that approximately one pound of inner bark would have been available from a scar this size.

Some of the trees exhibit only a single small scar, perhaps a test to sample the inner bark to determine if it was edible. Other trees exhibit two or more large scars produced at the same time or sometimes years apart. Studies of the behavior of tassel-squirrels indicate that the inner bark of certain ponderosa pine trees have a taste that is preferable over others. This difference in taste may have been detected by humans and could explain why some trees have small scars while others nearby exhibit several large scars.

Evidence to tie the culturally peeled trees found at the Great Sand Dunes National Monument to historic Utes is based on dendrochronology (tree-ring dating) and historical accounts. Dating the peeling event through dendrochronology is conducted by comparing a core sample from the scarred area of the bark which has stopped adding growth rings, with a core from the healthy portion of the same tree or other nearby trees (Figure 4). Since unpeeled or healthy bark continues to add

Figure 4. Removing core sample from peeled tree. Scar date: 1826.
Courtesy M. Martorano

growth rings, the difference in ring numbers between peeled and unpeeled sections indicates the time elapsed since peeling. Tree-ring analysis is important because it is possible to determine the actual year the bark was peeled from the tree. By examining a cross-section of these trees, it may even be possible to determine what season the bark-peeling was done (Swetnam 1984). Analysis of 27 culturally peeled trees from the Great Sand Dunes National Monument indicates that the majority of the trees were peeled between 1815 and 1846.

The period from the early to late 1800s was a time of vast changes in many parts of Colorado, including the San Luis Valley. As more and more outsiders (miners, ranchers and farmers) entered the state, the Utes, who were the primary inhabitants, were quickly pushed out of their traditional hunting and camping areas, and food became scarce. During this time there were also several periods of drought, especially during the early 1800s (1805-1810 and the 1820s) and the 1850s through the 1870s. These climatic conditions may have caused additional stresses to the aboriginal population, especially a decrease in animal and plant resources.

One historical sighting is definitely supportive of this interpretation. In 1853, 40 Ute families living in the San Luis Valley, south of the Great Sand Dunes National Monument, were observed eating bark and aspen because of the scarcity of game (San Luis Valley Historical Society, Inc. 1969). At times all major groups of Utes reportedly ate bark substances. They were known to have eaten the sap from aspen trees as a delicacy and the Northern Utes were reported to have tied small strips of the inner bark from pine trees into bundles and eaten them with salt (Smith 1974). In addition other documents and informants state that inner bark was harvested by the Utes and utilized for several other purposes. It was used medicinally as a tonic to "clean them out." The Utes also reportedly used inner bark as a thickening agent for meat soups and made a bark tea. This would suggest that, at least at times, inner bark substances were used as part of regular subsistence.

Because bark was already known to the Utes as an edible item, resorting to bark as an emergency food in times of starvation would have been a logical occurrence. It is hypothesized that population dislocation factored with environmental stresses may have stimulated the intensive utilization of bark by Utes in parts of Colorado including the

San Luis Valley. Although no eyewitness accounts have been discovered that document Utes peeling the trees at the Great Sand Dunes National Monument, all evidence suggests that Utes are the Native American group most likely to have utilized these trees.

Unfortunately, the trees used for studying this Native American practice of bark-peeling are threatened with obliteration. Because the maximum life span of a ponderosa is 300-600 years, many of the remaining culturally peeled ponderosa pine trees at the Great Sand Dunes National Monument and other areas may soon die of natural causes. Undoubtedly, numerous trees have already been cut down during logging activities, and others are being damaged by lightning, ground fires, insects, and disease.

Culturally peeled trees are important resources for studying the overall interrelationships of subsistence, migration, population fluctuations, environmental stress, and cultural adaptation of Native Americans from the late 1700s to the early 1900s. Identification and documentation of peeled trees are necessary while the evidence is still available. As more archaeologists, land managers, and the interested public become aware of this resource, more complete information about aboriginal practices of bark-peeling will become available. It is hoped the result will eventually be a better understanding of how white man's movement into the West affected Native American ways of life.

References

MARTORANO, MARILYN A.
1981. Scarred Ponderosa Pine Trees Reflecting Cultural Utilization of Bark. Unpublished M.A. thesis, Colorado State University, Fort Collins.

SAN LUIS VALLEY HISTORICAL SOCIETY, INC.
1969. Time-event Chart of the San Luis Valley. *The San Luis Valley Historian* 1 (1):1-13.

SMITH, ANNE M.
1974. Ethnography of the Northern Utes. Museum of New Mexico Press, *Papers in Anthropology*, No. 17.

SWETNAM, THOMAS W.
1984. Peeled Ponderosa Pine Trees: A Record of Inner Bark Utilization by Native Americans. *Journal of Ethnobiology* 4(2):177-190.

THWAITES, R. G. (Editor)
1905. *Original Journals of the Lewis and Clark Expedition, 1804-1806.* Vol. 3 Dodd, Mead and Company, New York.

WHITE, THAIN
1954. Scarred Trees in Western Montana. *Bulletin No. 8.* Flathead Lake Lookout Museum, Lakeside, Montana.

A History of Archaeological Research in the San Luis Valley, Colorado

BY DENNIS STANFORD
Smithsonian Institution

When human groups first entered the San Luis Valley it was different in many respects from the way we find it today. The climate, as well as the plant, animal and water resources, have fluctuated across the 11,000 year interval which spans man's tenure here. Snapshot views of this distant past are provided by archaeological research conducted in the Valley itself and in surrounding areas of the desert southwest.

Approximately 11,000 years ago small groups of hunter-gatherers, known archaeologically as Clovis, were experiencing widespread drought conditions throughout much of the southwestern United States. In southern Arizona, at the Murray Springs site, a dramatic scenario was enacted as Clovis hunters killed both mammoth (an extinct elephant) and bison near the edge of a small creek. Here, one can follow the remains of mammoth tracks from a prehistoric well to a low hill where a young female mammoth was uncovered (Haynes, n.d.). A large shaft straightener made of mammoth bone was found in one of these tracks — stepped on and broken by the mammoth's footfall.

The hunter's spears were tipped with large, fluted points made of stone selected for its fine grain and beautiful color. Other weapon tips were fashioned of mammoth bone, ivory, and possibly wood.

The distinctive projectile points made by Clovis hunters have also been found in the San Luis Valley. One possible Clovis site reported by Tad Carpenter of Mosca, Colorado, was excavated by a Smithsonian team in 1979. Located south of the Great Sand Dunes National Monument it consisted of badly

decomposed mammoth bone and ivory laying on the clay surface of a shallow Ice Age pond.

The excavation showed that the mammoth bone had been eroded and reburied by the periodic shifting of the sand dunes. During the excavation a local arrowhead collector reported that the bones were exposed during the 1950s and Clovis projectile points were collected from them. This account was collaborated by several small chert flakes and a Clovis-like scraper found in the loose sand around the bone. The bone was too badly deteriorated for further analyses.

Unfortunately, the presence of mammoth hunters in the Valley is documented by projectile points that were removed from their site contexts by private collectors and an understanding of Clovis lifeways here remains to be achieved.

Though many animals such as the mammoth did not survive the drought which occurred at the end of the Ice Age, many others including the bison lingered on. Around 10,800 years ago the climate began to improve throughout the southwest. Plant fossils and their pollen from San Luis and Como Lakes indicate that the San Luis Valley was also getting wetter (Jodry et. al. 1989). The water level in the lakes and marshes rose, many inter-dunal ponds formed, and grass conditions improved. The bison occupied a habitat for which they were ideally suited and had no effective competitors for the abundant food resources. As a result, bison populations appear to have increased. The abundance of water and bison made the Valley very attractive to early hunters known as Folsom.

Folsom people receive their name from the town of Folsom, New Mexico, where the first Folsom site was discovered in 1926. The history of Folsom research in the Valley begins shortly thereafter when Gene Sutherland of Monte Vista reported several sites to E. B. Renaud of Denver University. Although Renaud visited the Valley several times, archaeological excavations of the Folsom sites did not occur until 1941. At this time, C. T. Hurst, a zoologist from Western State College in Gunnison, worked on one of Sutherland's localities named for the Linger Bros. who when owned the Zapata Ranch.

Hurst found the remains of several fossil bison and the projectile points which killed them (Hurst 1943). Unfortunately, the onset of World War II made it difficult for Hurst to get gasoline and tires for his vehicle so he terminated

his work.

In the 1970s Jerry Dawson, a graduate student from the University of New Mexico, revisited the Linger site to determine if any of the Folsom deposits remained (Dawson and Stanford 1975). Dawson, a native of Monte Vista, was a close friend of Sutherland and as a youngster had accompanied Gene on many field outings. During this time Dawson developed his long-standing interest in Folsom studies and led to his excavation of the Rio Rancho Folsom site near Albuquerque, New Mexico (Dawson and Judge 1969).

Dawson's investigation indicated that a portion of the bone bed at the Linger site was still in place, but was rapidly eroding. If the site was to be saved immediate field work needed to be conducted. Due to other commitments Dawson was unable to excavate Linger at the time, so he reported the site to Dennis Stanford of the Smithsonian Institution. At Dawson's request the Smithsonian began its investigation of the Valley in 1977 and continues an active research program at the present time.

During the 1977 work at the Linger site an area adjacent to Hurst's excavation was found which had not been destroyed by wind deflation. Here the remains of at least five bison were found along with broken Folsom projectile points and several butchering tools. Unfortunately, before the excavation of this area was completed, vandals in search of artifacts looted the area and destroyed a large portion of the bone bed. Thus, our understanding of this site will always remain incomplete.

Near the bison kill a Folsom campsite was found. In this area the remains of at least five bison, as well as an antelope and wolf, were found.

The archaeological evidence at the Linger site record the events which took place. A small group of bison, while watering at a pond, were ambushed by Folsom hunters. After the slaughter butchering activities commenced along with the establishment of a nearby camp. Many of the bison bones, stripped of meat, were discarded where the animals fell. Others along with meat and hide were carried to the camp.

While the meat and hides were being prepared, hunters manufactured new projectile points from flinty stone which they carried into the Valley. Some rocks were from as far away as Amarillo, Texas. Broken points were repaired by flaking a new sharp tip or rebasing those which were salvageable.

Cobbles, gathered from the base of Sierra Blanca, were

brought to the camp and used as anvils, upon which the bison leg bones were broken to obtain the buttery bone marrow. Bison meat was dried and perhaps pounded up on the cobbles to be mixed with the marrow. In historic times Native Americans prepared pemican in the same way. Sometimes mixed with berries, the pemican would last for months, serving as a trail food.

Another of Sutherland's Folsom sites, known as Zapata, is located near the Linger site. This site was tested by F. C. V. Worman of Adams State during the 1950s. It was reexamined in 1979 by the Smithsonian. Worman's excavation was relocated, but wind deflation had destroyed the bone bed during the interim.

Geologic research indicates that the Zapata site was situated near a relatively large pond or small lake. Here, too, the bison were killed near the edge of the water. A campsite was located adjacent to the kill. The size and number of occupations at the site is unknown. Tools found during excavations and from surface collections indicate a wide range of activities which, like the Linger site, primarily center on hunting tool kit rejuvenation and hide processing.

The most extensively excavated Folsom site in the Valley is Stewart's Cattle Guard, named for Malcomb and Rosemarie Stewart, former owners of the Zapata Ranch. This site came to our attention through the efforts of Tad Carpenter. In 1977 Carpenter introduced Stanford to many local artifact collectors. One was Duane Martin, whose late wife Vera had a broken Folsom point. Fortunately, Martin was able to recall where she had found it. Subsequent examination of the site produced additional Folsom artifacts.

In 1981 the Smithsonian tested the site under the field direction of Tommy Fulgham and Sloan Emery, with the assistance of the Colorado Archaeological Society (Emery and Stanford 1982). The testing revealed a buried layer of bison bones with associated Folsom artifacts. Full-scale excavations of the site began in 1983 under the field direction of Pegi Jodry. Jodry reported the results of the 1981-1983 field season in her master's thesis at the University of Texas, Austin (Jodry 1987).

The site includes several activity areas: a bison kill-butchery area, a residential area where families maintained their campfires and conducted domestic tasks, a possible processing area where hide was staked out, and several bone dumps.

There are no landforms present at the site which could have served to aid in trapping the bison. However, at least thirty-five animals were killed, probably ambushed as they grazed. Only a few artifacts were found in the kill site and, like the Linger site, they consisted primarily of broken projectile points. One of the broken points fits to another piece of the same artifact found in the campsite, linking the two events. No butchering tools were found, but tiny chert flakes attest to the resharpening of knives.

The campsite, established after the kill took place, is located near kill. Discrete concentrations of tools and bones are likely family-centered activity areas. Although no charcoal was found, concentrations of burned bone and stone tools indicate the former presence of hearth features with each activity area.

Among the activities which took place in the camp was the manufacture of new weapon tips. Broken points were discarded, some even pitched into the campfires, as new points were hafted to the spear shafts. Sets of hammerstones and anvils used for marrow extraction were found among clusters of broken buffalo bones. Fragments of ground iron ore and grinding stones, stained red from the manufacture of red paint pigment, were found. Worn out scrapers and scraper resharpening flakes were recovered in the campsite activity areas as well as in the hide processing activity area.

The heavy fresh hides were carried to a convenient area located near the kill. Wooden hide pegs were made to hold the skins as they were stretched out to dry. When dried they were scraped clean of unwanted tissue.

The Folsom band camped at the site only long enough to repair their tools and process the buffalo. They soon moved on in search of a new location.

Another Folsom site was discovered by Gordon Reddin while collecting artifacts near Hooper, Colorado. This site was investigated by Stanford in 1979 and 1983. Widely spaced artifact concentrations suggest that the site area was used several different times, but the activities during each occupation were similar. Like the Linger and Zapata sites, bison were killed on the margin of a small pond. Campsites were established near the kills and were inhabited for the duration of the butchering and processing of the animals.

Like Clovis, the Folsom people prized high quality raw materials and traveled great distances to obtain stones for

making tools. If the Folsom flintknapper did not consider the local stones to be of high quality they would not be utilized. This is true in the San Luis Valley where basalt and quartzite are abundant but rarely used.

Among the raw materials imported into the Valley were Alibates dolomite and Edwards Plateau chert from Texas. Washington Pass Chalcedony was carried in from the area around Window Rock, Arizona. Other materials came into the Valley from Cumbres Pass, South Park and the Black Forest area of Colorado. The raw material was transported as well-worked preforms, which were made into finished artifacts when needed. Whether this material was obtained by direct procurement or by trade is unknown, but nevertheless it defines an interaction sphere for Folsom hunters in the San Luis Valley of over 240,000 square miles.

Pollen records from the Valley show that the wet period enjoyed by Folsom peoples came to an abrupt end about 10,500 years ago (Jodry et. al. 1989). The ponds and marshes dried up. The spores of fecal fungus, which lives on herbivore dung, common in the pollen counts during Folsom times, disappear and are not found again until the introduction of cattle by the Europeans. This would suggest that the biomass was greatly reduced after Folsom times.

For over 1500 years there is very little evidence for utilization of the Valley. The Paleoindian artifacts characteristic of this period and found commonly on the Plains and Front Range area of the Rocky Mountains are virtually absent in the Valley.

Around 9,000 years ago another wet period occurred, and it is during this time we again see a Paleoindian occupation in the Valley. These people, known as the Cody, were also big game hunters but utilized long slender, unfluted projectile points. No Cody sites have been excavated in the Valley, but Cody artifacts are common in most surface collections made by local amateurs.

On the Plains the archaeological evidence suggests that Cody people participated in large communal bison kills which took place during the fall (Frison 1978). Kills with as high as several hundred animals are recorded for the Cody hunters. Animals were manipulated into a topographic setting where they could be easily killed. This is in contrast to the small Folsom kill sites which appear to be opportunistic ambushes of small groups of animals.

After Cody times the drought conditions returned to the Valley and once again human habitation seems to be minimal until 6,000 years ago when there is evidence for increasing water resources. Again the lakes and marshes of the Valley floor became productive habitats and sandy areas were covered with edible plants such as Indian rice grass. During this period the economic pursuits of the inhabitants shifted away from big game and concentrated on smaller animals, fish, water fowl, and the processing of plant foods.

This hunting and gathering lifestyle, known as the Archaic to archaeologists, apparently continued up until historic contact. The Valley must have been extremely rich in these diverse resources as judged from the amount of archaeological debris scattered over the Valley floor and the literally tons of artifacts gathered up by zealous artifact collectors over the years.

From this summary, it is clear that the single most important factor governing the human habitation of the San Luis Valley is the availability of water. During periods when water resources were scarce there is little evidence for prehistoric habitation; however, during wet periods the Valley flourished with human activity. Perhaps the most important lesson to be learned from the archaeological record of the Valley is that water resources must be conserved in order to insure an adequate lifestyle for future generations.

References

DAWSON, J. AND W. J. JUDGE
1969. Paleo-Indian sites and topography in the Middle Rio Grande Valley of New Mexico. *Plains Anthropologist* 14:149-163.

DAWSON, J. AND D. STANFORD
1975. The Linger Site: A Reinvestigation. *Southwest Lore* 41(4):22-28.

EMERY, S. AND D. STANFORD
1982. Preliminary report on archaeological investigations at the Cattle Guard Site, Alamosa County, Colorado. *Southwestern Lore* 48(1):10-20.

FRISON, G. C.
1978. *Prehistoric Hunters of the High Plains.* Academic Press, New York.

HURST, C. T.
1943. A Folsom site in a mountain valley of Colorado. *American Antiquity* 8(3)250-253.

JODRY, M. A.
1987. Stewart's Cattle Guard Site: A Folsom site in southern Colorado. A Report of the 1981 and 1983 Field Seasons. Master's Thesis, Department of Anthropology, University of Texas, Austin.

JODRY, M. A., D. SHAFTER, D. STANFORD, AND O. DAVIS
1989. Late Quaternary environments and human adaptation in the San Luis Valley, south-central Colorado. *Water in the Valley,* Colorado Ground-Water Association, Lakewood.

Contributing Members 1990

We gratefully acknowledge the support of San Luis Valley Historical Society members and contributors who help maintain our organization's publication and activities. Regular memberships are $12. Special/contributing memberships are: Patron ($100); Sponsor ($50); and Associate ($25).

PATRONS

Mr. & Mrs. Glen Bean
Mr. & Mrs. John H. Brownell
Jack K. Cooper, D.D.S.
George & Elizabeth Kroenert
Mr. & Mrs. Robert L. McCullough
Mr. & Mrs. Raphael J. Moses
Motz, Gonzales & Martinez
O&V Printing, Inc.
Emma Riggenbach
San Luis Valley Title Co.
S.L.V. Federal Savings & Loan
The Valley Courier

SPONSORS

Alamosa National Bank
Mrs. Edith H. Davis
First National Bank of La Jara
Gladys Shawcroft
Edyth C. Wiley
W. E. Wiley, Jr.

ASSOCIATES

The Baca Library
Jon W. Beatty
Billy Bond, Jr.
Dr. Eva Borrego
Mrs. L. J. Bunch
John & Eileen Burt
Gretchen W. Clarke
Ruth M. Colville
Cay Conkey
Evelyn Y. Curtis
Dr. Dwight David
Mr. & Mrs. John Davis
Bette B. Deacon
Willis & Betty Jo Fassett
Honorable Hamilton & Lydia Fish
Mr. & Mrs. Warren Gilbreath
Mayebelle B. Gilfillan
Mr. & Mrs. Gerald L. Gimlin
George Givan
Mr. & Mrs. Levi Gonzales
Mary W. Hamilton
Bill Keeling Oil Co., Inc.
Eleanor C. Labouisse
Mr. & Mrs. John LaRue
Ronald V. Lester
Mrs. Vera E. Linger (In Memoriam)
Richard L. Messick
Gordon L. Off
Mrs. J. G. Piccinati
Public Service Company of Colorado
Nydia Joan Reynolds
S.L.V. Medical Clinics
Lyle E. Smith
Vincent Spero
Mrs. E. Duane Underwood
Willis O. Underwood
Juanita Valdez
John D. & Juanita Von Bernuth
Mr. & Mrs. Robert D. Von Bernuth
Constance M. Walt
Mr. & Mrs. Thomas F. Weiss
Mr. & Mrs. John Woodard
Mr. Edward P. Wuckert