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Following Custer

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Published in accordance with an Act passed in 1881 by the 14th Legislative Assembly, Dakota Territory, establishing the Dakota Agriculture College and with the Act of reorganization passed in 1887 by the 17th Legislative Assembly, which established the Agricultural Experiment Station at South Dakota State University.
FOLLOWING CUSTER

By Donald R. Progulske with Frank J. Shideler
Bulletin 974. Agricultural Experiment Station
South Dakota State University, Brookings
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About the cover photo...

The Black Hills Expedition, led by General Custer, camped along French Creek August 1-5, 1874. This was the most southerly camp of the wagon train. It was in this vicinity that paying quantities of gold were found. The discovery of gold brought rapid settlement of the Black Hills region shortly after.
FOREWORD

Tourists and others annually spend about 2.1 million visitor-days in the Black Hills National Forest enjoying auto touring, camping, hiking, fishing, hunting, cross-country skiing, and snowmobiling. They use virtually every square mile of the forest, which is situated in western South Dakota and eastern Wyoming.

In contrast to the year 1898 when the Black Hills Forest Reserve was created, forest managers now provide opportunities for a variety of activities to meet user demands. Until the public began to have abundant leisure time, recreational demands were light, and the forest was managed primarily to provide timber and forage and to conserve water supplies. Production of timber and forage still is a major management objective, but it no longer holds complete dominance.

Following George A. Custer’s expedition in 1874, the area was developed by miners, ranchers, and other settlers. Such activity changed, and continues to affect, the landscape.

This publication has several purposes. It compares the present landscape with that at the time of the Custer expedition by means of new and old photographs. Selected photographs taken by the expedition photographer William Illingworth reveal the forest under the sole influence of natural forces. A 1975 series of low-altitude helicopter photographs serves as a guide over the expedition route and shows the forest as it exists today.

Another purpose is to identify several 1874 photo sites, not discovered earlier and or documented in “Yellow Ore, Yellow Hair, Yellow Pine,” a 1974 account of the Black Hills expedition by the South Dakota State University Agricultural Experiment Station.

Perhaps the main purpose is to sketch a sequence of land-use and forest-management practice changes with resulting ecological changes beginning with the 1874 expedition. The heyday of mining continued into the 1900’s and past the establishment of the Black Hills National Forest. By the 1970’s a significantly greater and varying demands on forest resources occurred. In a sense, this publication is a thumbnail review of activities on the Black Hills National Forest since Custer and his command passed through it more than a century ago.

This work could not have been completed or published without the help of several individuals and organizations. Extension of previous field work and photography was funded principally by the U.S. Department of Agriculture with the Agricultural Experiment Station at South Dakota State University, and supplemented by the Agricultural Experiment Station at University of Massachusetts. Much of the field and publication photography was done or guided by Richard Sowell of the South Dakota State University Photo Lab. Substantial editorial assistance was provided by Larry Tennyson and John Pates of the Agricultural Editorial Office at South Dakota State University. Excellent cooperation was received from Cameron Ferweda formerly of the Black Hills National Forest staff; James Overbay, former Supervisor of the Forest; James Mathers, present Forest Supervisor; Ardell I. Bjugstad, U.S.F.S., Rocky Mountain Forest and Range Experiment Station, Rapid City; James Morriss, Recreation Specialist, Black Hills National Forest; Warren W. Jackson, Director, Custer State Park; Harvey D. Wickware, Superintendent, Mt. Rushmore National Memorial; Lester F. McClanahan, Superintendent, Wind Cave National Park; Albert J. Hendricks, Management Assistant, Jewel Cave National Monument; and Joel Wagenaar, Manager, Homestake Forest Products Company.

One of the more valuable contributions to the study was from the South Dakota National Guard which, in planning training missions, detailed a pilot to cover the Custer route in a helicopter and allowed the senior author and a photographer to go on the mission. Photographing the Custer trail from above allowed a new perspective of the terrain and forest growth as well as photographing one important site not accessible on the ground.

—Donald R. Progulske and Frank J. Shideler

No factor affected Plains Indians as forcefully as railroad construction across the northern prairies. For centuries, Indians lived close to and were fully dependent upon the vast bison herds roaming the great grasslands surrounding the Black Hills. Bison populations were so plentiful there was little need for Indians to enter the Black Hills (called Paha Sapa, Sioux words meaning "hill," "black") except to follow trails to other areas or to gather berries and meat during favorable weather. Some evidence indicates many Indians, who may have been superstitious in nature, feared the Hills because of frequent rumbling of thunder.

The settlement of the area caused bison numbers to decline precipitously during the mid-1800's. Indians were forced to rely more heavily on other animals such as deer, elk, and pronghorn antelope. By 1850, they most certainly had to turn increasingly to Paha Sapa to search for these species in the forest area. Even so, Indians had little impact on the physical and natural features of the forest. The most prominent influences on this environment were natural—forest fires started by lightning, violent local wind storms, and the indigenous bark beetles—all of which provided for production of berries and habitat ideal for wild animals.

Reports by early explorers of the area note the abundance of large trees despite the fires. The forest landscape also was described by Custer in several of his 1874 reports: "There are a few standing sound pines, but there seems to have been here...very extensive fires, that have burned the former forest and left charred trunks and limbs scattered on the surface. Among these have sprung up a perfect mesh of shrubs and small deciduous trees mostly trembling aspen."

Expedition photographs by Illingworth clearly reveal the occurrence of natural fires in that forest ecosystem [Figure 2] untouched by man until that time.

The forest also was described by Colonel Dodge who accompanied a scientific group through the Black Hills in 1875. He noted fires had damaged broad areas, yet throughout the Hills there were dense masses of immature trees and abundant saw-log trees two and three feet in diameter, with many 40 to 50 feet high without a limb. He felt there was abundant lumber for all area uses, except railroad ties. Other common species were fine growths of spruce, extensive aspen stands, scattered white birch, and some mixtures of ash, oak, elm, and boxelder.

According to Custer and Dodge, wildlife was abundant, including extraordinary numbers of deer, large populations of bear, beaver, wolves, coyotes, foxes, chipmunks, and lesser numbers of mountain lion, bobcats, elk, mountain sheep, woodchucks, and undescribed mice. Great numbers of birds also were present, including ruffed grouse, sharp-tailed grouse, Sandhill cranes, mallard ducks, and many species of smaller birds. Trout were not present; only dace and suckers were found in the streams. There were no natural lakes or reservoirs.

Before 1874, the Indians had priority on the forest and wildlife populations, but the situation changed quickly when settlers and miners were allowed in the area.

Figure 1. Direct descendants of those vast herds of bison still populate sections of South Dakota prairies and the Black Hills.
Before white settlement, several Great Plains tribes were competing over certain territories. By 1860, the Sioux had gained from the Crows and Shoshonis that vast bison range from the Missouri River west to the Powder River in which the Hills were centrally located. Several Sioux tribes, especially Oglalas and Cheyennes, remained in conflict with other tribes even after the Platte River country to the south had been settled by whites. To assure the peace, military forts were built along the northwest Missouri River and the Oregon Trail across Nebraska.

In 1861-65, the military withdrew from the frontier for the Civil War. Meanwhile, the Sioux regained strength to dominate the area, causing unrest among other tribes and whites. When the war was over, military units again were assigned western duty. Many Indians had accepted the whites, while others remained hostile. In 1865, a major offensive was launched against the whites and Indians who lived at military forts. Crazy Horse and his Oglalas failed to destroy the Oregon Trail Bridge across the Platte River, and Sitting Bull failed in his simultaneous attack on Fort Rice north on the Missouri. Military pressure increased as clashes continued. General Sherman established forts along the Bozeman Trail in the Powder River area—the Sioux's last stronghold.

By 1868, the Indian-white conflict was stalemated, and Sherman decided to attempt a treaty.

At a treaty council at Fort Laramie, April, 1868, Chief Red Cloud and others concluded a document of peace with which some others did not agree. Crazy Horse and his followers remained against the Crows and Shoshonis in the Powder River area, while Red Cloud and his group settled upon a reservation.

The years following the Civil War brought new industrialization and development to the country. Railroads were being built, employment was full, and the stock market remained strong. An economic crash hit in 1873, and prominent banks began to
Prices started to plummet, and unemployment reached new highs. Government leaders, businessmen, and the public then turned attention to opening new land for settlement and mineral resources to boost the economy.

With rumors of gold in the Black Hills, adventurers had attempted to seek their fortunes there during the early 1870's despite the military's effort to prevent prospectors from entering that treaty land. Newspapers everywhere began to excite the public about alleged riches in the Black Hills but also warned of dangers there. Shortly, pressure to open Hills resources prompted the military reconnaissance expedition there by General Custer during the summer of 1874.

The expedition did find gold, and, with several newsmen on the expedition, the entire nation soon received this news. Some members of the expedition formed a mining company and established claims on French Creek, the discovery site.

Returning to Fort Lincoln, Custer said a military post should be established within the Hills. Prospectors, land speculators, merchants, and unemployed persons immediately prepared to go there. The military was ordered by Sheridan to use necessary force to exclude them, but the inflow of invaders was too great, and many mining parties got through. Government leaders then sent a scientific expedition there the following spring (1875) to further assess the resources. Colonel Dodge led the eight military companies, and geologist Walter Jenny headed the civilians. Once in the Hills, they found hundreds of trespassing miners. In the following months, two unsuccessful meetings were held with the treaty Indians to discuss a purchase of the Hills; subsequently, Congress fixed a value of $4.5 million on the land. In signing the treaty of October, 1876, the Indians ceded Paha Sapa to the U.S. Government, and the Hills area was officially opened for settlement February 28, 1877. Several thousand whites already had made mining claims, built the first towns, and established provisional governments. (Figure 2-2).

2. For the expedition, Colonel Custer was given the rank of Brevet Major General. During the Civil War, 10 years earlier, Custer was breveted as Brigadier General.
An 1874 military expedition was mounted at Ft. Abraham Lincoln, Dakota Territory, located on the west bank of the Missouri River. Lieutenant Colonel George A. Custer was selected as its commander because of his frontier experience. The expedition was a dual-purpose reconnaissance for mapping the Black Hills and for finding a site there for a new military fort. Custer's contingent departed from Ft. Lincoln on July 2 with orders to return within 60 days.

Men, wagons, livestock, military equipment, and supplies of the expedition were spread over 40 or more acres of prairie for overnight camps. Somewhat bedraggled after traveling southward almost 350 miles in 22 days across the hot and dry prairie, both the military and civilian contingents seemed to acquire renewed spirits as they camped for two nights near Inyan Kara mountain at the western edge of the Black Hills. For three days, the Hills had been in sight and expedition members were eager to move into them.

The two days prior to arrival at the western edge of the Hills had been difficult for the command. Many individuals were irritable and quarrelsome. Some were afflicted with diarrhea. Private John Cunningham of Company H died in camp July 21, two weeks after contracting diarrhea. On July 22, two long-feuding soldiers of Company M, Privates George Turner and William Roller, began arguing on the picket line before camp was broken. Turner had cross-hobbled Roller's horse so the animal could not walk. As a result, Roller shot and killed Turner, whose body, like that of Cunningham, was shrouded in canvas and placed in the ambulance for evening burial after camp was made on Inyan Kara Creek. Two graves were dug on a nearby knoll. Funeral services were a regimental affair and included music by the band. A fire was lighted over the graves to conceal evidence of burial. This location, near Highway 385, about 15 miles south of Sundance, Wyoming, is marked and maintained as an historical site [Figure 3].

The expedition remained at camp for two nights (July 22 and 23), an uncommon luxury of the trip, because Custer took his scientists and some cavalry men to Inyan Kara Mountain [Figure 4] four miles west of camp. Custer, botanist A.B. Donaldson, Chief Engineer Lt. Col. William Ludlow, geologist Newton H. Winchell, and a few others climbed to the summit of Inyan Kara to view the surrounding scenery.

Figure 3. The Custer expedition entered the Black Hills from this location in Wyoming. Arrow indicates grave site of the two troopers.

* The expedition route, camp and photo sites, and other details are shown on maps in "The Trail from Above" section which follows.
territory. They saw little, however, because of smoke from a prairie fire—started perhaps by a violent thunderstorm four days previously. Colonel Ludlow chiseled Custer’s name and the year in a rock wall at the mountain summit.

Meanwhile, scouts had reconnoitered routes for the next march. The July 24 route led up rugged terrain to a semi-wooded plateau where the expedition moved eastward into the valley of Cold Spring Creek south of what is now the old and nearly deserted mining settlement of Moskee.

The men were delighted with this pleasant mountain canyon, carpeted with many varieties of wild flowers. Appropriately named “Floral Valley” by General Custer, the valley (Figures 5 and 6) extends as a meandering meadow 21 miles to a summit and divide at an elevation nearly 6800 feet above sea level. From the expedition’s entry point, the valley downstream is an impressive canyon extending into a larger box canyon that winds north nearly 25 miles, then meets the prairie and Redwater Creek near the present town of Beulah, Wyoming. Along some areas where the expedition traveled, limestone walls with talus slopes rise 100 feet or more from the stream meadow.

Travel up this valley was easy for the expedition, because the long meadow was nearly free of trees and shrubs. A well-worn lodge trail indicated that Indians frequently used the same route for travel. Men of the expedition enjoyed the natural beauty of this forest setting, which contrasted greatly with the nearly treeless prairies surrounding the Black Hills. The regimental band played the first Black Hills band concert from a nearby ledge after the expedition made camp in the lush growth of the meadow. Everyone was impressed, including Custer, who wrote in one report, “Every step of our march that day was amid flowers of the most exquisite colors and perfume.”

Although it was the third week of July, the temperature dropped to below freezing, causing ice to form in water buckets on the morning of July 25.

Moving about 20 miles up the valley later that day, the expedition gradually ascended nearly 1400 feet to the short divide of the limestone plateau where numerous old Indian camps and abandoned lodge poles were found.

The divide provided easy access into a similar valley and stream flowing southeastward, opposite to Floral Valley. Named “Castle Valley” by Custer because of the many spires of limestone outcropping for several miles, it also was frequented by Indian hunting parties. An occupied Indian encampment was discovered about three miles above the present site of Deerfield. After unsuccessful attempts to befriend the group, Custer captured one of them, Chief One Stab, and retained him as a guide for two weeks.

On July 26, Custer made camp on the rolling grassy flats near Deerfield [Figure 7]. The next day, the expedition moved northward from the valley onto an expansive natural prairie. After traveling for three or four miles over this grassland, Custer realized that his Indian guide had been misinterpreted, and that the expedition was headed in the wrong direction. While on the prairie (now designated Reynold’s Prairie), Illingworth photographed a stack of elk and deer antlers obviously erected by Indians. Exact location of this photo site was recorded for the first time in 1975 [Figures 8 and 9].

Returning to Castle Valley, the
expedition made camp that evening only two miles below their previous camp. This second campsite is now covered by the waters of Deerfield Reservoir.

The July 29 route was southward up a small tributary (Gold Run) of Castle Creek. It took the expedition onto another large prairie opening now called Gillette Prairie. From the higher knolls of this open area, expedition members were afforded a spectacular panorama of the high and rugged area to the south and east. Moving from this prairie, with its great variety of grasses and other typical prairie plants, the expedition followed what first appeared to be a likely course, but it soon became virtually entrapped in the narrowing, impassable canyon of Spring Creek. After retracing the route for about three miles, they climbed over knobs and crossed hill valleys, then followed another small clear-running stream to where they found a suitable meadow for camp. The weather had been rainy, and the major portion of the wagon train lagged far behind the lead wagons. It was almost daylight, July 30, before the entire group rejoined to camp on the meadow along Vanderlehr Creek. This campsite is on the creek approximately 1.5 miles above the crossing of Deerfield-Custer City Road (Forest Service #297).

That day, General Custer allowed some troops to rest a few hours past reveille, because many were fatigued from difficult travel of the previous day. They departed by mid-morning. Following the creek a short distance, they climbed southward up several slopes to a summit, then dropped into a rather steep drainage area now known as Graveyard Gulch. Illingworth ventured from the slow-moving wagon train to take advantage of promontories from which he could get better views of the landscape. One of his previously undocumented photo sites in this locality was 

**Figure 5.** Expedition photo shows Floral Valley.

**Figure 6.** Current photo taken at site of Figure 5.
discovered in 1975 [Figures 10 and 11].
Graveyard Gulch, a pleasant valley which cuts into a lower edge of the massive granite core of the Black Hills, provided easy travel from the higher limestone area. The expedition emerged to enter a north-south oriented, larger valley where the men and wagons turned downstream to the south. Continuing along this valley [Tenderfoot Gulch], they passed spectacular mountains of granite, one of which is Thunderhead Mountain where a giant memorial to Crazy Horse, the famous Sioux Indian leader, now is being sculpted by Korczak Ziolkowski, its present owner [See also figure 72]. Here, Illingworth made several pictures of interesting geological formations.
Rather than continue along the narrow stream area, the expedition likely moved onto the adjacent rolling prairie where travel was easier. This route led to the sprawling and flat meadow upon which the city of Custer was built in 1875. Camp was established on the meadow along French Creek July 30 and 31, then relocated 3.5 miles to the east, because of better grazing conditions for the animals. This camp among pine glades fingering from the creek (see cover photo) was occupied for five days to allow for exploration of the area. It was within this campsite that gold was discovered by the miners. From this permanent camp, three reconnaissances were made. One took an exploring party 25 miles eastward, along French Creek, through what is

Figure 7. Expedition photo shows Custer camped near Deerfield, S.D.

Figure 8. Expedition photo shows stack of deer antlers erected by Indians.

Figure 9. Current photo taken at site of Figure 8.
now Custer State Park, to the vicinity of the present town of Fairburn, S.D. A longer but easier trip (actually made from the previous encampment) was about 45 miles southward through foothills and valleys to the south fork of the Cheyenne River. It was from this point that frontier guide "Lonesome Charlie" Reynolds was dispatched to Fort Laramie with news of the gold discovery. A third and much shorter exploration was made to the top of Harney Peak by Custer and a small contingent of men and horses.

Apparently, Illingworth did not take these side trips, because there is no pictorial evidence to document what that part of the southern and southeastern Black Hills was like during 1874. Rather, he remained near camp, moving about the interesting park-like terrain with its fingers of meadows and serrated spires amid mountains of solid granite. Some spires rise abruptly 200 to 300 feet above the meadows. At least 36 photographs were made by him in the vicinity, about

**Figure 10.** This expedition photo was made as Custer moved into Graveyard Gulch.

**Figure 11.** Current photo taken at site of Figure 10.

**Figure 12.** Expedition photo shows granite spire east of present town of Custer, S.D.

**Figure 13.** Current photo taken at site of Figure 12.
three miles east of the present city of Custer. All but three were found and documented in 1974; one of these was discovered in 1975 [Figures 12 and 13].

On August 6, the expedition repacked and began its return journey. It had come as far south as deemed necessary, and time was important if Custer was to return his command to Fort Abraham Lincoln by August 31.

After breaking camp with the usual 2:45 a.m. reveille routine, the wagon train retraced its route to Reynolds Prairie (now flanked by Deerfield Reservoir), then continued northward through new country. Leaving the prairie, they traveled through broken terrain, descended into the valley (canyon) of South Fork of Rapid Creek, squeezed up a winding narrow gulch (Telegraph Gulch), and camped August 7 on a broad, sloping meadow with a small stream feeding into North Fork of Rapid Creek near Nahant. A large male grizzly bear was shot and killed by Custer and others near where camp was made. The bear was photographed at the campsite [Figure 14], which was located and rephotographed when ground and aerial studies were made of the expedition route in 1975 [Figure 15].

On August 8, scouts led the wagon train eastward over a divide to a drainage (South Boxelder Creek) southeast of a spectacular, prominent, conical mountain which Colonel Ludlow named Custer Peak. Continuing northeastward, they crossed to Hay Creek, where they halted for the night.

On August 9, the route was northeastward, then eastward to a campsite near Flagstaff Mountain on Little Elk Creek. The following day, travel was downstream approximately 1.25 miles where they left this creek and headed southward, passing between White Mansion and Green Top Mountain [Figures 16, 17, 18, 19, 20 and 21] into the canyon of Boxelder Creek.

**Figure 14.** Expedition photo shows Custer with bear he shot near Nahant, S.D.

**Figure 15.** Current photo shows that trailer house and, occasionally, sheep now occupy Custer's Nahant campsite.
Within the canyon, they established two camps, one on August 10 and 11, some three miles below Nemo settlement, the other on August 12—after marching another seven miles downstream. Exit from the canyon was a difficult climb through a narrow ravine now called Custer's Gap.

Leaving the canyon, the command moved eastward up a gradual rise through sparse pine stands and onto tableland covered with prairie vegetation where camp was made only about 2.5 miles east of the previous one. It was here that Private James King died after being ill for only two days. He was buried [Figure 64] early August 14 before the expedition emerged from the Black Hills proper into the broad “race track” valley 1.5 miles north of the present town of Blackhawk. Descending into the valley, they found travel easy through the grassland. The route then was about 4.5 miles north-by-

**Figure 16.** Expedition photo views direction taken by Custer between White Mansion and Green Top mountains.

**Figure 17.** Current photo at Figure 16 site shows how forest has closed in.

**Figure 18.** Current photo taken from helicopter shows sites of Figures 16 and 17.
Figure 19. Another expedition photo taken in locale of Figure 16.

Figure 20. Current photo shows Figure 19 site today.
northwest, through a foothill ridge along the north side of Piedmont Butte, then northwest again between parallel ridges sparsely covered with scrub-type ponderosa pine—the transition zone between the forest and the prairie.

The last encampment in the Black Hills vicinity was made on a prairie flat five miles south of Bear Butte (Figure 22), after the expedition had traveled nearly 26 miles from the previous camp. Here, Custer ordered an extra day overlay for reloading and refitting for the grueling three-weeks march across parched prairies. Since entering the Black Hills on the western side near Inyan Kara Mountain July 23, the main wagon train had traveled about 180 miles in the envigorating forest environment. From the Bear Butte Camp, they had another 255 miles to reach Fort Abraham Lincoln. The joyous entrance to the Fort was made about 4:30 p.m., August 30, as the band played, "Gary Owen," the theme song of that famous 7th Cavalry regiment.

Figure 21. Current photo taken from helicopter shows site of Figures 19 and 20.

Figure 22. Expedition photo shows site of last encampment in the Hills near Bear Butte before Custer entered the prairie for the return march.
Aerial views of the major Black Hills expedition route provide a novel dimension in retracing the reconnaissance of Custer and his command in the summer of 1874. The views start from the western entry at the soldiers’ graves near Inyan Kara Mountain (Figure 23), then to the camp at Agnes Park east of Custer City, and finally north and eastward from the Hills near Bear Butte. These were photographed from a helicopter in July, 1975, and provide an understanding of the present-day forest terrain. The following selected photographs provide a 180-mile tour covering much of the route of the 1874 Black Hills expedition. Photo sites were used by Illingworth in 1874, then rephotographed a century later. Points of interest such as expedition campsites, present settlements, and roads are noted in these aerial views. The 1975 route—with some minor corrections from the 1974 version—is recorded on accompanying maps.


Figure 23. View WSW. The Expedition entered the Black Hills three miles east of Inyan Kara Mountain. Custer and several of his men climbed to the summit to observe the landscape, but widespread smoke reduced visibility.
Figure 24. View N. Entry to the Hills was in this locality, in Wyoming, near graves of Privates Cunningham and Turner. Cunningham became fatally ill, and Turner was shot by a fellow trooper. The graves are appropriately marked, and a historical plaque has been erected at the nearby highway. Arrows in this and other figures indicate direction traveled.
Figure 25. View ENE. From the western edge of the Hills, the route was eastward, across this flat, into the thicker stand of pines.
Figure 26. View NE. Via the flat, men and wagons descended into a lush valley (Cold Spring Creek), which Custer called Floral Valley because of the abundant flowers. We believe they reached the valley about a mile upstream from where the mining town of Moskee (now abandoned) was established.
Figure 27. View SE. The Floral Valley route was a steady, winding climb of 1400 feet over a distance of 21 miles from this starting point. Much of the area today is owned by the Homestake Mining Company. An unimproved vehicle trail used as a logging and cattle road runs through the valley meadow to the summit.
Figure 28. View SE. The serpentine configuration of Floral Valley through the Ponderosa pine forest is evident in this photo made from a helicopter at 700 feet.
No evidence is available that Illingworth recorded more than this one scene of Floral Valley. It is difficult to accept that he did not take more photographs of this valley, which contrasted impressively with open plains over which the expedition had traveled. The ecological and historical values of the glass negatives from Illingworth's camera were not realized for several decades, and many were broken and discarded. This photo site was documented by the senior author in July 1975 and indicates that Illingworth used vantage points to capture the nature of terrain and vegetation (see also Figures 5 and 6).

Figure 29, View E. No evidence is available that Illingworth recorded more than this one scene of Floral Valley. It is difficult to accept that he did not take more photographs of this valley, which contrasted impressively with open plains over which the expedition had traveled. The ecological and historical values of the glass negatives from Illingworth's camera were not realized for several decades, and many were broken and discarded. This photo site was documented by the senior author in July 1975 and indicates that Illingworth used vantage points to capture the nature of terrain and vegetation (see also Figures 5 and 6).
Figure 30. View SE. In some sections, the valley widens and is covered with lush meadow vegetation now used for cattle pasture. When the meadow blooms in June and July, one can readily understand why Custer called it, "Floral Valley."
Figure 31. View ESE. Floral Valley now is crossed by Wyoming Highway 85 at the small settlement of Buckhorn. A straight section of the old highway is in the lower part of the photograph.
Figure 32. View E. In this aerial view over Highway 85, the valley runs in a northeasterly direction. The South Dakota-Wyoming state line is near the highway. Cold Spring Creek, which waters the valley, is aptly named because of its crystal-clear water from higher elevations.
Figure 33. View NE. Elevation of the valley here is about 6,800 feet above sea level. The upper valley has several branches in this area. White Spruce (Black Hills spruce) is common along the borders. Nearby tracts of aspen indicate the area was devastated by natural fires two or more centuries ago. The forest in this area today is very similar to the way it was in 1874.
Figure 34. View ENE. The valley provided easy travel to Indians before Custer came this way. Natural conditions prevent trees from encroaching. The summit of Floral Valley is marked “A”. 
Figure 35. View E. At the divide ("A"), the valley becomes a long meadow at about 6,800 feet. It is not certain if the expedition reached this point from the passage in the foreground or from the lower opening at the extreme left.
Figure 36. View NW. This is the opposite view of the divide from the previous photograph [Figure 35]. Floral Valley is in the distant left. Bear Lodge Mountains in Wyoming are beyond the prairie bordering the Black Hills.
Figure 37. View SSW. After a short distance along the divide, the expedition turned eastward into another drainage area (Castle Creek Valley). Sharp shadows of trees are from bright sunlight during mid-morning. The uneroded limestone plateau expands for several miles west and south.
Figure 38. View NE. The terrain of Castle Valley is more rugged than Floral Valley. This valley is more accessible to the public because of the improved road, which serves the National Forest and private ranches of the area. When the expedition traveled this valley, Illingworth climbed several vantage points and made at least 10 photographs. Castle Creek descends from left to right in this view, then reappears above, going in the opposite direction.
Figure 39. View SSE. Rugged terrain is evident in Castle Valley, named by Custer in 1874. Spectacular limestone bluffs, now screened by the thick forest, reminded him of castles. Two sites on a bluff from which Illingworth made photographs are identified. Part of a large area struck by a tornado in mid-June, 1975 (one month before this photograph was taken), is in the lower left corner.
Figure 40. View SE. On July 26 and 27, 1874, the expedition camped in this broad meadow. It was near here that a small group of Indians was encountered, and one of them, Chief One Stab, was captured and retained by Custer to help guide the expedition. Several 1874 photographs were made here. Deerfield settlement and Deerfield Reservoir are prominent landmarks today.
Figure 41. View NE. The expedition traveled about a mile down Castle Creek Valley from the previous camp before moving northward to a large interior prairie (now called Reynold's Prairie). A few hours later, Custer realized his leaders had misinterpreted directions from Indian guides and angrily ordered a return to the valley to camp at a site now covered by Deerfield Reservoir.
While on what is now Reynold’s Prairie, the expedition encountered this pile of deer and elk antlers which apparently were stacked for ceremonial purposes by an Indian hunting party. Illingworth made this photograph, and the event also was noted in the official logs of the expedition. The exact site of the pile was determined by the senior author in 1975. Hills on the skyline helped identify the site shown in the modern photograph [Figure 43]. Previously, it was thought to be on a similar prairie elsewhere.
Figure 44. View SSE. Turning southward on July 29, 1874, the contingent followed a small tributary, now known as Gold Run, which led to another interior grassland, now designated Gillette Prairie, visible in the upper left of the photo. One arm of Deerfield Reservoir is in the foreground. Roads in the lower right access Black Hills National Forest picnic, camping, and fishing areas.
Figure 45. View SSE, slightly NNE of Copper Mountain. The apparent route July 29 was from the southeast corner of Gillette Prairie and down Negro Creek five miles to its confluence with Spring Creek. One report indicated the advance party went two or three miles down Spring Creek Canyon—where it became impassable for the wagon train—then went upstream to find passage over a hill which led about a mile to another clear-running stream (Vanderlehr Creek). Its broad meadow was selected for camp that night. The wagon train was far behind because of rain, but, under starry skies, it reached the campsite near daylight, in time to prepare breakfast.
Figure 46. View E. Custer then ordered the march from Vanderlehr Creek to begin at 7 a.m. This photo shows the route from left passing the Rindell Ranch (in right distance) situated along the present Deerfield-Custer Road. Roetzel Deer Camp is in the foreground. A portion of the northward route also is shown.
Figure 47. View ENE toward Harney Peak. The route may have been along this shallow, open valley to the summit approximately a quarter-mile to the right, then eastward, descending sharply into Graveyard Gulch. Some believe they entered the gulch beyond the indicated photo site.
Figure 48. View NE. St. Elmo Mountain is in the center background. Graveyard Gulch, leading from the foreground, merges with Tenderfoot Creek Valley (oriented south to north), now containing U.S. Highway 16 and a railroad track. Expedition members likely enjoyed these pleasant gulches, which now show considerable evidence of past mining. Cattle are presently pastured in the lush stream meadows. The designation at top right indicates the area that Illingworth used for photo sites.
Figure 49. View S. Tenderfoot Gulch, in the immediate foreground, meets Tenderfoot Creek Valley six miles north of Custer City. Illingworth was busy with his camera in this area of spectacular granite outcroppings and mountains. When the expedition headed homeward August 6, it swung westward across the grassland in the photograph, then went north nearly 20 miles before camping.
Figure 50. View SE. This aerial view includes the expedition's two most southerly camps. Several parties were sent to explore these locations. Small amounts of gold were discovered at Custer Park along French Creek July 30, 1874, but the first worthwhile amount was found in Agnes Park. There is debate over when and where the first significant discovery was made. While on an exploring party about 35 miles south of here, Custer dispatched "Lonesome Charlie" Reynolds, a prominent frontier guide, to carry messages of the gold discovery to Fort Laramie, Wyoming Territory.
Figure 51. View ENE. In this area, the return (north) route is uncertain. It is shown coming from east of Atlantic Hill, but it could have been from the west side to link with the depicted route at the center of the photo. Leaving the permanent camp east of Custer City [Figure 50] August 6, the expedition passed the previous campsite at Custer City and the one indicated here on Vanderlehr Creek, then camped on Gillette Prairie about six miles north. From Gillette Prairie, the northward route was down Gold Run [Figure 44], into a broad meadow now inundated by Deerfield Reservoir, then to Reynold’s Prairie.
Figure 52. View NW. The expedition had been on Reynolds Prairie July 27 but turned back when Custer realized they were heading in the wrong direction. It was at photo site 24, on the right of this photograph, that a large pile of deer and elk antlers was discovered [Figures 42 and 43]. The northward march August 7 from the camp on Gillette Prairie, then across Reynolds Prairie must have been relatively easy.
Figure 53. View NW. Leaving the prairie at Reynolds Ranch the expedition passed into a shallow drainage, West Fork Castle Creek, followed it a short distance to the west, then went over a minor divide into Lessering Draw.
Figure 54. View N. The route was through a semi-forested area near the present Lessering Ranch next to Long Draw. Custer Peak ("A") is 10 miles away.
Figure 55. View N. Long Draw led into the South Fork of Rapid Creek about three miles upstream (west) of Rochford settlement. The expedition entered the Black Hills 15 miles west of here July 25. This view is across the limestone area 6,400-6,500 feet elevation, with Terry Peak, on the horizon, 14 miles away.
Figure 56. View NNW. The route was eastward along South Fork of Rapid Creek about a mile, then northward up narrow Telegraph Gulch and across broken open country to a meadow where they camped August 7, 1874, about 16 miles from the previous camp on Gillette Prairie.
Figure 57. View N. Shown is North Fork Rapid Creek valley from the upper left to the middle foreground. Custer Peak is on the right horizon and Terry Peak is left. Camp on August 7, 1874, was on a meadow off the lower left. This area now is called Nahant, and it was here that Custer and others killed a grizzly bear before the wagon train reached the campsite [Figure 14]. The route August 8 and 9 is in question. It apparently began in an easterly direction from this camp. Mr. Winchell, the expedition geologist wrote in his report for August 8: "In leaving camp, we climb with the train the hills on the east of the creek, and find an open undulating country stretching off northeast, and travel in that direction." He also mentioned passing within four miles of Custer Peak. Unfortunately, this area was not fully photographed from the helicopter. Camp August 8 was evidently on Hay Creek. On August 9 the expedition went north three miles, returned south, and camped in a broad grassy valley, perhaps about two miles WSW of Flagstaff Mountain.

Figure 58. View SE. On August 10, the expedition moved southeastward and likely came down Wilson Draw east of Green Top Mountain, then into Boxelder Creek. (Author's note: We know they were in this locality because the photographer took two pictures of Green Top Mountain [Figures 16 and 19].) This 1874 photo site was one of the several documented in this study.
Figure 59. View SE. This photo presents a perspective of Boxelder Valley above the settlement of Nemo. Extensive limestone bluffs form the eastern rim of the valley. The expedition went down the valley August 10 beyond the far bend, where they camped near the mouth of Estes Creek.
Figure 60. View SE. They camped on these stream flats August 10 and 11, 1874. Downstream, the valley narrows and was difficult for travel. Geologist Winchell measured the height of the limestone bluff at the left and found it was 245 feet above the meadow.
Figure 61. View E. Boxelder Creek winds through this narrow valley. The line of foothills and prairie surrounding the Black Hills can be seen near the horizon. The trip down Boxelder Creek was routine until the command tried to exit from the rugged canyon. Custer wrote in his August 15 dispatch:

"We advanced without serious obstacle [from the permanent camp] until within ten or twelve miles of Bear Butte, when we found our further progress barred by a high range of impassable hills. We attempted to effect a passage through some one of the many valleys... but in every instance we were led into deep broken canyons, impassable even to horsemen.

Through one of these I made my way on foot, and from a high point near its mouth obtained a view of the plains outside... I placed the command in camp in a fine valley, in which it had halted, and devoted the remainder of the day to further search for a practicable route... The result decided me to follow down a water course... Elk Creek. We camped twice on this stream, and as far as we proceeded down its course we had most excellent road; but finding that... its course would take us into a canyon which could be barely made practicable for our wagons, I searched for and discovered a narrower gap in the rocky wall... which was conveniently large to allow our wagons to pass through."

The second camp August 12, mentioned by Custer, was about three miles downstream from the last arrow.

Figure 62. View N. Custer Gap is a rugged passage leading from the valley and rises more than 200 feet. To get from the canyon, the Pioneer Corps, which always went ahead of the main wagon train, had to construct a temporary trail up this gap. Ambulance driver "Antelope" Fred Snow described in his 1886 unpublished account of the expedition the difficulty for men, equipment, and animals to leave the canyon. He said that one wagon and a mountain howitzer were lost over a steep embankment during the climb on August 13.
Figure 63. View SW. This view is southwest in Custer Gap toward Boxelder Creek and beyond. The winding creek is hidden by the nearest two hills. Rugged terrain of the central hills toward Harney Peak is evident across the photo.
Figure 64. View SSE. After the expedition ascended Custer Gap to this plateau, the route was southeastward for about a mile where the final Black Hills camp was made August 13. The reconnaissance covered 500 miles to this spot on the eastern edge of the Hills since leaving Fort Lincoln July 2, 1874. While in this camp the third man to die on the trip, Private James King, was buried at the camp site by members of his unit August 14.

Illingworth also made a group photograph of officers and scientists at this campsite.
Figure 65. View NNW. A winding route brought the expedition from the plateau of the previous camp to the peripheral valley about a mile west of Black Hawk, S.D. This broad valley encircling the Hills was created by volcanic action which forced a massive bubble of molten material from the earth to surface, rupture, and lift layers of sandstone and limestone in the region. The low hills on the side of the valley are edges of surface layers and are inclined upward toward the central granite core of the Black Hills. Travel in this valley must have been easy for the expedition. The men did not look forward to leaving the lush hills for the long, hot northward march across the prairies to Fort Abraham Lincoln.
Figure 66. View NW. After traveling about six miles northward and encountering wet ground in the valley, the regiment turned eastward through a gap near Piedmont Butte to the edge of the Hills. The town of Piedmont, S.D., can be seen near the center of the photo, and Interstate Highway #90 is prominent.
Figure 67. View NW. The route was northward toward Bear Butte and goes nearly 10 miles through the edge of these pine-clad hills. This land is now a private ranch holding and is outside of the Black Hills National Forest. According to expedition reports, the forest cover was similar to that in this scene.
Figure 68. View W. This photograph shows an abandoned stagecoach trail which likely followed the expedition route in this area.
Figure 69. View W. The route was by Tilford Gap and about a mile east and nearly parallel with the broad valley shown in Figure 42. Farther north, the route moved from the edge of the Hills toward a campsite near Bear Butte.
Figure 70. View W. This gap at Pleasant Valley Creek (flowing north) angles from the distant valley toward Bear Butte.
Figure 71. View NW. Here, where the trail turned from the Hills, Bear Butte is nearly eight miles away. Custer ordered the expedition to remain at this campsite August 14 and 15 for repacking wagons and refitting draft animals. This is the final camp associated with the Black Hills, but 15 others were made during the two weeks travel to Fort Abraham Lincoln more than 360 miles away. On August 15, an exploring party climbed Bear Butte to make scientific observations. During the 22 days the expedition was in the Black Hills since July 24, invaluable information was collected about the physical features of the region and the flora and fauna existing under the sole influence of nature and the Indian. References to these physical figures were included in scientists' reports in the official expedition logs.
The Black Hills forest is clearly dominated by Ponderosa Pine (Figure 72) growing in virtually pure stands—except where replaced by White Spruce (Figure 73) on cooler more moist sites, and by Quaking Aspen (Figure 74) in areas disturbed by catastrophic fires.

The forest vegetation pattern now differs from when white men first entered the region. Early photographs and reports reveal fire was a major factor in perpetuating a mosaic of vegetation, from grasslands to stands of mature pine. Such diversity created habitat for many wildlife species, including the grizzly bear, which prefers open, shrubby growth.

Here, pure stands of pine develop naturally because pine is a prolific and frequent seeder and because conditions are optimal for germination and growth. Much of the annual precipitation falls during spring when seeds are on the ground; summer rain showers are frequent. This contrasts with conditions elsewhere in the Ponderosa range. If undisturbed, thick beds of pine seedlings develop under a seed tree canopy. Within a few years, young trees form an exceptionally thick stand, which then stagnates in growth because of intense competition for nutrients, moisture, and sunlight (Figure 75). These stands were once uncommon, but now some have as many as 15,000 stems per acre. The surface beneath them is devoid of vegetation because little sunlight and moisture reach the ground, and the thick mat of pine needles prevents growth of other plants.

Under conditions a century ago, fire kept the pines in
various stages of development and the landscape generally open. Many fires under those conditions were beneficial to the forest health. After a century of use and about 70 years of forest management, the forest now has developed into a generally vast stand of even-aged, mature trees that challenge forest management to provide lumber, water, livestock forage, and wildlife, as well as recreation needs.

Tree insects also influence forest growth. The small mountain pine beetle is common to the Black Hills and is the most troublesome, probably causing damage for centuries. Beetle populations spread rapidly through forest stands when large areas of closely spaced pine trees reach a size of about 9 inches in diameter. Younger trees generally are not attacked.

Serious beetle outbreaks swept through the Hills early this century, causing a lumber loss of 1 to 2 billion board feet. In 1963, another epidemic started, but chemical treatments by federal and state agencies thwarted the spread. In the Hills today, one can see evidence of another vast infestation. Foresters estimate beetles annually kill 600,000 trees during large outbreaks, and present heavy insect damage is expected to continue.

**Federal Influence**

Because of its varied resources and accessibility, the "untouched" forest was destined to be prominent in serving the expanding nation. Since its transfer from Indian ownership, it was successively altered by heavy exploitation, preservation, reforestation, and multiple-use management beginning shortly after Custer returned to Fort Lincoln from his 1874 expedition.

*Figure 74.* Aspen tends to replace pine after a forest fire. Note charred remnants of pine both in background and foreground of photo.

*Figure 75.* Exceptionally thick stands of young pines will eventually stagnate because of intense competition for nutrients, moisture, and sunlight as shown in this U.S. Forest Service photo.
The forest must be considered totally, not as the Black Hills National Forest alone, because much of it is not federally owned. However, the U.S.D.A. Forest Service, through its policies and management practices, heavily influences the character of the forest, as directed by Congress through important public laws. Major laws affecting the Black Hills National Forest include:

1878 - The Free Timber Act and the Timber and Stone Act gave people in nine western states the right to cut trees at will for domestic and mining purposes. The President power to establish forest reserves from the public domain but was repealed by the Organic Act of 1897 which provided for the Black Hills Forest Reserve that same year.

1906 - This special act provided that public-domain lands, chiefly valuable for agriculture, be listed for homestead and entry purposes. Much Black Hills stream bottomland and prairie in the Black Hills originally were claimed under this legislation. Congress then provided that a fourth of all money received by National Forests from grazing permits, timber sales, and other products or special uses be paid to the states to benefit public schools and roads of counties containing National Forest.

1911 - The Weeks Law established state-federal cooperation for fire protection in forests and established a national policy for purchasing forest lands to protect headwaters of navigable streams.

1924 - The Clarke-McNary Act authorized state-federal cooperation in protecting state and private lands against fire and provided a system for giving tree seedlings to private land owners and, by later amendment, to states for reforestation.

1928 - The McSweeney-McNary Act authorized a forest research program.

1933 - The Civilian Conservation Corps Act (CCC) established a program of road building, small dam construction, forest management, and recreational facilities development, which substantially impacted the Black Hills National Forest.

1934 - The Taylor Grazing Act ended unregulated use of public grazing lands, including those in national forests, by establishing a system of allotments, fees, and guidelines for grazing.

1960 - The Multiple Use, Sustained Yield Act declared that forests were to be "...administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes..." to maintain a high level output of forest resources without impairing land productivity.

1964 - The Wilderness Act endorsed a long-standing Forest Service policy of designating certain lands as wilderness areas.

1967 - The Air Quality Act mandated state programs and guidelines for air quality standards. Burning of sawdust and saw mill residues was curtailed.

1969 - The National Environmental Policy Act required the Forest Service, other public agencies, industries, organizations, and individuals to keep activities of man in harmony with the natural environment. A 1977 environmental statement for the Black Hills National Forest Timber Management Plan was required by this Act.

1970 - The Youth Conservation Corps Act established summer youth conservation work-and-learning programs on national forests and other public lands. Some forest management and recreational facilities development was undertaken by this program.


1976 - The National Forest Management Act amended the Resources Planning Act and gave unprecedented direction to the management of the National Forest System by specifically addressing reforestation, fiber utilization, regeneration methods, tree rotations, National Forest System resource planning, road development, timber removal limitations, and public participation in formulating Forest Service programs.

Other Federal legislation established Norbeck Wildlife Preserve, Wind Cave National Park, Mount Rushmore National Memorial, and Jewel Cave National Monument within the Black Hills National Forest and defined the resource management activities allowed on each. Except in Norbeck Wildlife Preserve, general forest management and timber harvesting either are restricted or prohibited.

**Land Stewardships**

The Hills area is predominantly public land, most of which is the 1.2-million-acre National Forest. Lesser acreages are in Custer State Park, Wind Cave National Park, Jewel Cave National Monument, Mount Rushmore National Memorial, state school lands, and federal land under U.S. Bureau of Land Management jurisdiction. Private land is scattered throughout but mainly restricted to stream meadows and grasslands. The largest single private holding is that of the Homestake Mining Corporation, which manages its 40,000 acres for timber and water production.
Custer State Park

When South Dakota became a state in 1889, two 640-acre sections of every township were reserved as school land, resulting in state holdings throughout the Black Hills. Hundreds of these scattered tracts within the National Forest made resource management difficult. The Forest Service traded other sections for these to consolidate the pattern of ownership and concentrate state lands into a single block. In 1906, the State Commission of School and Public Lands began the transfer process, and, by 1912, a block of 61,400 acres of “lieu lands” was created.

Led by South Dakota Governor Peter Norbeck, later a U.S. Senator, several South Dakotans asked the 1913 State Legislature to designate this large area a game preserve. The 1919 State Legislature removed it from school-land status and named it “Custer State Park.” The Park has been under jurisdiction of the State Game, Fish and Parks Commission since 1945.

Additional land trading and purchases have increased the Park to about 72,000 acres, making it one of the largest state parks in the nation [Figure 76].

Located in the southern Hills east of Custer’s 1874 encampment where gold was discovered [Figure 77], Custer State Park now is developed for outdoor recreation. It serves as a large wildlife sanctuary, and hunting is prohibited except under certain conditions. A large bison herd is maintained, but a portion of it is eliminated annually through sale or shooting of live animals to keep it balanced with the natural food supply. Proceeds are used for park upkeep.

Lodges, picnic areas, campgrounds, and other recreational facilities have been developed along streams and near the several man-made lakes in the Park. Annually, more than 1.3 million people visit the Park and its spectacular Needles area.

Custer State Park, like the adjoining National Forest land, is covered mostly with pine forest. Some 55,000 acres is managed for timber production, principally to maintain a healthy forest, enhance wildlife habitat, reduce fire hazard, and provide income.

6. Sections 16 and 36 were retained to generate income through lease or sale to help support public schools and colleges in the State. Much of it has now gone to private ownership.
Wind Cave National Park

Wind Cave was discovered by a hunter in 1881. The cave was claimed by the South Dakota Mining Company in 1890 and later sold to a company which catered to tourists. In 1903, it was made into a national park [Figure 78]. This 28,060-acre area is a wildlife sanctuary and features a large expanse of preserved mixed-grass prairie and some areas of abundant Ponderosa Pine. Forest and range management programs protect and perpetuate this natural vegetation.

More than a million visitors have enjoyed the park in each of the past several years, many coming to observe the large variety of wildlife there [Figure 79].

Figure 78. Wind Cave National Park adjoins the southern boundary of Custer State Park.

Jewel Cave National Monument

Jewel Cave, in the southwestern Hills, was discovered in August, 1900, by two gold prospectors. Because they found no precious minerals in the cave, they used it as a tourist attraction. This was unsuccessful and later abandoned. The area then became part of the public forest reserve, and it was named Jewel Cave National Monument by Presidential Proclamation in 1908. In 1933, it was transferred from the U.S. Forest Service to the National Park Service [Figure 80].

The 1275-acre area is preserved and managed for its natural features. It is a wildlife sanctuary, and all animals and plants are protected. Underground, more than 60 miles of passageways have been discovered on four levels, and most are now open to the public. More than 100,000 visitors stop at the Monument annually, with about 70,000 touring the cave.

Figure 79. The prairie dog is one species of wildlife readily visible to visitors at Wind Cave National Park.

Figure 80. Jewel Cave National Monument is located about 16 miles west of Custer State Park.
Mount Rushmore National Memorial

A former South Dakota State Historian, Doane Robinson, first proposed that a memorial sculpture of national significance be placed in the Black Hills. After both the State Legislature and Congress approved the idea in 1927, he invited sculptor John Gutzon Borglum [Figure 81] to choose a suitable site. Mount Rushmore was selected because of its solid granite, accessibility, and orientation toward the sun.

Initial funding for the project was contributed by school children, private citizens, organizations, and businesses throughout the nation. Work began in August 1927 when President Calvin Coolidge, then vacationing in the Black Hills, dedicated it “Mount Rushmore National Memorial.” Congress appropriated federal funds in 1929 and created the Mount Rushmore National Memorial Commission to oversee the project. In 1939, the Commission

Figure 81. Roadside marker describes the sculptor who carved a mountain near here “... as a memory of the great things we accomplished as a nation...” Former South Dakota State Historian Doane Robinson is credited with first proposing the memorial.

Figure 82. Gutzon Borglum’s carving, Mount Rushmore National Memorial, recently was placed on the National Register of Historic Places.
Figure 83. Black Hills National Forest now encompasses about 1.2 million acres and has been designated a national forest since 1907.

Figure 84. This marker notes several of the management objectives of the Black Hills National Forest by the U.S. Department of Agriculture Forest Service.

Most of the Hills area became national forest in 1907 after being in forest reserve status since 1897. It now encompasses about 1.2 million acres, mostly in South Dakota. Old maps indicate parts of the Forest had been named, “Bear Lodge,” “Sundance,” “Harney,” “Sioux,” and “Fort Meade Wood and Timber Reservation” before receiving the present single name in 1905.

The Black Hills National Forest is administered by the U.S. Department of Agriculture Forest Service, as are all national forests [Figure 83]. Locally, it is administered by a supervisor at the Forest Service headquarters in Custer, South Dakota. The seven forest districts each have a ranger who is responsible for all activities in the area. The Forest is managed by objectives of the National Forest System to produce sustained yields of timber and
other raw wood products, recreation, wildlife, water, and forage for livestock [Figure 84]. Because of its scenery and location, the Forest is particularly suitable for recreation ranging from automobile touring to fishing and hunting. Now, such use averages 2.1 million visitor days annually.

**Land Use Plan**

For overall management, a forest plan currently is being written in accordance with the 1976 National Forest Management Act. The plan will establish the long-term direction for all resources and uses of the National Forest, including the Norbeck Wildlife Preserve, Harney Peak Wilderness Area, the Experimental Forest, the Research Watershed, and the Research Natural Area.

The land also will be classified for suitability, capability, and availability for range and timber production purposes.

**The Pattern for Timber Management**

The abundance, distribution, age, condition, and species of trees affect all forest uses, so careful management of tree stands is necessary.

The present plan indicates the forest is heavily overstocked with young trees, a condition unfavorable for many wildlife species. Also indicated is that nearly pure stands of adult pine, mostly 80 years of age, are ideal for the spread of the destructive bark beetle now infesting more than 20 percent of the trees.

Two objectives of the plan guide the direction of future work in the Forest:

1. Enhance the scenery, wildlife, recreation, and

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Figure 85. The reservoir behind Pactola Dam is one example of the effort to enhance the forest area for multiple uses.
other multiple-use benefits [Figure 85].

2. Improve the health of the Black Hills National Forest to amplify benefits of an improved timber management program [Figure 86].

Accomplishing these objectives requires improvement of winter range for deer and habitat for other birds and mammals. The plan also calls for preserving rare plant species.

Other aims are to control the outbreak of mountain bark beetles, to reduce potential for catastrophic wildfire loss, and to produce stands of large Ponderosa Pine and White Spruce for scenic beauty and wood products.

Planned tree removal eventually will produce blocks of even-aged pine stands. The standard rotation for the cutting cycle will be 100 years; although, in certain zones, Ponderosa Pine trees will be allowed to grow 130 years or longer to produce picturesque “yellow bark” specimens. Initial thinning will begin when trees are 10 years old to improve their vigor and quality, and no commercial product will be derived from this first removal.

Subsequently, trees will be thinned every 20 years, to age 80, and this will yield pulpwood, posts, poles, and fuel wood. Sawlog harvesting will begin when trees reach age 90, but sawlogs will be removed in three cuts to allow the stand to regenerate. Cuts will be spaced 10 years apart, so the remaining third of the stand won’t be taken until 110 years of age. This allows mature trees to produce seeds which will grow for several years under the protection of their canopy.

White Spruce cuttings will occur every 10 years, but both large and small trees will be removed to encourage regeneration and to create aesthetically pleasing stands.

Aspen will be maintained by harvesting through patch cutting with patch sizes of 10 or fewer acres every 10 years. Complete cutting is necessary to stimulate maximum sprouting from roots and to continue the stand’s growth-cycle.

**Manipulating Travel**

The timber management plan also requires adjusting the road system.

Forest roads are in three classes: arterials, collectors, and locals. There are about 3.8 miles of road per square mile of forest. Locals will be reduced by one-fourth during the next several years. Many are unnecessary for forest management or cause soil erosion and stream degradation [Figure 87]. Some will be improved and others constructed to complete the travel system.

No additional miles of arterial roads are needed over the present total of 495. Nearly 20 miles will be upgraded, but no new roads will be built. The collector road system of 608 miles also is nearly complete, but about 20 miles of improvements and 7 miles of new construction may be needed. During a period

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**Figure 86.** Excellent stands of Ponderosa Pine like this are the result of careful management.
of 10 years or less, 470 miles of local roads will replace unsatisfactory roads. Some will be seeded with grass and opened only for seasonal use.

The purpose is to provide efficient and safe travel in some areas but restrict access to others. Relocation and upgrading the road system began more than 10 years ago to provide entrance to blocks of forests for management and protection. The system not only is designed for tree production, but also to enhance all forest uses.

Recreation Plan

The recreation management plan—once coupled with the interrelated plans for land use, timber management, and travel—will complete the system when it is developed.

Research in the Forest

Forest resource management now is more sophisticated than when reforestation and fire protection were foremost. Systematic observation and research of tree growth, wildlife and fish, soil strata, and water run-off have increased significantly, and influences of management practices now can be predicted more precisely.

Figure 87. Closing forest roads on a seasonal basis—or even permanently—is another management technique for controlling soil erosion and stream degradation.
The Black Hills area is being researched by scientists from various agencies, universities, and colleges—including the federal Forest Service, the Wildlife and Fishery units and Agricultural Experiment Station at South Dakota State University, The South Dakota School of Mines and Technology, the University of South Dakota, and the South Dakota Department of Game, Fish and Parks.

For 30 years, forest scientists, from the Rocky Mountain Forest and Range Experiment Station at Rapid City, S.D., have collected basic data to help answer interrelated problems of forest management. Some research is forest-wide, but long-term studies of tree spacing are centered at the Experimental Forest near Roubaix, and hydrological studies are being conducted on the Sturgis Experimental Watershed. These studies are designed to increase yields of wood, water, and animal products. One goal is to produce a 16-inch diameter pine tree within 100 years while also improving esthetic values, wildlife habitat, water yields, wood fiber utilization, and livestock forage.

The Agricultural Experiment Station at South Dakota State University, Brookings, has used Black Hills resources for various types of research. Currently, attempts are being made to identify the substance that causes pregnant beef cows which consume pine tree needles to abort their calves. Extracts from pine needles, previously fed to mice for study of the problem, are to be extensively probed for possible relationships to calving losses that cost western livestock producers thousands of dollars annually.

Cattlemen have been plagued for years with "pine needle abortion," an up-to-now mysterious affliction blamed for cattle losses through calving abortions and deaths of heifers because of retained placentas. Many cattlemen have no alternative to pasturing their animals adjacent to or within areas in which pine needles—dry or green—are present, especially during times of storm or blizzard. Cow and calf losses are considered serious in South Dakota, Idaho, Colorado, Montana, Oregon, and Wyoming. Surveys covering eight western South Dakota and eastern Wyoming counties suggest an annual loss of 700 calves in that area alone from pine needle abortion [Figure 88].

Currently, SDSU and a Texas institution are cooperating in attempts to identify the substance that causes the abortions. When the causative substances are identified, scientists will be better able to designate measures for control or prevention of the costly disease. White mice and fertilized chicken eggs have been used to screen extracts believed to contain the toxic substances.

Approval by the U.S. Food and

Figure 88. Pine needle consumption by cattle can become a serious problem when these farm animals move into the timberline for protection from weather.
Drug Administration of aspen wood as a new feed for animals in August 1979 culminated several years of research by the SDSU Agricultural Experiment Station. It was part of investigations designed to study uses and conservation of byproducts. The Food and Drug approval permits interstate sale of processed aspen as a livestock feed.

SDSU had been investigating potential uses of cellulose by ruminants (animals with compartmented digestive systems such as cattle, deer, sheep, goats, and many zoo animals). Cellulose in the form of fibrous feed is one of the world’s most available byproducts.

The South Dakota Department of Game, Fish & Parks was attempting to establish or populate ruffed grouse as a game bird in the Black Hills. This bird thrives on higher protein young aspen buds and shoots. Appropriate areas were available in the Black Hills where aspen stands were growing following fire or other destruction of the common Ponderosa Pine cover. The problem, however, was that the aspen was over-mature, often in stands at least 75 years old. It was too tall for broods of young birds to use for protective cover, and it lacked the young succulent regrowth shoots needed by the birds in their diet.

One answer was to cut the trees to encourage the rapid natural regrowth characteristic of aspen. This, as expected, provided excellent natural regrowth. However, to clear-cut large areas of mature aspen trees resulted not only in an eyesore but also in slashings which increased the fire danger.

Contacts with SDSU resulted in a livestock feed investigation at the Agricultural Experiment Station in Brookings using aspen chipped at the Black Hills “ruffed grouse” sites near Nemo, S.D., and transported and processed (finely chipped) at a plant in Egan, S.D.

The cows fed this material did well in the experimental feedlots at Brookings during the initial research. It was determined that as much as 48 percent aspen could be fed successfully in growing rations or as the roughage portion of finishing rations. No toxicity problems were encountered.

A later and larger experiment-
demonstration was on a ranch near Pukwana in central South Dakota. Because of the much larger amount of aspen needed for the Pukwana research, it was obtained through a commercial source in northern Minnesota and processed by a commercial firm in DeSmet, S.D. [Figure 89].

The Pukwana experiment indicated the high potential of aspen as an emergency feed for overwintering bred stock cows. Normal, healthy calves were born to each of the three experimental groups (cows on aspen silage, cows on a pelleted aspen and alfalfa mixture, and cows on prairie hay as a control).

This experiment, conducted during a time of severe moisture lack in the mid-1970's, indicated that during times of drought, shortage, or high prices for hay or other roughage material, aspen can be a competitive substitute for more conventional ration ingredients.

The potential of aspen as a ruminant feed comes mainly from its low lignification and relatively high digestibility without special physical or chemical pretreatments. SDSU animal scientists point out. Both bark and wood are palatable to ruminants. Aspen contains 75 percent holocellulose which is used as a source of energy by ruminants, much as they use traditional roughages. Whole-tree Aspen used in these experiments is deficient in protein, vitamin A, and phosphorus, and these ingredients must be supplemented to attain a proper ruminant diet.

Aspen is a widespread tree species in North America, growing on millions of acres. Properly managed, it is an important factor in resource land use. It is beneficial for watershed improvement, soil building, wildlife forage, recreational use, scenic beauty, and now as an approved fibrous feed. Prior to Food and Drug Administration approval, aspen was used in preliminary experiments as basic feed for the beef breeding herd at the Northwest Vocational Technical School at Sturgis, S.D., and some 1,200 sheep were overwintered on privately processed aspen on the Blackfeet Indian Reservation at Babb, Mont.
The early settlers and miners in the Black Hills harvested much of the sawtimber. It should be noted that a great deal of mature trees needed to be cut at this time, but early residents apparently also cleared large areas of the forest [Figure 89-2]. A replacement forest followed through plantings [Figure 89-3] and natural revegetation but was unrepresentative of the previous natural conditions. The value of the forest was recognized shortly after it was opened for prospecting and settlement, and, to protect and manage its resources and natural features, national and state forests and parks were established by legislative action. Unfortunately, man thereby created conditions which now favor widespread destruction of trees by insects and a reduction of wildlife. Recently, this has been recognized by federal and state foresters, and present aggressive management planning by the U.S. Forest Service should correct the situation and demonstrate an ecologically sound program for others to follow.

In the future, the forest should be even more aesthetically pleasing, without the present monotonous growth of pines, by being broken into small uniform stands and combinations of seedlings, saplings, post and pole-sized timber trees, mature sawlog trees, and lush ground vegetation. This diversity will enhance wildlife populations and provide more forage for livestock grazing. Timber management for multiple uses also will favor stands of aspen and spruce previously considered inferior to pine. This overall change will result from increased understanding of the forest ecosystem, its management technology, the use of its wood fiber.

New attitudes toward past management practices will surface during the next 10 years. For example, forest scientists already recognize fire as an important force for maintaining a healthy and
productive forest. The Forest Service has revised its management policy to use fire as a management tool. Under this policy, prescribed fires are ignited under carefully controlled conditions to reduce fuel hazards, improve vegetative conditions for livestock and wildlife, and enhance the scenic quality of the forest. As a management tool, fire is entirely consistent with goals to improve biological, physical, social, and economic conditions of the Black Hills forest. Unplanned wildfire ignitions actively will be suppressed as in the past.

Unless petroleum shortages overly restrict private travel, Black Hills tourism may increase 83 percent by the year 2000, according to U.S. Forest Service analysts. Resource managers will alter programs not only to meet these increasing demands for recreation, but also to provide an adequate flow of lumber and wood products. New forest products plants likely will be established in the Hills to process wood fiber from forest management operations and benefit the economy of the area.

America can be confident of the welfare of this forest. If necessary, even public access can be controlled to assure future protection of these valuable resources because, fortunately, most of the Black Hills is held in public trust.

Figure 89-3. Efforts to restore the forest began early in the century, but the result was unrepresentative of the natural forest.
SELECTED REFERENCES


Tallent, A.D. 1885. The Black Hills; or, the last hunting ground of the Dakotas. Chicago. 713 p.
APPENDIX A—SELECTED PHOTO PAIRS FROM BULLETIN 616

One of the features which distinguished "Yellow Ore, Yellow Hair, Yellow Pine." Bulletin 616, was the painstaking search for Illingworth's original photo sites.

Research often is considered a sedentary activity, one which is apt to occur in the sterile atmosphere of a scientific laboratory or the dark recesses of a great library.

But the search for Illingworth sites involved not only the perusal of volumes of documents and maps, but also hundreds of hours of thrashing through dense pine growth, climbing rocky ledges, and lugging heavy photo equipment as the sites were re-photographed.

In fact, those who produced the research, text, and photographs for Bulletin 616 and this, its sequel, covered far more than the 1200 miles, including the side trips, marched by the original expedition in 1874.

Because of the popularity of the photo pairs in Bulletin 616 as voiced by the readers, this Appendix contains a reprise of some of the more visually outstanding of those photographs. Maps which follow indicate the locations of the 19 pairs.

Figures 90-91. Here, senior author Don Proguliske, center, checks landmarks in file copies of the 1874 photographs with Cameron Ferweda, then with the U.S. Forest Service. Photographer Richard Sowell, right, takes a light reading at this site near Cathedral Rock as shown in the background. The accompanying 1874 photograph by Illingworth also shows Cathedral Rock, although not taken at this exact location. The trio called this one of their "easier" photographic sites.
This is the route followed by the Custer expedition as it entered the Black Hills from the Wyoming side, worked its way southward, then re-traced about half of its route to turn toward the northeast and homeward. Photo pairs in this Appendix were selected from three sections of the route indicated as Sections A, B, and C. Details of those sections and the photo locations are contained in the three maps which follow.
Figure 92. The expedition begins to make camp in an area near the present community of Deerfield, S.D. A limestone outcrop is a prominent towering landmark in the distance. Silver Creek flows in the foreground from the left. View NE.
Figure 93. Viewed today, the limestone outcrop and adjoining background slopes are now grown over with pine trees. A fence in the foreground reveals that the previously wide mountain meadow is now a pasture for cattle. View NE.
Figure 94. Part of the encampment shown in Figure 92. The open "park-like" forest is evident on the far slope. View SW.
Figure 95. A century of ecological changes mainly caused by man has allowed pines to become excessively dense in some areas as shown in this companion photograph to Figure 94. View SW.
Figure 96. Another view of the Deerfield camp looking up Silver Creek near its confluence with Castle Creek at right. Note the horses grazing beyond the line of tents and the "laundry" spread on bushes along the stream at lower left. View W.
Figure 97. A comparison of this 1973 view with the 1874 photograph (Figure 96) provides a striking example of how the forest has "closed." View W.
Figure 98. Looking down Castle Creek, Illingworth caught another view of the Deerfield encampment showing grazing horses, clustered wagons, tents and campfires in the lush mountain meadow. The lines in the upper right center of this photograph are from imperfections in the original glass plate—possibly a fingerprint ... of Custer? ... of Ludlow? ... of Illingworth? View SE.
Figure 99. The top of Hat Mountain in the distance remains in prairie but lower and distant hills have become overgrown with pine. The Deerfield community is around the far bend of the road. View SE.
Figure 100. Illingworth called this "Turkey Rock" when he photographed it in 1874. (Photo from National Archives.) View NNE.
Today the background slopes from Turkey Rock are more heavily wooded. Turkey Rock was as elusive as its namesake, the wild turkey, and many hours were spent in seeking this formation. View NNE.
Figure 102. Several areas of the granite range north of Custer, S.D. and Crazy Horse Monument were included in Illingworth's photographs. Soil is relatively shallow, thus the forest is somewhat naturally restricted. View E.
Figure 103. A striking combination of natural and man-caused changes over the past century can be observed in this photograph. Excluding fire as one of Nature's management tools has probably been the major factor in allowing the pine to "come in" much thicker. Construction of Highway US 385, domestic livestock grazing, and killing of the willow by the willow borer undoubtedly have been the major factors which have eliminated much of the shrub vegetation along the valley bottom. View E.
Figure 104. Late afternoon sunshine causes long tree shadows and emphasizes crevices in the distant rock wall. Note the soldiers in the right foreground shadows., View NNE.
Figure 105. Illingworth called the scene "Sunshine and Shadow Mountain." This interesting rock formation is just north of the city of Custer, S.D., along Highway 385. View NNE.
Figure 106. Illingworth captured this permanent camp scene from high rocks situated across the valley. View N.
Figure 107. The scene in Figure 106 today, similar to many others, shows the forest growth. This photograph illustrates man's use of the locality. The distant hills (to the north) are known as the "Needles." The highway is from Custer, S.D. (to the left) into Custer State Park and along Stockade Lake (to the right). A South Dakota historical marker (not shown here) is along the highway left of center. View N.
Figure 108. The photographers in 1874 and 1972 swung their cameras to the left from the views in Figures 106 and 107. The same line of tents appears in both photos-106 and 108. View NNE.
Figure 109. A tourist rock shop shown in this modern match for Figure 108 now occupies nearly the same place where tents were set a century ago. Replica covered wagons now stand almost exactly where Expedition wagons were parked in 1874. View NNE.
Figure 110. Remaining at the same spot, with the camera swung still more to the left than for the Figure 108 series, this 1874 scene shows a few tents of the permanent camp which was strung along the valley. An earlier, one-night camp was set up near the downtown area of the present city of Custer, S.D. The General then moved his expedition to this site for six days because of more plentiful grass and water. View NW.
Figure 111. The forest has not spread out appreciably in this area (matching Figure 110) because of the bare granite hills. Stands have thickened, however, since 1874. View NW.
Figure 112. This 1874 scene near the permanent camp shows an old weathered pine tree in the crevice of the rocks. View N.
Figure 113. Weathering of dead trees is obviously a slow process in the Black Hills. Note the same tree and its branches in both this photo and Figure 112. The present day photographer was able to capture more background details than did the photographer in 1874. View N.
Figure 114. Figure series 112-117 were taken from Calamity Peak near the permanent campsite east of Custer, S.D. This one is a view towards the east showing relatively few trees on the distant hills in 1874. View ESE.
Figure 115. Closure of the forest is evident in this modern photo. Note man-made Stockade Lake in the upper right and road leading up a meadow (center). View ESE.
Figure 116. Another 1874 view from Calamity Peak showing a string of tents within a curve of French Creek. Note the wagon road that has been formed to the right of the tent line. View SE.
Figure 117. In addition to the thickened forest, note that the stretch of gravel road (which is old Highway 16) runs almost precisely where the wagon road did a century ago. The bends in French Creek are still identical. The same tree is in the foreground of both photos but very little growth has taken place because of the lack of soil nutrients and available moisture. A marked grave, dated 1876, of a private of the 5th Cavalry is at the edge of the road near the white building in upper center. View SE.
Figure 118. Another meadow watered by a small, clear stream was photographed in 1874 in this view looking towards the Needles. Pine stands are restricted by environmental factors. View N.
Figure 119. The stand has thickened over the years and foreground trees virtually block out the small stream in this modern photograph. Rocks in front were used as a location key. View N.
Figure 120. Illingworth climbed from the permanent camp valley to capture this scene. The meadows in previous photographs lie below, and the Needles are at a higher elevation behind the camera. View SW.
Figure 121 The modern view is toward the city of Custer with smoke rising from it, top right. The meadows have become more distinct as the pine forest thickened since 1874. View SW.
Figure 122. Nearly a century ago, this was the appearance of an area about 4 miles northeast of Custer, S.D. View NW.
Figure 123. In spite of the seemingly solid granite, pines here also have become thicker during the past century. View NW.
Figure 124. Photographers swung their cameras to the right to get these views of areas north of Custer, S.D., in Figures 124-127. The first photo in each pair is by Illingworth. Matching photos were taken in 1973. Figure 127 is from the National Archives. View NNE.
Figure 126.