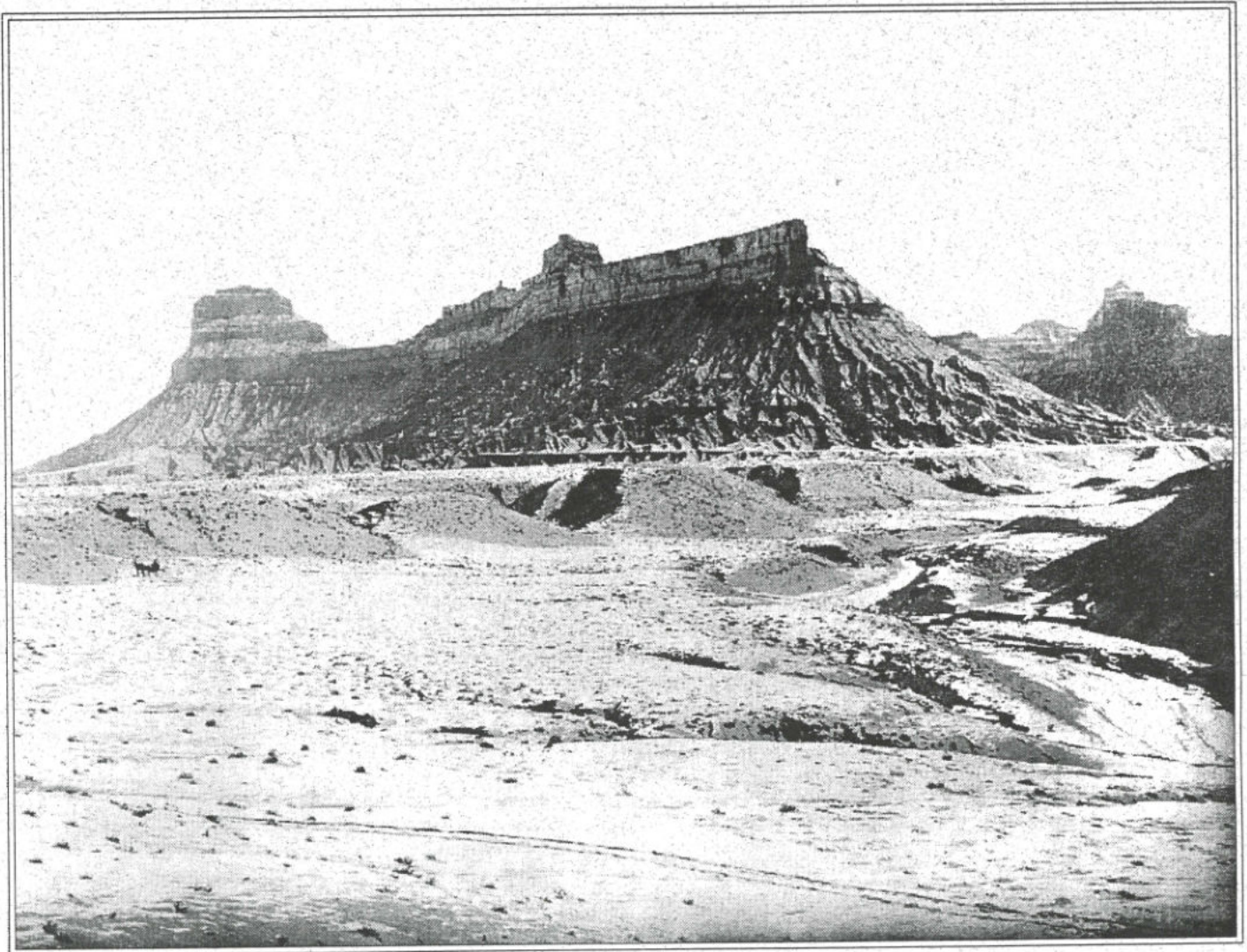


# Canyon Legacy

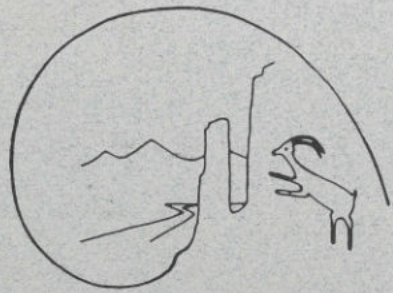
Journal Of The Dan O'Laurie Canyon Country Museum  
Summer 1997 / Volume 29

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## The Book Cliffs





# Canyon Legacy

The Journal of the Dan O'Laurie Canyon Country Museum

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Canyon Legacy was established in 1989 to publish articles on the history, prehistory and natural history of the Colorado Plateau in southeastern Utah and the Four Corners region.

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**Within**—I viewed the Book Cliffs for the first time in the fall of 1972 after graduating from high school and finishing a summer as a lifeguard in Phoenix, Arizona. It was a time of celebration for my friend Kevin and I as we toured the West for a month in a station wagon that my mother and father let me buy for a song and a prayer. In those days I was more interested in the Rockies and the Sierras as a favorite geographic landscape. Interstate 70 was the traverse we choose to get from the one range to the other. I remember that day vividly and reflect often on the irony that the experience now represents to me. On that fall day in 1972 the Book Cliffs were on my right, the Cisco and Green River deserts were on my left, and straight ahead was a blaring setting sun. I said to myself, "This is the most God forsaken country I have ever seen and why would anyone want to live here?"

Twenty-five years later I find myself living only 30 miles from that very moment on Interstate 70 in 1972 and editing, by choice, a Book Cliffs theme for our museum's journal.

The drive on the Interstate is now one of my absolute favorite landscapes. Especially when I am about seven minutes east of the Green River. When I can see the Henry and the La Sal mountains to the left, the Book Cliffs to the right and the San Rafael Swell straight ahead. I now say to myself, "What a wonderful place to live and how God has blessed us."

The Book Cliffs, the Roan Cliffs and the Tavaputs Plateau are places, practically, with no human habitation. To this day, in comparison with other Plateau regions, most documents concerning the Book Cliffs are found only in research centers. I welcome you explore it with me the Book Cliffs in the pages of the Canyon Legacy.

For the development of this issue I would especially like to thank, Fran and Terby Barnes, Bill Chenoweth, Nancy Coulam, Dan Murphy, Bob Stevens, Brad Wallis, Roy Webb, and Craig White.

## Museum Membership Purpose

The purpose of the Dan O'Laurie Canyon Country Museum is to collect, preserve, study, exhibit and interpret for the public those objects that will serve to illustrate the history, geology, archeology and paleontology of the Colorado Plateau region, concentrating on that area within one hundred miles of Moab. Interpretation will occur through museum exhibits, school programs, lectures, publication of the journal Canyon Legacy, and other educational offerings. Additionally the museum will support the local arts and crafts community by hosting temporary exhibits.

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# Canyon Legacy

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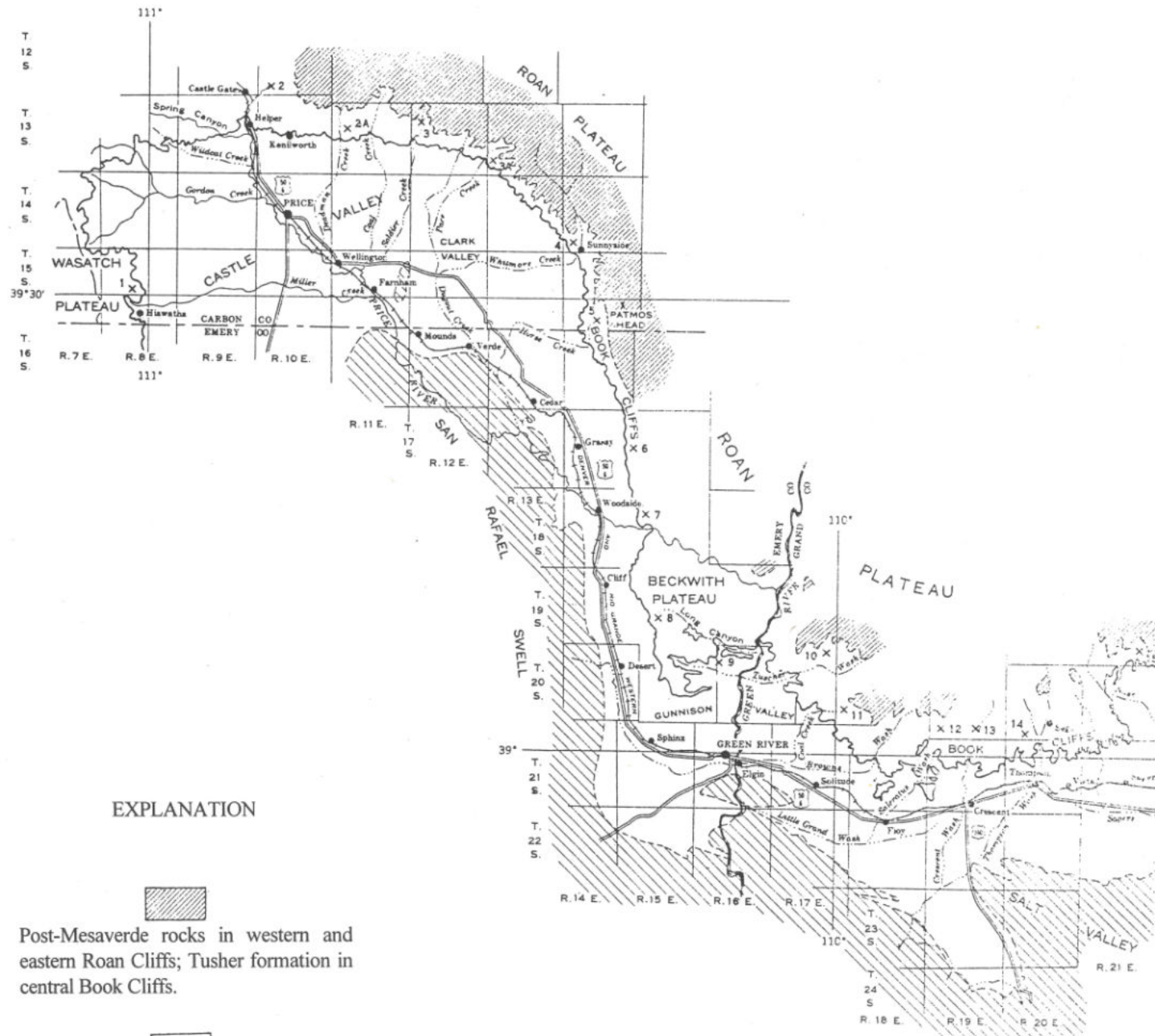
Front cover photo: William Henry Jackson took this wintry picture of the Book Cliffs circa 1875 for the United States Geological and Geographical Survey of the Territories, Ferdinand V. Hayden in charge.

Back cover photo: John Weisheit took this photo near the camera station of William H. Jackson. This photo was taken on the west side of the Green River near the pump house below the diversion dam; Gunnison Butte is featured.




### The Western and Central Sections of the Book Cliffs

From USGS Professional Paper 332 by  
D. J. Fisher, C. E. Erdmann and J. B.  
Reeside, Jr. 1960.



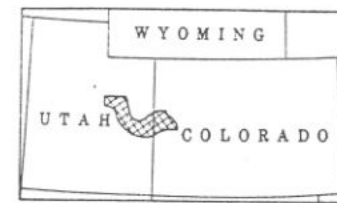
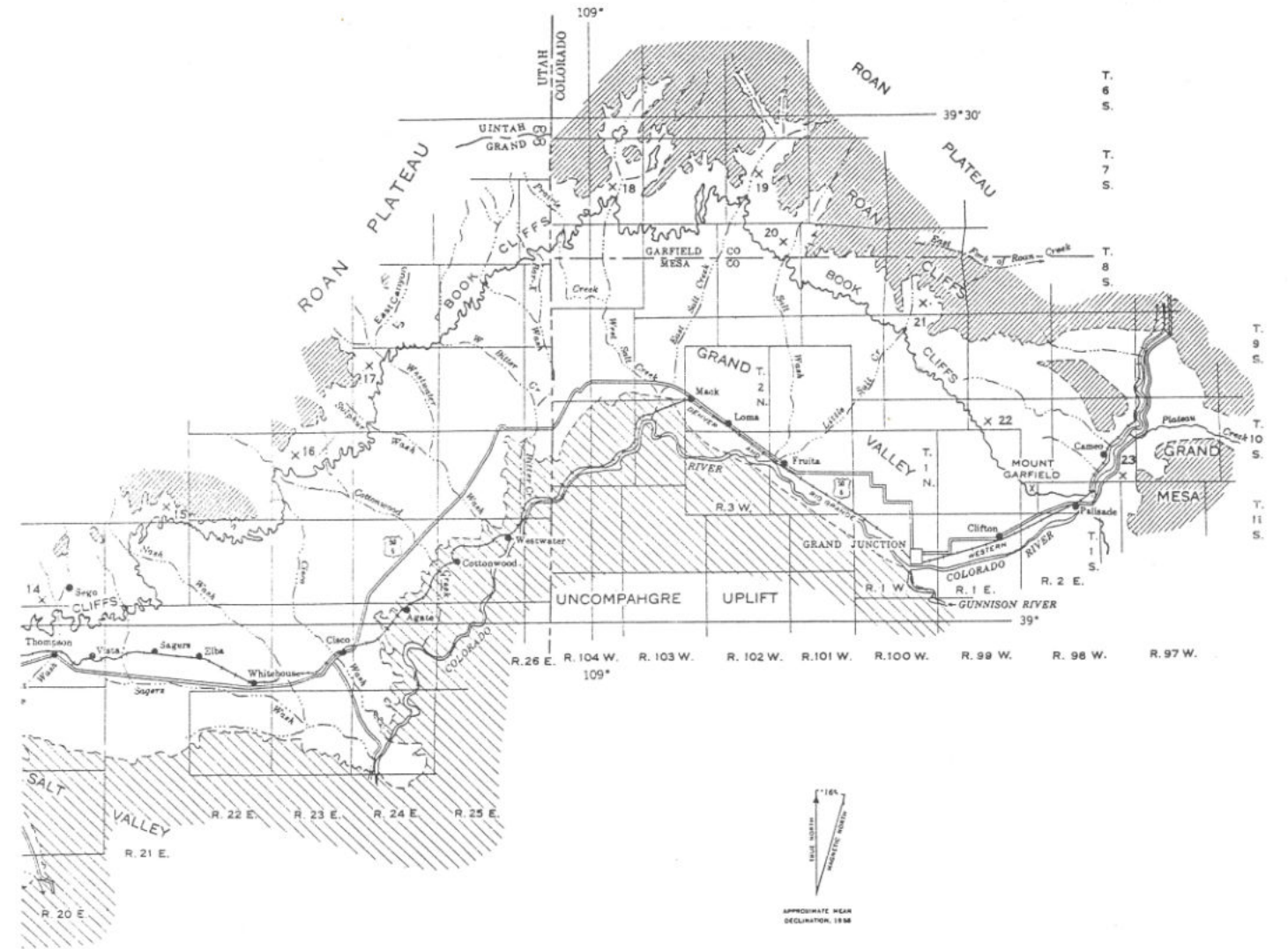
#### EXPLANATION

 Post-Mesaverde rocks in western and eastern Roan Cliffs; Tusher formation in central Book Cliffs.

 Top of Mancos shale

 Pre-Cretaceous rocks

### The Eastern Section of the Book Cliffs in Colorado



INDEX MAP SHOWING AREA OF THIS REPORT



# The Topography and Morphology of the Book Cliffs

by John Weisheit

The Book Cliffs are, mostly, a south-facing escarpment of sedimentary rock that is Cretaceous in age. Above the Book Cliffs, as if another step on a staircase, are the Roan Cliffs, which are Tertiary in age. These sediments are part of a Colorado Plateau sub-province called the Uinta Basin. These cliffs are eroding *headwardly*, that is, cutting back into themselves towards the headwaters of the dominating streams. It is very similar to peeling blankets off your bed from toe-to-head. Niagara Falls, which erodes backwards and lengthens Niagara Gorge through time, is one of the best demonstrations of *headward erosion* occurring in nature today. Though this progressive wasting away of the Book and Roan cliffs is not evident to us in our eighty or so years of life, thousands of cubic miles of Cretaceous and Tertiary sediments have already been stripped from the Colorado Plateau by the erosive power of rivers. How long this process has been occurring is very problematic, but evidence indicates that the "Great Denudation" of the Colorado Plateau started about 20 million years ago.

The Book and the Roan Cliffs of the Uinta Basin are not the only places where Cretaceous and Tertiary beds still remain on the Colorado Plateau. Cretaceous and (or) Tertiary beds are mostly intact on the peripheral areas of the Colorado Plateau, such as: the Wasatch Plateau and the Grand Staircase in Utah; Mesa Verde and Grand Mesa in Colorado; Black Mesa in Arizona. As a general rule, the further you travel away from the principle destroyer of rock, the Colorado River, the younger you will find the rock to be.

The area of high relief north of the Roan Cliff escarpment is called the Tavaputs Plateau, or in older literature, the Roan Plateau. The area of lower

relief before the Book Cliffs is called the Mancos badlands. These badlands are sub-divided into place names, such as: the Cisco desert, the Green River desert, and the San Rafael desert. The Book Cliffs escarpment curves, like a meandering river, for a length of 215 miles; by a straight line 150 miles. It extends eastward from the Wasatch Plateau in east-central Utah, to west-central Colorado, where the Colorado River dissects the cliffs from Grand Mesa, which too consists of Cretaceous and Tertiary beds but are better protected from erosion due to a volcanic cap rock. The cliffs are features of the following counties: Carbon, Emery and Grand in Utah, and Garfield and Mesa in Colorado.

The Book Cliffs are divided into three sections: the western, central and eastern. The western section is west of the Green River and includes the Beckwith Plateau, which is dissected by the Price River. This topographic section is controlled (erosionally) by the relief of the San Rafael Swell, which is a Laramide fold that is Late Cretaceous in age (this will be explained in upcoming paragraphs). The central section is east of the Green River to the Utah-Colorado border. This section contains a divide called the Thompson Bench. Drainage emanating from the Book Cliffs west of the Thompson Bench, such as Thompson Wash, will flow into the Green River, and drainage east of the Thompson Bench, such as Westwater Wash, will flow into the Colorado River. The central section is controlled by the relief of the Uncompahgre Uplift which too is a Laramide fold, by the La Sal Mountains which are Tertiary in age, and to a lesser extent by the Salt Valley Anticline, a salt dome that is probably Quaternary in age. The eastern section is in the state of Colorado and its erosion is effected by the relief from the eastern flank of the Uncompahgre.

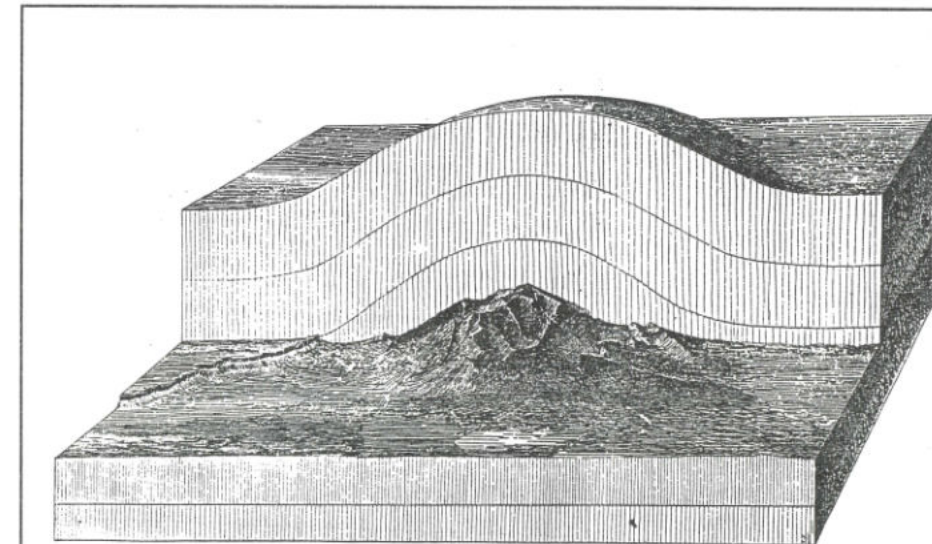
The drainage patterns off the Tavaputs Plateau are very interesting. The headwaters of many creeks and washes, which emanate from the declivities off the back side of the Roan Cliffs, flow north, following the natural gradient of the Colorado Plateau's beds, which tilt downward from the south to the north. I like to use Triassic beds to illustrate this tilt. Triassic beds at the southern reaches of the Colorado Plateau are about 7000-feet above sea level. The Triassic beds in the Uinta Basin, as per drilling reports, are several thousands of feet below sea level.

The north-trending drainages that emanate from the backside of the Roan Cliffs will, however, be captured by the Green and Colorado rivers, whose flows trend to the south and to the Pacific Ocean. These rivers are the ultimate controllers of the topography of the Colorado Plateau. Headwaters that emanate at the base of the Roan Cliffs will drain to the south through canyons that eventually break through the Book Cliffs, flow across the Mancos badlands, and into the Green or Colorado rivers.

Cretaceous and Tertiary beds, like those of the Book and Roan cliffs, are fundamental in explaining the evolution of the Colorado River drainage system because they are relatively young rocks that are still intact on the Colorado Plateau. Cretaceous beds have ocean fossils and Tertiary beds have fresh-water fossils. What caused this change of landscape between these two geologic Periods?

This particular history is best explained by a specialized branch of earth sciences called geomorphology. One of the primary founders of this new science was John Wesley Powell and his assistant Grove K. Gilbert.

Mr. Gilbert's field work on the Colorado Plateau, in the mid-1870s, was completed in an area very close to the Book Cliffs called the Henry Mountains basin, which is a Laramide depression; a structural sag. Millions of years later, in the Middle Tertiary, hot magma was injected into this structural sag and created the Henry Mountains, which literally appeared in those days as a big surface bulge. These mountains, affectionately called "the Henrys", are igneous intrusive mountains or *laccolithic* mountains. As a laccolithic mountain is made from igneous materials that have cooled within sub-surface rocks, and in this case Tertiary rocks, where did all these Tertiary rocks go? This was the question Gilbert eloquently answered in his report of 1877 called Geology of the Henry Mountains.



From Gilbert, *Geology of the Henry Mountains*, 1877

"A half stereogram of Mount Ellsworth drawn to illustrate the form of the displacement and the progress of erosion. The base of the figure represents sea level. The remote half shows the result of uplift alone; the near half the result of uplift and erosion, or the actual condition."

Gilbert labeled the layers top to bottom as: Tertiary, Cretaceous, Jura-Triassic, and Carboniferous.

Era	Period	Beginning in millions of years ago
Cenozoic	Quaternary	2
	Tertiary	66
Mesozoic	Cretaceous	144
	Jurassic	208
	Triassic	245

Literally geomorphology is the study of changes in landscape due to the effects of relief structures, such as mountains, bulges (anticlines and monoclines), and sags (synclines). "Mountains are born and mountains die", is how one geomorphologist once explained it to me, "and rivers are the typical destroyers". Slopes from mountains and upwarps will create drainages and these drainages will flow to an ocean or

into a land-locked basin, such as the Great Salt Lake; the eventuality of all land forms, including the Colorado Plateau, is destruction once sea level is attained by a free-flowing river. Gilbert called this process *dynamic equilibrium*.

Gilbert summarized the Cretaceous and Tertiary history of this study area in five parts:

- 1) The deposition of the Cretaceous.
- 2) The folding and erosion of the Cretaceous.
- 3) The deposition of the Tertiary.
- 4) The desiccation of the Tertiary lake.
- 5) The erosion that is still in process.

**1) The deposition of the Cretaceous.** The environment of the Cretaceous Period was sometimes slightly below sea level and sometimes slightly above sea level. The upper Morrison Formation, Dakota sandstone, Mancos shale and the Mesaverde Group are representational of the Cretaceous stratigraphy on the Colorado Plateau.

**2) The folding and erosion of the Cretaceous.** The folding implied here is called the *Laramide orogeny*. It occurred in the Late Cretaceous and extended into the Early Tertiary. This orogeny is largely believed to be a process of our continental plate colliding with the Pacific plate. This orogeny created the Rocky Mountains. It also created anticlines and monoclines on the Colorado Plateau. These include the Kaibab, the San Rafael, the Uncompahgre, the Monument, and others. It also created a structural sag, the Henry Mountains syncline. Remember that the Henry Mountains came millions of years after the Laramide orogeny.



The topography of the Colorado Plateau, at the time of the Laramide orogeny, was still at or below sea level. The San Rafael Swell probably appeared as a bump on a coastal plain. It may even have appeared as an island in a shallow sea. Because relief was created by this fold it began to erode away. However, in time, these folds were buried by sediments because the Colorado Plateau was then a closed drainage system. Gilbert described this episode of erosion until burial as — erosion that was *truncated*.

### 3) The deposition of the Tertiary.

The Tertiary sediments of the Colorado Plateau were formed in a closed basin. Relief structures in Tertiary times were the Sevier Mountains to the west, the Uinta Mountains to the north, the Colorado Rockies to the east, and to the south rising highlands due to regional uplifting. This uplifting progressed through time from the south to the north into our more recent times. Gilbert called this mass regional uplifting *epeirogeny*.

In this closed basin large continental lakes formed and the accumulating sediments, derived from river transport off the highlands, buried the Laramide folds. It was in this time-period that the laccolithic mountains, such as the Henrys and the La Sals were born. With the Henrys birth in a structural sag, it is quite possible to imagine that the Henrys appeared as an island in a swallow lake. If not, at least in a playa.

### 4) The desiccation of the Tertiary lake.

Gilbert concludes, for obvious reasons, that the great dissector is the Colorado River. The birth of this river probably occurred when this basin filled to its maximum potential, overspilled into an area of lower topography, and eventually found its way to sea level. It is therefore safe to conclude that the Colorado River had its origins in the Late Tertiary.

### 5) The erosion that is still in process.

Like a growing child the Colorado River has matured. Through the process of headward erosion it has captured all the major drainages; especially the San Juan and the Green rivers. Gilbert called this process *stream capture*. With each stream capture the Colorado River increased its flow and sediment load to grind away the Colorado Plateau. Since its birth it has reexposed all the Laramide folds and revealed the igneous cores of the laccolithic mountains.

**In conclusion:** the escarpments of the Book and Roan cliffs were made by the desiccation of sedimentary rocks caused by the erosional power of the Colorado River and its tributary streams. These escarpments are eroding away in a slow yet progressive northward direction. In a few more million years they will be completely destroyed. They will then be replaced by the rocks of the Jurassic Period and the escarpment will be a wall of Wingate sandstone, which too will be eventually destroyed. In time the Colorado River will eventually

consume the entire Colorado Plateau and reduce it to the sea level environment that it was born in to. It is very metaphorical of our own human experience—for naked we came into the world, and naked we will leave it.

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### About the Author

John Weisheit is a river and land guide who works for Tag-A-Long Expeditions in Moab, Utah. John recently completed a 107-day river trip from Flaming Gorge Dam, Utah, to Lake Mead, Arizona. About thirty glorious days were spent hiking and boating in the Cretaceous and Tertiary rocks of the Uinta Basin.



Map showing major outcrops of Cretaceous rocks in parts of the Rocky Mountains and Colorado Plateau regions (after Stose, 1932) and relation of the Book Cliffs of Utah and Colorado to other areas. From USGS Professional Paper 332.

Periods of the Cenozoic	Epochs of the Cenozoic	Beginning in millions of years ago
Quaternary	Holocene	0.01
	Pleistocene	2
	Late	5
Tertiary	Pliocene	5
	Miocene	24
	Oligocene	37
	Eocene	57
Early	Paleocene	66



## Book Mountains — Book Cliffs

by William L. Chenoweth

The Book Cliffs, originally named the Book Mountains, are a great southward-facing escarpment which extends 215 miles from Grand Mesa, near Palisade, Colorado, westward to the Wasatch Plateau at Castlegate, Utah. The upper part of the Book Cliffs are composed of sandstone, shale and coal beds of the Mesaverde Group and the lower slopes are the upper beds of the Mancos Shale.

Both geologic units are Late Cretaceous in age. The valleys, eroded in the Mancos Shale, below the escarpment are known, west to east, as the Castle, Gunnison and Grand Valleys.

Fur trappers, traders and mountain men on the Old Spanish Trail, and its North Branch, passed by and through the cliffs from the 1820s to the 1840s, but these travelers made no written record of their observations. Beginning in 1853, the first of several expeditions passed through the area. These explorers kept journals of their travels and observations. This article summarizes some of these observations as they pertain to the feature we now know as the Book Cliffs.

In the spring of 1853, Lt. Edward F. Beale, superintendent of Indian Affairs for the state of California, was directed by Congress to take the shortest route possible to California to select lands for Indian reservations. West of the Missouri River, he chose a route along the 38 and 39th parallels. Lt. Beale's cousin, Gwinn Harris Heap, kept a journal of the expedition. Although Heap recorded the Ute Indian names for many features in western Colorado and eastern Utah, he makes no reference to the Book Cliffs. Felipe Archilete served as guide and interpreter and pointed out features to Mr. Heap.

On July 19, 1853, while camped on the bluff overlooking the Blue (Colorado) River near the present site of Clifton, Colorado, Heap (1854, p. 82) described the views as follows:

"The scenery was grand beyond description; the fantastic shapes of the mountains to the northward resembled in some places interminable ranges of fortifications, battlements, and towers, and in others immense Gothic cathedrals; the whole was bathed in beautiful colors thrown over the sky and mountains, and reflected in the stream by a glowing sunset."

This appears to be the first recorded description of the Book Cliffs.

The U.S. government's survey of the Pacific railroad route along the 38 and 39th parallels was lead by Capt. John W. Gunnison of the Army's Corp of Topographical Engineers. In western Colorado, Antoine Leroux was the expedition's guide and interpreter. Since Capt. Gunnison and seven men were killed by Paiutes in the Sevier Valley, Utah, on October 26, 1853, the second in command, Lt. Edward G. Beckwith, wrote the report of the expedition, using Gunnison's journal.

On September 19, 1853, while approaching the Blue (Colorado) River, southeast of the present site of Grand Junction, Colorado, Gunnison (Beckwith, 1855 p. 61) recorded,

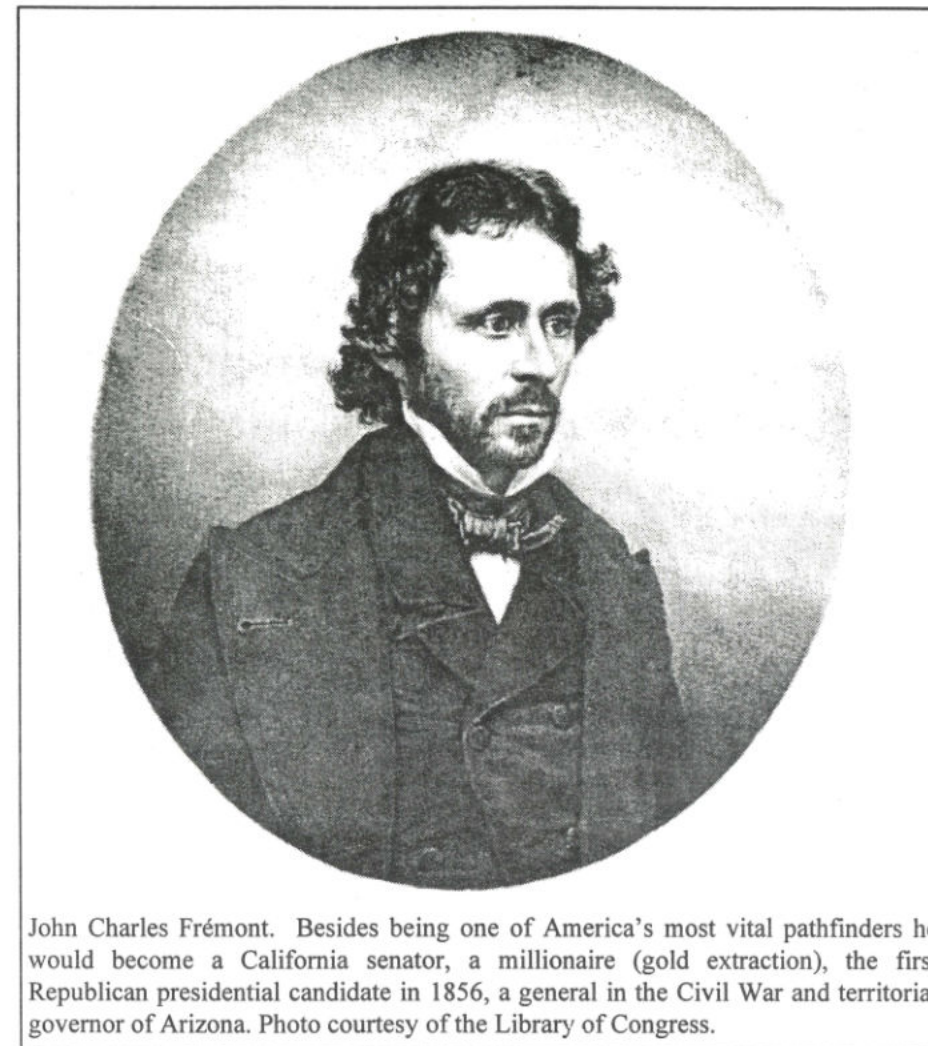
"The river enters this valley through a canon or immense gorge, which separated the Elk Mountains (Grand

Mesa) on its east from the Roan or Book mountains to the west, and, bending from its southern course, unites with the Grand (Gunnison) river just below us. Roan mountain, which derives its name from the color of its sides of red, gray, white and blue clay, in horizontal strata, destitute of vegetation and washed into many deep gorges and fanciful forms, sweeps round to the west following a course some miles from the river."

No mention of the name Book is made in this description.

West of the Green River, Gunnison used the name Little Mountains for these same features. He wrote, "But in reality, Little mountain, which is united to the Wahsatch range on the west, is merely a continuation of the Roan, whose character and appearance at a distance I have described at Blue river." (Beckwith, 1955, p.67)

The names Roan or Book Mountains and Little Mountains are shown on a map prepared by the expeditions topographer, Richard H. Kern. According to the U.S. Board On Geographic Names (written communication, 1996) this is the first use of the name Book Mountains on a published map. How did Gunnison know to use these names? I suspect that his guide Antoine Leroux, who had traveled through the Grand Valley many times with the Robidoux brothers, pointed the Book and Roan features out. Could Book be a bad translation of a Ute Indian word? Who knows?



John Charles Frémont. Besides being one of America's most vital pathfinders he would become a California senator, a millionaire (gold extraction), the first Republican presidential candidate in 1856, a general in the Civil War and territorial governor of Arizona. Photo courtesy of the Library of Congress.

A second group to explore the "central route" for a Pacific railroad in 1853 was lead by Col. John C. Fremont. His was a privately-funded expedition to examine winter conditions along the same route as Capt. Gunnison had taken. Fremont kept no journal but a member of the expedition, Soloman Nunes Carvalho, kept some notes. The "Great Eastern Fork of the Colorado" was forded near the site of Grand Junction in late December 1853, but Carvalho (1857) makes no mention of the topography north of the river.

In 1858, the first large wagon train to pass through the area was lead by Col. William W. Loring. He was en route from Camp Floyd, Utah to Fort Union, New Mexico with 50 wagons and 300 men. Antoine Leroux served as his guide. Between the Green River and the Blue (Colorado) River, Loring

(1946, p. 61) refers to the escarpment north of his route as the Gray Mountain. Since Leroux was Loring's guide, it is surprising that he didn't use the same names as Gunnison did, five years earlier.

Major John Wesley Powell on his 1869 epic trip down the Green and Colorado rivers described the Brown and Book Cliffs where these cliffs were crossed by the Green River. Powell (1875) referred to the lower part of the Book Cliffs (Mancos Shale) as the Azure Cliffs. According to the U.S. Board On Geographic Names (written communication, 1996) this was the first published use of the name Book Cliffs.

The Brown Cliffs were recognized as the Roan Cliffs. Clarence Dutton (1880, p. 161) writes that "Powell named the Tertiaries the Roan Cliffs

and the Upper Cretaceous the Book Cliffs." This notation restricted the use of the term Book Cliffs, for future map makers, to the cliffs formed by Mesaverde and Mancos rocks.

During 1875 and 1876 a survey party of the U.S. Geological and Geographical Survey of the Territories, commonly called the "Hayden Survey" mapped the Grand Valley of western Colorado and eastern Utah. Their mapping extended west to longitude 109° 31'. Henry Gannett, the party's topographer, in his report to F. V. Hayden wrote,

"The Grand River Valley is limited on the north by the Roan or Book Cliffs. The first name has been given them for their prevailing color, the second from the characteristic shape of the cliff, which, with its overhanging crest and slight talus, bears considerable resemblance to the edge of a bound book." (Gannett, 1877, p. 346).

This is the first published description of how the Book Cliffs got their name.

Today, persons looking at the Book Cliffs either see books upright and open, or lying on their sides, or a stack of books, or no books at all, and the 1853 origin of the name is still unclear.

### About the Author

William Chenoweth is a consulting geologist who lives in Grand Junction, Colorado. Mr. Chenoweth is also a contributing author to publications offered by the Grand Junction, Four Corners, and New Mexico geological societies. Mr. Chenoweth recently gave a discourse on the uranium industry of the Colorado Plateau at the Moab Information Center, part of the ongoing lecture series provided by the Dan O'Laurie Canyon Country Museum.



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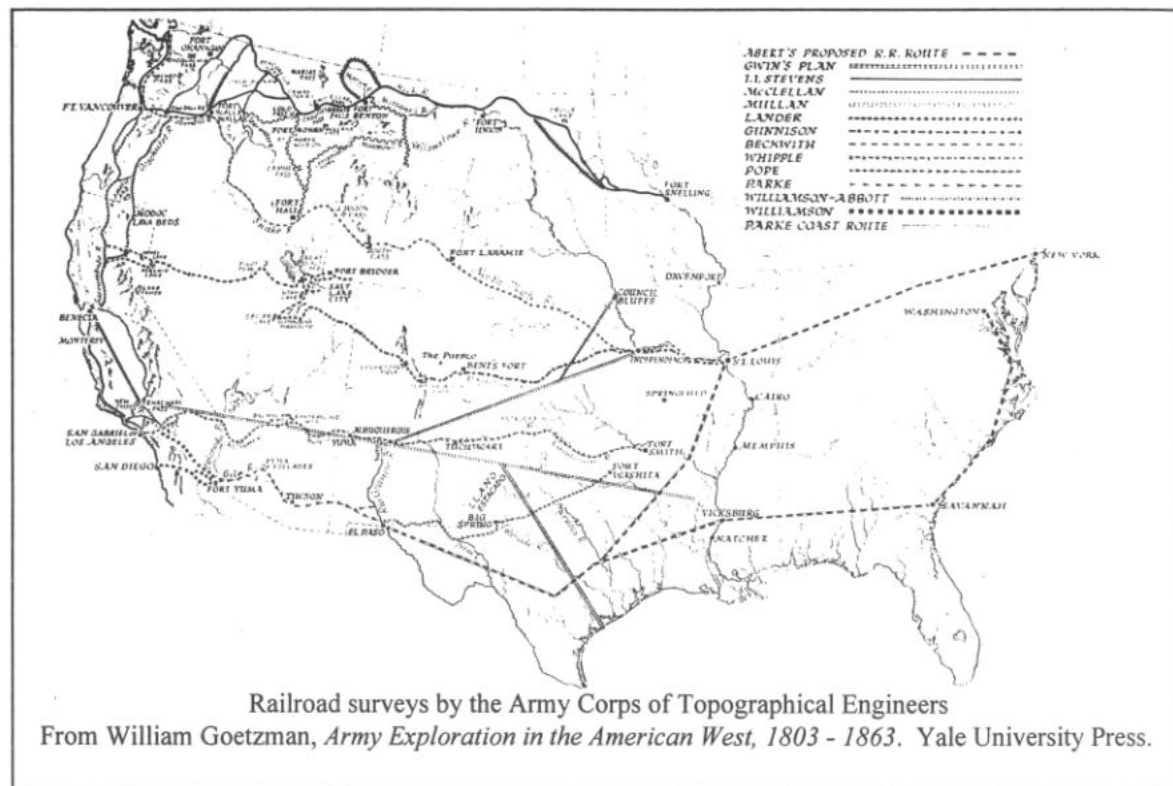
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## The Book Cliffs Conservation Initiative

Text provided by the State of Utah; Department of Natural Resources; Division of Wildlife Resources. Northeastern Region; 152 East 100 North; Vernal, UT; 84078-2126.

The Book Cliffs is one of the last untamed areas in Utah. Its rugged geographic formations, abundant wildlife, historical significance, oil and gas reserves and other surface and subsurface natural resources make this land truly unique. The Book Cliffs Conservation Initiative (BCCI) is a once-in-a-lifetime opportunity to balance the management of these natural resources. Wildlife enthusiasts, outdoor recreationists and the remaining ranchers have been the primary beneficiaries.

### The Beginning

The Initiative began with a dream to benefit the wildlife and watershed values in the Book Cliffs. It was expressed over a campfire by biologists and managers from the Utah Division of Wildlife Resources and the Bureau of Land Management. The participants soon realized it was possible because four of the five ranches in the Book Cliffs were for sale. A couple of owners had even approached the agencies as potential buyers. These ranches, while relatively small in actual acreage's, controlled the keys to wildlife in the Book Cliffs—the streams, the canyon bottoms and the grazing permits. The agencies asked for help. The Nature Conservancy, Rocky Mountain Elk Foundation, the Mellon Foundation through The Conservation Fund, Shikar Safari International, National Fish and Wildlife Foundation and other conservation groups answered the call. Together, they are making a campfire dream a reality.

### Book Cliffs Conservation Initiative Mission

Manage for the diversity of available resources to restore and maintain stable

and properly functioning ecosystems that will produce clean water, abundant wildlife and forage; while provided a legacy of multiple use of the resources, including primitive outdoor experiences for the future generations.

### The Goals

Since its conception, the partners of the Book Cliffs Conservation Initiative have been working with the following basic goals:

- 1) protect and enhance wildlife populations through acquisitions of key private lands and habitat restoration;
- 2) increase species diversity and enhance riparian communities by proper management and watershed improvement projects;
- 3) provide a diversity of public access opportunities for wildlife and outdoor related recreation;
- 4) continue to manage the land and resources under a multiple use philosophy while maintaining the legacy of historical and cultural use.

### The Ranches

The Book Cliffs Conservation Initiative partners have acquired two of the four ranches in the Initiative area. Two other adjacent Book Cliffs properties, the Little Creek property in the Roadless Area and the Two Waters property at the confluence of the Bitter Creek and the Sweet Water Creek, will also be managed in accordance with the goals of the Initiative. Numerous habitat projects have been initiated on these ranches including willow and cottonwood planting, fencing to manage livestock use, prescribed burns, reseeding, greasewood reduction to promote better range vegetation and noxious weed control.

### Wildlife

Elk: Plans have been approved to allow population to increase from 2,000 to 7,500 on the Bitter Creek elk unit and from 1,000 to 2,000 on the Little Creek unit. These are the only elk units in Utah where elk populations will be allowed to significantly expand. This is a direct result of the BCCI.

Deer: Efforts are under way to increase deer populations in the Book Cliffs. Better management of livestock on the winter range, winter range rehabilitation projects and a two year closure of the general hunt are in progress. Further plans being developed by the Initiative partners will focus on restoring quality mule deer habitat to bring the population back towards historic levels. This focus will include efforts to better understand predator impacts on this important deer management unit.

Transplants: Rio Grande turkeys were introduced into Willow Creek in 1994. The Book Cliffs are high on the priority list to reintroduce Rocky Mountain bighorn sheep, bison and moose. Plans are being completed to reintroduce Colorado River cutthroat trout.

Research: Black bear studies, including radiotelemetry and habitat use, are ongoing; baseline inventories for birds, small mammals, reptiles and amphibians are being completed; an elk radio-telemetry study has been initiated in the Little Creek unit, several riparian plantings have been completed and others are planned; water quality and riparian/upland vegetation baseline inventories and monitoring studies are underway; and a coyote/cougar predation study will soon be implemented.

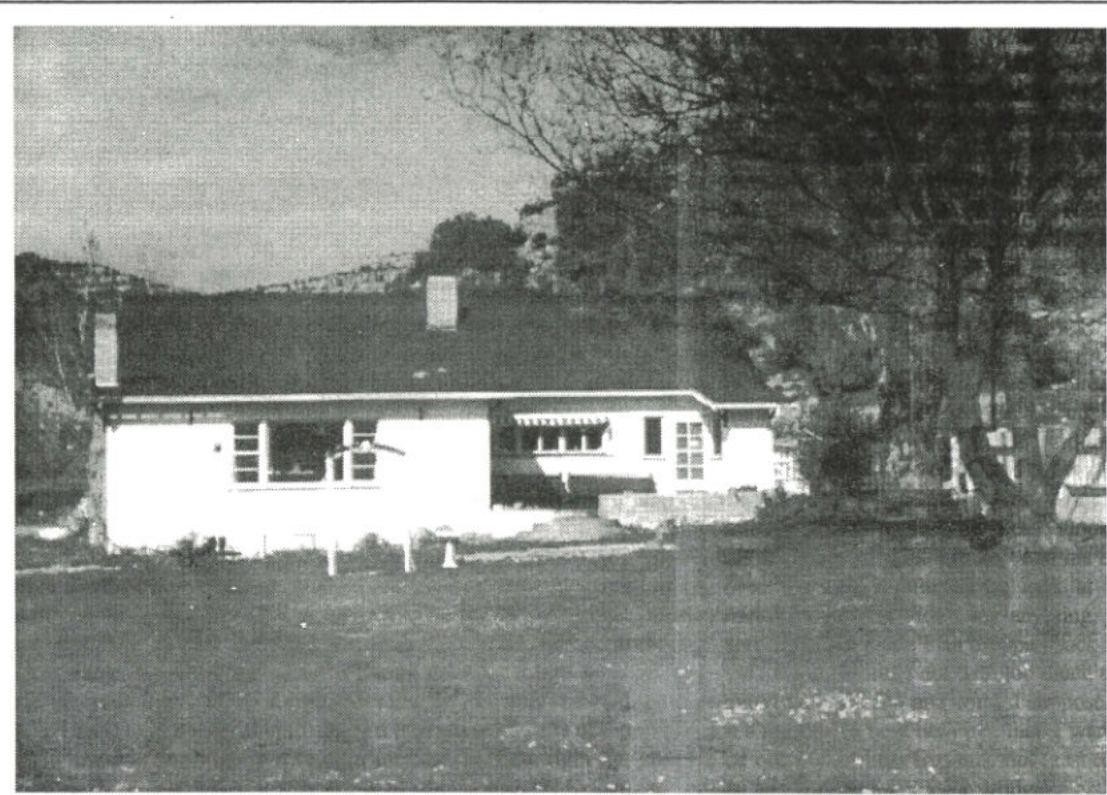


## Access

The BCCI has increased public access in Willow, Meadow, Bitter, and Little creeks. All BLM and UDWR lands are open to the public.

Bitter Creek is now open to vehicle access via Brewer and Rat Hole canyons. The gates at Chipeta Canyon and the mouth of Rat Hole Canyon are on Tribal Lands.

Meadow Creek via V Canyon to Moon Ridge Canyon. Currently the state has an agreement with the Ute Tribe to allow access to the Roadless Area via their lands (Totem Pole trail) which is reviewed yearly.



Cunningham Ranch near Nash Wash tucked into the Book Cliffs . Photo by John Weisheit.

## Conclusion

Five years ago, a tour was held which resulted in State, Federal and Private interests working together to enhance wildlife populations and sportsmen's opportunities in the Book Cliffs. The new partnership was called the Book Cliffs Conservation Initiative. The goals were simple; to enhance wildlife by improving habitat, restore watersheds and to more evenly allocate forage AUM's, between livestock and big game animals under a multiple use philosophy.

In only five years, the partnership acquired two of the three ranches for sale in the Initiative Area, plus a third ranch in the roadless area. The purchase of these ranches, habitat improvements and the reallocation of AUM's to a 50/50 balance is allowing elk herds to expand from about 3,000 animals to 9,500 in the roaded area of the Book Cliffs.

To date, the partnership has converted 550 acres of bottomland greasewood

into big game winter range, planted willows to stabilize stream banks and help restore the water table, treated noxious weeds, built fences to help control cattle movements and built water control structures. There are plans to rejuvenate stagnant aspen groves, improve more watersheds, and enhance habitat for deer. Diverse public access opportunities have also been increased for those who want access by foot, horseback and vehicles.

Recently, all this work for wildlife and outdoorsmen is being threatened by a serious misunderstanding. The misunderstanding is based on local perceptions by some members of the public that have confused the Initiative with a proposal by Congressman Orten to form six National Conservation Areas as part of his wilderness bill.

The Book Cliffs Conservation Initiative is completely separate from the recent wilderness issues. The partnership has

concentrated on local agency effort and is not seeking designation as a Wilderness or National Conservation Area. Those actions are being spearheaded by Utah's Congressmen, not the Initiative Partnership or local Initiative supporters.

# Stories of the American Black Bear on the East Tavaputs Plateau

by

Julie Tolman with Craig White

The drive along Interstate 70 between Green River, Utah, and the Utah/Colorado border has put more than one person to sleep. What would be an awakening along this strip of I-70 would be a visit to the Book Cliffs, to the north, and witness the diversity of habitat types and landscapes such as; scrub oak patches, aspen and snowberry stands, sagebrush flats, and rugged sandstone cliffs spattered with desert shrubs, piñon pines, and junipers. From the southern rough and rugged terrain of the Book Cliffs to the north, on top of these cliffs, there extends a large plateau. This plateau and the cliffs (Book Cliffs) seen from I-70 are an ecological area called the East Tavaputs Plateau.

This area is a particularly rich part of the state for most types of vertebrate animals. Small birds like the dark-eyed junco and MacGillivray's warbler are found throughout the area as well as birds of prey including red-tail hawks, northern harriers, prairie falcons, American kestrels, and golden eagles. Mammals species include mule deer, elk, cougars, bobcats, coyotes, gray fox, and a wide variety of small mammals such as chipmunks, squirrels, deer mice, voles, and shrews. Another mammal of the area that is the subject of long term research is the American black bear.

Under the direction of Hal L. Black, a professor at Brigham Young University and native of southeastern Utah, with funding provided by the Utah Division of Wildlife Resources, Bureau of Land Management, Brigham Young University and private contributors, this study began

in the spring of 1991. I joined his "crew" as a graduate student in 1995, driven by the desire to learn something about the natural world, about the natural behavior and ecology of the black bear.

During my first summer I saw a bear in the wild for the first time. Across a deep canyon the crew spotted a bear from the truck. I watched it through binoculars as it moved along the hillside and finally over the top, not unaware of our presence. Now almost two years later, full of stories from other crew members and some of my own, I have an increased curiosity about the American black bear.

Sighting a black bear in the wild is memorable, but a first encounter with one always immobilizes the viewer. Craig White related his first encounter with a black bear in these words,

I had already spent one summer and two winters in the Book Cliffs studying the ecology of the gray fox before my first run in with a bear. I knew bears inhabited the area because I had found bear tracks and feces, and knew of the encounters other biologists had had. Indeed, I had heard it said of the Book Cliffs that there was a bear behind every tree. I was, then, somewhat disappointed that I had not seen one yet. My chance came unexpectedly. Rain had fallen most of the morning and afternoon and although a welcome visitor in the Nash Wash area, it

had slowed down my research for the day. So when the rain stopped I set out in search of the foxes that I had radio collared. I drove down a narrow canyon in the Nash Wash area radio-tracking a fox.

I stopped the truck and prepared to walk into a little side canyon where the radio signal indicated the collared fox was located. I finished loading my pack and radio receiver and took a few steps up a dry wash when movement on the rimrock caught my eye. An "extremely large" (upon further thought I came to realize that the excitement of the moment lead me to overestimate the true size of this bear) light cinnamon-colored bear came over the rimrock and headed up the same side canyon. The mobility of the large mammal in negotiating the rimrock and steep slope it was crossing took my breath away. I scrambled up the opposite slope to try to get a better view. Nevertheless, it had vanished from my view as quickly as it entered.

In contrast with first encounters, the crew sometimes sees a particular bear more than once. During the summer of 1995, the crew trapped a certain two-year-old bear named Whiner several times. Amy, a crew member, recalls walking up to the trap in Trail Canyon excited because the door to





"Whiner" being released from trap. Photo courtesy of Julie Tolman and Dr. Hal Black.

the trap was down. It was Whiner, again caught just two days earlier in a nearby trap in Main Canyon. Later that day we returned to the trap and decided to release her. Rob pulled up the door, a flash of brown exploded out of the trap, and went up a fir tree. She was fast and climbed it with ease, surprising to me since the fir was old and had no branches for Whiner to pull herself up with.

Trees are important "escape" routes and security for black bears. Craig was staying at the Cunningham Ranch located at the foot of the Book Cliffs, owned and operated by the Utah Division of Wildlife Resources for the express purpose of wildlife conservation when a small black bear in the summer and fall of that year became a frequent user of the old abandoned orchard. Feces were regularly seen but not the bear. Then one summer night when the caretaker of the ranch, Dan Murphy, sleeping outside with his dog, Cisco, saw the bear make a trip to one of the pear trees. Craig had not fallen asleep and could hear Murphy's excitement spurred by the close proximity of the

bear. By the time Craig came out of the trailer the bear was on the move. Cisco, the dog, had begun to bark excitedly. Craig was in time to hear the bear go up the closest tree (a little pear tree). What an interesting sight, a little black bear in a little pear tree. Cisco was quieted down and the bear was left alone to go along its way.

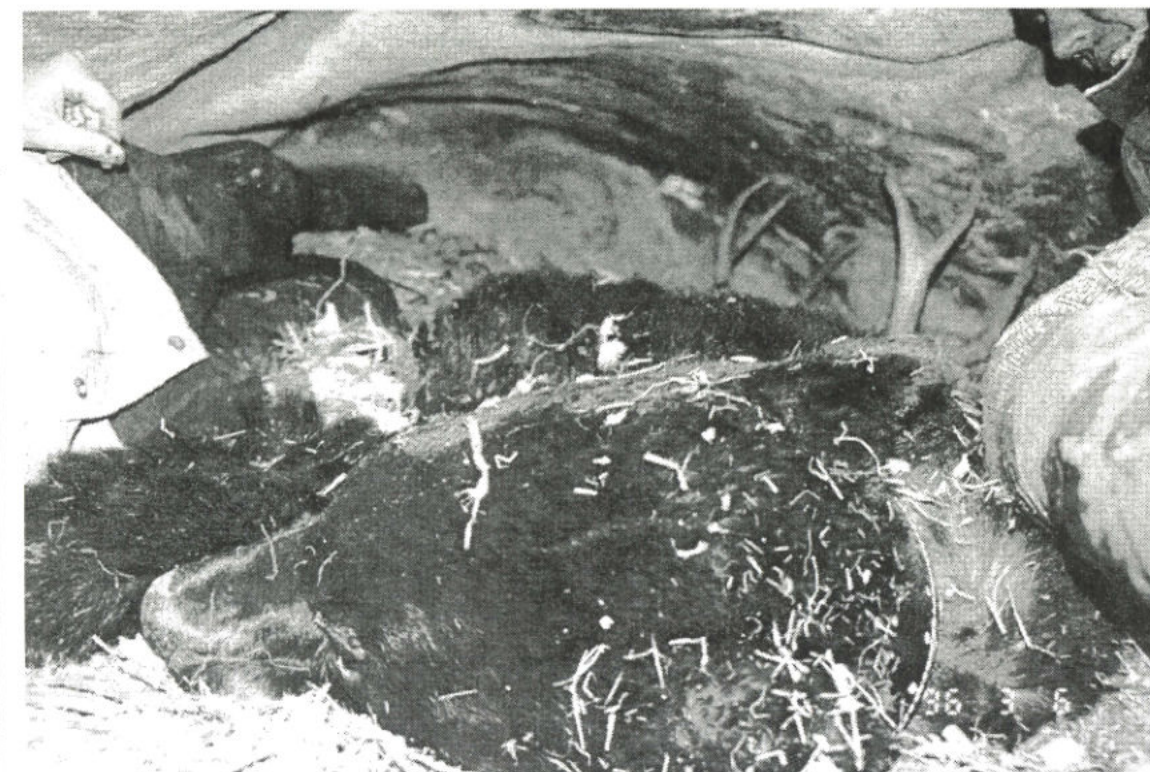
Another story where a bear ended up wandering along on its way involves the first capture of a four-year-old bear, Soula. It was a typical June day; no clouds, warm, and breezy. We anaesthetized Soula and took measurements including length and weight. She suddenly started to move; the crew quickly backed up as Soula stood up and walked down the trail away from us, up an embankment, and into a thick patch of oak brush. Two crew members in charge of analyzing bear tracks were eager to measure the tracks of a "known" individual. Rob and Jen immersed themselves in measuring tracks and stride lengths, and did not notice that the bear had come back onto the trail. She watched them measure her tracks and then turned and headed back down the trail.

The best stories of the crew are perhaps those of large and old bears. One of those old bears is Uncle Newt, the oldest known bear in the study area at 28 years old. Senior crew member, Wade, was surprised at the Uncle Newt's den in March 1996. Wade recalled that the last thing he expected to see was a four-point buck skull. His den was fairly typical; a cavity under a large rock full of nest material, mostly juniper bark. To some of the crew peering into the den it looked like a four-point bear, to others like a trophy. Most likely the deer had been scavenged or perhaps left over from the deer hunt before Uncle Newt had denned there, but the picture of a "rack" sitting near a 28 year old male bear in the den is the same. It is in fact rare to find such an old bear in a hunted population; however, Uncle Newt was not the only old male bear known to the

field researchers.

Dr. Black often tells about a 16-year-old male first caught in the summer of 1991. His worn teeth alone were evidence of his advanced age. He was thin and missing part of one ear, some of his tail, and several lower incisors. Arriving at his den in March of 1992, the crew saw him bedded down at the base of a large Douglas fir. He jumped up and ran towards them a short distance and then scooted back into his den. Thin and emaciated he was found dead three weeks later outside his den. This bear and Uncle Newt are exceptional examples of bears able to persist in spite of hunting seasons, cowboys, gas wells, and campers and says something about how rough and remote much of the Book Cliffs area still remains.

Many things about black bear natural behavior are yet to be observed but for the meantime I can say they are an integral part of the diverse ecosystem found in the Book Cliffs. As I look out across the Book Cliff landscape at sunset I am often left with the feeling that wild things still run free here.



"Uncle Newt" asleep in his den. Photo courtesy of Julie Tolman and Dr. Hal Black.

#### About the Authors

Julie Tolman is a graduate student at Brigham Young University working on a Masters degree in zoology. She was raised in California and came to Utah to work as an undergraduate student with Dr. Kim Harper, who is working on the genetics of an endangered poppy in the Santa Clara area of southwest Utah.

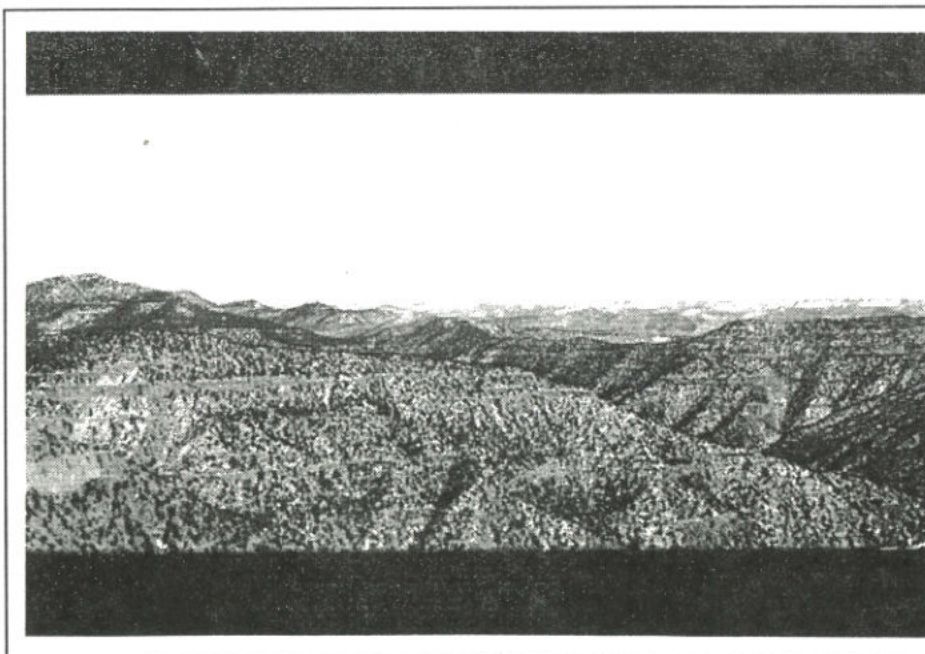
Her graduate work is under the direction of Dr. Hal Black studying the ecology of black bears on the Colorado Plateau. In one more year Julie will be in a Doctoral program emphasizing ecology.

Craig White grew up in Dugway Proving Grounds, Utah. He has nearly completed his Masters studies in wildlife and range resources at Brigham

Young University. His thesis is on the ecology of the gray fox in eastern Utah, which is under the guidance of Dr. Jerran Flinders of

Brigham Young University. He has been a guest speaker at the meetings of the Utah Chapter of the Wildlife

Society. In 1997 the society honored Craig with the best student paper. Craig is also conducting research on the kit fox. He volunteers his time to work on black bears with Dr. Hal Black and also volunteers time with projects under the direction of Utah Division of Wildlife Resources.





# A Book Cliffs Journal: The Summer of 1981

by  
Roy Webb

In the summer of 1981 I was hired by the Bureau of Land Management (BLM) as a summer seasonal to work in the Book Cliffs on an archeological survey project. At the time there was an energy boom going on in the Uinta basin, everything from a coal-fired power plant, oil and gas exploration, to talk of a dam on the White River to supply power and water for oil shale development. The boom was big time.

Naturally the BLM was anxious to do all it could to protect the resources and foster development. One of the resources they wished to protect was the cultural heritage of the Native Americans who'd been using the land for millennia before the energy companies learned there was anything of value underneath that varied landscape of river bottom, clay badlands, upland sagebrush plains, twisted sandstone canyons, vast pinyon-juniper (P-J) forests, and alpine meadows.

I was hired to work on an archeological survey of the eastern Tavaputs Plateau—popularly known as the Book Cliffs. The BLM manages great tracts of land there, and it was administered under the Vernal District, Book Cliffs Resource Area. Since there was pressure to explore the area for oil and gas, and since a normal "clearance" or survey of a proposed well-site took quite a bit of time, the project I was hired for was to test a prediction model—the Theoretical Habitation Site Prediction Model—that had been developed in Colorado to see if the presence of archeological sites could be predicted from a map, by looking at the terrain, vegetation, and so on, and thus speed-up the clearance process. Our first job was to lay-out, at night on the floor of the office in Vernal, the entire series of 7.5 minute topographical maps that covered the eastern Tavaputs. We then cross-hatched every sheet, dividing then into numbered tracts of

about a half-mile each. We next wrote each number on a slip of paper and using scientific method (mixing then up in a cowboy hat and drawing out 50 slips) we chose the "units," as they were called, to be sampled by on-site survey.

In other words, by finding the unit, no small task sometimes in the largely still-wild and unmarked Book Cliffs area, and then walking it. Up and down, over hill and dale, through thicket and meadow, looking at the ground the whole time for cultural artifacts; lithic scatters (flint chips), arrowheads, scrapers, manos (grinding stones), rock art, and so on. We spent the summer doing just this out of a charming little cabin set in a little draw off South Canyon, itself a tributary of Main Canyon, which we reached via a hundred miles of dirt roads south of Vernal. The route went first to Ouray, the depressed little village on the banks of the Green River; there the pavement ended. For miles the road passed through what is locally known as "sow-th'a O-ray," Uinta basin badlands that have been badly treated as well. Overgrazed, mined, drilled, burned over, bulldozed, dumped on; not a very inspiring landscape. But then, after the Seep Ridge Road split from the Willow Creek Road (which went into the Uintah-Ouray Ute Reservation), it gradually began to rise toward the distant plateau to the south, and soon you were driving for hours through pinyon-juniper, gradually climbing, until you reached the Winter Ridge Road, the transverse road that ran along the very spine of the Tavaputs at an elevation of about 8000 feet. A short way east along the road to the head of South Canyon, then a few miles down it and there was the cabin. My companion and crew leader was a blustery, plump, voluble Romanian, who claimed to have received training in archeology at the Sorbonne in Paris, and to have worked all over the

country and generally, in the modern phrase, been there and done that. He talked the talk, but as the summer progressed, I began to realize he did not walk the walk. Enough of his personality comes out in the journal that I won't elaborate here, suffice to say I've not seen him since and don't care to. Other figures came in and out of the cozy little world as South Camp; Ward, sort of a district ranger and general overseer of the place; the fire crew, an ever-changing cast of young rowdies; the forestry crew, ditto but not quite so rowdy; and various other officials and employees. Plus there was a lot of oil field traffic that summer, so we were always running into people on the roads. Sometimes almost literally.

But the Tavaputs itself was too big to seem crowded. Once we left the truck and walked into a unit, whether it was a sagebrush covered flat, a rolling P-J forest with dry washes, or a rugged, broken sandstone canyon, I often had the feeling I was the first person there. The plateau still contained a great deal of that ineffable but very tangible quality we call wilderness. Intellectually of course I knew it wasn't so, that the region had been grazed, and mined, and fought over for a century, but still, when I walked into a shaded glen of P-J, or stumbled on a sandstone ledge lined with old-growth Ponderosa pines, or topped a rise by Winter Ridge and could see the whole of southern Utah, from Grand Mesa to the Wasatch Plateau laid out at my feet, it set me back and made me think. In short, I loved that summer, wandering here and there through the vast, mostly untouched region of the Tavaputs, doing nothing more challenging than navigating by map and compass, and walking walking walking and looking looking looking. At first we walked together, but after I got to where I couldn't stand my crew leader, we began to split-up and meet at the other

side of the unit, ostensibly to cover more ground but really so I could be by myself in this enchanting wilderness and get away from his constant prattle. At night we'd retire to the cabin where I would write up the reports of the units we'd seen that day, and then catch up in my journal, which I kept in pencil in a spiral bound notebook. Ward and my crew chief would play horseshoes, or cards, or drink and B.S., which I sometimes joined in and sometimes just observed. Often, I'd leave the cabin and walk down the road and up into the forest, where a huge sandstone boulder overlooking the road and cabin provided a marvelous perch for writing, brooding, and meditating. Finally, feeling the delicious burn that comes from good, fulfilling physical activity, I'd go upstairs to my loft, where I spent the sometimes cold but always delightful summer nights writing, reading, thinking, or communing with nature in the form of a big cat-faced spider that lived in the window right by where my bed was made.

The Project itself, as I saw it, was a bust. We rarely found anything cultural besides flint chips, an occasional arrowhead, some petroglyphs, traces of homesteaders and cowboys, and beer cans. As I struggled up and down those broken canyons or trudged across the sagebrush flats, I often thought that no prehistoric native in his or her right mind would live up there; conditions were too extreme to be a place to live. Hot and dry in the summer, biting cold and covered with feet of snow in the winter; they had to be smarter than that. They used the area, or passed through, and sure enough most of what we found was around Main Canyon, a main route and tributary of Willow Creek, the main route through the Tavaputs. Once we were up in the isolated forests, if we found a flint chip it was noteworthy, a petroglyph it was a marvel, an arrowhead the subject of a three page report. I should say I felt this way; my crew leader, who was supposed to be a trained, degree-ed archeologist, had a somewhat more accepting view.

Thinking that the bosses wanted to see the model work, he tended to see much more in the units than I did. An overhang became a rock shelter, a depression in a sandstone ledge was an "in-situ" metate or grinding platform, the scavenged remains of a long-dead deer had to be bone tools. Since he was supposed to be the one who knew what he was doing, I went along at first but finally drew my own conclusions and wrote my own reports. At the end of the project, he produced a thick bound report postulating the existence in the Book Cliffs of a prehistoric acorn culture, which depended for food on the acorns from the Gamble oak which grew in thickets in the lower-to-middle elevations. The BLM District archeologist, no prize himself, accepted the report at face value and passed it along to his superiors. I've since heard that it was the source for no little amusement in the archeological community, and for years afterwards I'd run into people in the field who would start chuckling about the "acorn culture" in the Book Cliffs.

Sad to say, I've never been back to the Book Cliffs and South Camp. I've often meant to go, but end up going somewhere else or down the river or traveling with my family. Scant weeks after I returned to the University of Utah from my summer job, I took a job in the library and have been there since. Much of the land in the Book Cliffs is private, and as a citizen I doubt I would have the same access I did as an agent of the BLM. But now the Tavaputs is the scene of an environmental controversy that is wearily familiar; a big developer wants to realize as much profit as he can, no matter the cost to the public or the land, and he's supported by the locals, who don't know any better, and opposed by too-few farther-visioned individuals and groups who would like to see the public land in the Tavaputs stay truly public. May the spirits I briefly glimpsed during that summer sustain and guide their efforts, so that all future generations may see what a marvelous landscape and reservoir of quiet wilderness the Tavaputs really is.

## The Journal

(abridged and edited)

July 13, 1981

First day at South Camp, and a fine one it is. The rain is beating down (hmmm—I wonder if this roof leaks?). I'm presently ensconced in the loft of the cabin, a delightful structure nestled in a pocket of aspen and Doug [Douglas] fir in a little draw just off of South Canyon. Will be here tonight, so the story goes, but tomorrow might have to move to a "Road Ranger" mobile travel trailer, which has much less class, and besides I would have to sleep with Larry, who will probably drive me nuts before this stint is over if I don't kill him with a shovel before. More on that anon.

Anyway, here I am alone save for Larry-the-forementioned; Ward, an old sinecure codger who seems to be the "King of South Camp," and a local rowdy named Bill who also occupy the premises, and there is supposedly a fire crew coming down tomorrow.

This is a beautiful place; we're about 8500 ft, in the top of the Book Cliffs. From the road in you can look down (to the south) and see the Colorado River valley, the La Sals, and Grand Mesa. The country is mostly broken by forested canyons with corresponding ridges, covered with Doug fir, pinyon, aspen, sage lower down. Plus lots of flowers, of the same types we found in our class time walks at the University, when I took that Wildflowers of the Wasatch biology-for-humanities majors class last year.

While we were out in the field, doing one of the sample units in our "Theoretical Habitation Site Prediction Study," also known as "Roy and Larry's walk in the piney woods," it almost got hot. So this afternoon as we cooked dinner and watched the day draw to a close, big thunderheads built up to the west, and we heard some thunder, until it finally built over us enough to rain. I would wish for more rain, and thunder, and even some lightning.

Writing by "E-lectric light." Ward (the sinecure) got the generator going so he could read his Louis L'Amour novels. Noisy as hell but I can scribble too, as it turns out.

Tuesday, July 14, 1981. Bastille Day!

Sleeping out tonight. Today, at Larry's insistence we moved into one of the trailers, only to learn that they belong to the fire crew, so we had to move everything back



out when they showed up after dark! I'll move back into the loft tomorrow.

We did two units today, one on the side of a steep, hot ridge, the other a basically level, classic pinyon-juniper area. Would have been nicer without all the noise from a drilling rig, and construction of another location. We didn't find much on either unit, and in fact nothing cultural at all in the P-J forest.

I've heard stories of bears and wolves out here. I doubt if any of them would come near this noisy generator, although after they turn it off, since I'm sleeping out I guess I'll find out if the stories are true.

### Wednesday, July 15, 1981

Can't sleep in around here as Ward gets up at the very crack of dawn and fires up the generator. Goodbye chirping birds!

Late afternoon. Checkered day; got up on the wrong side of bed, grouchy. Alone at last, as they say, in the loft. Larry lost my compass today, my good old faithful compass I got while I was in the army, so he's off to Grand Junction to replace it, and I'm sure to imbibe of civilization, as if this place wasn't civilized enough. So here I am. Quite nice, without all the noise; the fire crew, Ward, everyone gone, so I have the place to myself. I moved back into the loft, which I don't think anyone else wants to sleep in because you can't stand up in it; it's like being in a tent. The end of the loft opposite the stairs has a nice little screened window that overlooks the front yard, a mattress, and is very comfortable and cozy.

The day began beautifully, aside from my crankiness, with clouds burnished orange by the rising sun, birds tweeting and singing, until Ward turned on the generator. At any rate, we did only one unit today, and a hard one it was. Down into Berry Canyon, a steep, broken, heavily forested gorge full of deadfall and rock outcrops, quite the tough little walk. On the first part, we found a number of rock shelters, some full of ash, and one with an animal nest and what Larry thought was a storage cist of rock and mud. I remain unconvinced on the latter identification, as he's always seeing cultural remains that look like aboriginal sex stones to me.

On the other side of the canyon we found a metate in a sandstone ledge, complete with mano. Then a quiet stroll in the forest for the rest of the unit. The good thing about doing this kind of survey, it forces you to walk slowly. So then back down the side again and back up the other, to the road. The view from the hill where we parked the truck was fantastic; to the

west, Tavaputs Plateau and basins as far as you could see; to the northwest, a series of bare, pale lavender and red buttes, just like around Sand Wash [Desolation Canyon boat landing], so I bet that's just what it is. We drove on to the next unit, crossing the pipeline to do so, and down a little road right by where the crew is working on the pipeline, through a gate, then through one and onto another location. The roads runs right through the middle of the unit, so not much artifacts remain if there were any in the first place. The "NO TRESPASSING" signs and locked gate are a good example of what I call the "Big Lie" of the federal government "locking up" public lands. "Why you won't be able to fish or hunt or develop, if the land is wilderness!" True enough, but even in wilderness and primitive areas, you don't see gates and "NO TRESPASSING" signs.

Been sitting here watching a veritable parade of modern industry; a rig is going in just down-canyon. Believe me, I know the signs: fast driving, big trucks, lots of pickup trucks and Blazers full of men, planes and helicopters overhead, plumes of dust, and noise noise noise. How much fuel do all the internal combustion engines associated with the oil field burn? A self-perpetuating monster

Whew! Need to be filling out these forms from today's labors. Brown was certainly right, this job is all forms: site forms, sample unit forms, forms for gas and oil, forms for pay, and on and on.

Later in the day. South Camp is pretty active now, with fire crew back from a controlled burn in PR Canyon; some inspector of fire lines or some such from the main office (and probably out on a lark); the guy doing the faunal inventory, another way of saying also out on a lark.

Well, Larry finally got back, as I was climbing around some rock shelters down the road. Very nice area here. The moon is almost full, and I sat out and watched it rise over the pines.

As I was walking back from Skylight Cave (a curious place I found, a cave with a hole in the roof), a couple of guys came by in a pickup truck and stopped to chat. They said they're working on an oil shale project over on McCook Ridge. More despoliation!

### Thursday, July 16, 1981

Out back, cooking dinner. Got nice vibes from one of the fire crew, a blonde from USU, but Larry's leering advances and crude and suggestive humor shut her up. Another time, perhaps? So I wandered around the camp area, spacing out, exulting in the beauty of the moon and aspens,

hiding from the oil-haul trucks roaring down the road, worrying about snakes and bears. As if they'd be around oilfield trucks!

Locals said that the camp at PR Springs was invaded by bears, scratching at the door of their camper. All right! The world needs more bears and coyotes and bobcats and cougars; already plenty of skunks though.

One unit was on same side of Berry Canyon, very rugged terrain again. Forested canyon, loose rock; did find a number of rock shelters, one a big one with ash in it. Next unit was entirely different terrain, P-J/sage flats, to the north on Indian Ridge. Very pleasant stroll through the forest. Found lots of lithics, and one bone point. Rained in a desultory fashion all day.

Really developing surveyors slump, the tendency to look at the ground as you walk. Part of the job.

A Mexican guy, building fence on contract, showed up and chatted, and we had a nice game of horseshoes with Ward.

Into town tomorrow, already! How the week has flown. Lots to do once there, repair clothes, buy food, et al. All for now.

### Monday, July 20, 1981

Back home, at South Camp. Had a nice weekend, visited with Bob till all hours, lots of stimulating conversation as always.

Saturday, not much happened. Blaine invited us to dinner, so Friday afternoon we sat around the office from 4:00 until 5:30 talking about the project, he's quite excited about it. Thence went to dinner at Blaine's. Sunday was a very nice day. Slept in, then Bob came over and off we went, first to Jensen to the Cub Creek Ranch to meet Ellis LaFever, the interpreter.

We went off and did a tough unit, on a 50-80 degree slope, rocky, deadfall; it was hard work. My heart just wasn't in it either. Larry did find a nice rock shelter with burned rock, detritus, blackening on the roof. But we both were exhausted when we were done. So, back to camp, after I burned my hand sliding down a rocky slope, just like a 2nd degree burn.

### Tuesday, July 21, 1981

We went down Pine Spring Canyon to Main Canyon. Did a unit up an unnamed side canyon, that was another workout; steep, rocky, trees fallen down. Quite nice, although I've been getting flashes of paranoia about bears lately. This was just across from Berry Canyon, where I found the bear feces. The unit was bisected diagonally by a canyon, so we each did one

side; found a bit of stuff too. Some rock shelters, a fire ring, and bedrock mortar. Also, just off the site a nice little petroglyph panel, and some inscriptions, including the ubiquitous Dick Thompson, 1964. Whoever he was, he sure got around this country for we've found his name carved everywhere. Anyway, others from 1915, and one, the real find if its authentic, of Louis Robidoux [cracked off]—must be Robidoux with some French writing and the date 11 Mai 1841. Fascinating! Could be a hoax, I guess, but if not, it's the most interesting thing we've found out here.

Anyway, we found petroglyphs and rock shelters all up and down Main Canyon, so it must have been a—ahem!—main travel route through the plateau. On to our next unit, which was up on the ridge to the west of the last one. Up by Wire Fence Canyon—hmmm, wonder if there's any connection with Wire Fence Rapid on the Green down in Desolation Canyon? We found the unit to be a forested island ridge in the midst of a big, old burn. Nothing in it, not a flint chip, in the whole unit. Admittedly, we did it pretty fast. Anyway, the next part was the burn—fire-break, chopped trees, 'dozer tracks. You could still feel the intensity of it, the radios, the chatter, the yellow-suited crews, the planes overhead.

I'm beginning to get a picture of the aboriginal use patterns of this area. I think it was just a place to pass through, a place to hunt and gather, not a habitation area like the model was developed for. The ridges are too steep and rocky to live on, the conditions too severe, and some resources too scarce. I think they passed through on the way to the Uinta Basin and the Grand River valley.

Just back from a stroll to the big rock across the road; went for a break and stood and stretched, felt great. "The wildest of scenes have become unaccountably familiar," as the prophet Muir said. Beginning to feel more at home here. It wasn't that outdoors that made me feel ill-at-ease, either, but the routine and all the folks. It is so nice here without the crowds.

The more I go outdoors, into the wilderness, whatever, the more I like it. I'm getting to the point where I think I could do it for good.

Anyway, to finish the day. The best for last, in this case. We drove back on Horse Ridge, a road south of the Seep Ridge road. At one point, the road swings by a little knoll with a promising view. We stopped, walked out to the edge, and bingo! Southern Utah at a glance. You could see from north of Grand Mesa, though the La Sals, the Abajos (my favorites!), to the

Kaibab Plateau and even Navajo Mountain! *What a view!* We were both astounded.

### Wednesday, July 22, 1981

Just spent an hour writing a report on a projectile point I found (! My third; two and one fragment. Not much out here, or it's all been picked up already). Its about 2 inches by 1 inch, of brownish-gray chert. I found it in a P-J forest by upper Seep Canyon.

Anyway, we did *three* units today, all pretty easy and only one productive. Still, it was a lot of walking, both to get to them and then in and out of the units themselves, and we were dead tired at the end of the day. Two were P-J flats, ridges, and washes, and one, the last, was a ridgetop that was completely burned—a ghost forest of dead trees you could push over with your hands. You could still see the outlines of trees that had fallen over and burned, it was kind of spooky. Oddly, that was the most productive; with rock shelters and metates.

The big deal of the day was radio chatter and finally a news report on a big fire, 3000 acres or so up by Diamond Mountain. They had to evacuate Jones Hole Fish Hatchery; there are 150 firefighters on it. Also, about 30 more on an 800 acre fire in Island Park. I kind of hate to miss out on that, but Blaine wouldn't like it if I got myself involved on the fire team, he's already pointed out, no mistake. Hopefully, I can get in on some of the mop-up, it's such good money! Less work, same pay and excitements.

No cows in the yard tonight. I walked outside last night and almost had a *tete-a-tete* with one of them in the dark. Ward may like them around but I sure don't. They're big and smelly and leave big piles of poop all over, no matter how pastoral and rustic they may make it I don't like cows!

### Thursday, July 23, 1981

In Vernal. Long day, trying at times. Got up *early*, as Ward was there, and he's an early riser, capital E! So off to do units 33, 32, and 21, as it turned out. The first was easy, and badly disturbed by the oilfield crews. We found out that the reason the gate was locked was drip gas, just like we used to steal back in high school. Tough on the engine but sure makes it go! They're losing 1200 gallons a week. So, to unit 33. A high, remote, forest primeval plateau; couldn't be more different than the previous one. Typical P-J, but somehow it had real wild feeling. Vistas of distant forests, remote ridgetops. We decided to do one more that afternoon, one out on Monument

Ridge, in the same burn we were in yesterday. Again, not a thing. A big storm blew up as we were finishing it, with distant thunder and lightning. There was a nice view from there, too, to the north; you could see the Uintahs and even Whiterocks (so that's why it's called Whiterocks!).

### Saturday, July 25, 1981

In Vernal still. Yesterday, then, went to the office all day, a drudge in itself. Spent the morning filling out *forms forms forms*, turning the ailing jeep in for another one at GSA. About 10:30 I called George Stewart, the old historian in Roosevelt, who someone told me would know about that Robidoux inscription, and got an interview time with him. So after some more bureaucratic meanderings and lunch with Bob, I went over to Roosevelt to talk to the old guy. What an enchanting afternoon! Him, his dog, his books, his knowledge. The thunder crashed, rain pattered in the street, but the tales he wove, the pictures he painted. He told me all about the Robidoux's, Ashley, Carson, Gunnison, Escalante, Miera, Red Moon, the last war chief of the Utes, Chipeta, Ouray. He speaks Ute, and taught me some words and signs. Really got a feel for the history of the area from him. He also gave me directions to some more inscriptions, 1835 ones, and told me that the Utah Westerners has known about the Robidoux one for a long time but didn't advertise it, figuring some idiot would go out there and shoot it up (which indeed has happened anyway to some extent). So finally I had to pull myself away from him and his dog ("I can't live without a dog; they come in here and tell me things I'd miss otherwise.").

### Sunday, July 26, 1981

Nice day, even if I was in Vernal and not at South Camp. Bob and I went up to Brush Creek Cave, in the Uintahs, which I'd heard of forever but never been to. Quite the place. A gigantic cave opening, with a 30-foot pillar of ice in the mouth. We sat in there nice and dry and listened to a great thunderstorm crashing and resounding and echoing in the cave. Waited out a downpour, and clambered back up the arduous trail with a stop in the beautiful meadow.

### Monday, July 27, 1981

Back at South Camp, yay!

Today, off to work. Took the new jeep off for a test, over to Cocklebur Wash, between here and Dinosaur. Looked at some



very nice petroglyph panels, that were exciting to get to. You couldn't see them from below, but had to go out on an exposed ledge. I think Blaine just wanted to get out of the office. Back to the office, to this and that and the other. So it was 12:30 before we got out of town, and I could not stay awake, so Larry drove. We almost got crushed by a big haul truck, but escaped. Got here and then went to do unit 20, a half-unit that was some of the hardest work I've done all summer. Beautiful view, though, of Trap Canyon and the lovely Sweetwater Canyon and its many beautiful tributary canyons.

#### Tuesday, July 28, 1981

Last night turned out to be quite cold, capitol C. Luckily I had my goose-liver down sleeping bag, that and my quilt kept me so toasty warm that I slept soundly.

Off to Tom Patterson Point, a neat, high place. Units 13,15,16,17, as it turned out. O for 4. Not a thing in any of them. Two were chained, real moonscapes. Could have been alien spacecraft wreckage there, but it's gone now. One had been burned besides, so it was really laid waste. But getting out onto Tom Patterson Point was nice. (so who was Tom Patterson?) All the way on a road that kept getting worse and ruttier, and finally ended altogether, at the point. Excellent view, from the vestige of untouched P-J forest, of Sweetwater Canyon, just above the mouth of PR Canyon. Would have liked to go out on the point all the way (about a mile's walk), but no time, gotta get to work. All four units were zilch. Nothing, except one of those suspicious bedrock metate/manos that Larry's always seeing. A hole in the rock does not a metate make, nor an overhang a rock shelter. So we walked and walked, me looking at clouds building up, horned toads, and distant vistas. Since we didn't find any artifacts, I stocked up on mental images of wildness.

All of this leads me to reflections on chaining. People in the west seem to think a P-J forest is good for nothing but firewood or to be chained down so a few deer, or worse!, cows can eat. Well in defense of P-J I like it! I like the winds in the scraggly branches, the dead juniper reaching grotesquely to the sky, the pinyon jays, the sandstone. I love it! I was born and raised, and will probably die, surrounded by a pinyon forest, and can't think of any better fate. I hope the practice of chaining falls into disfavor and soon!

We'll be in town next week, doing an archeological survey of a wilderness area north of Jensen. It should be a nice break,

although I begrudge the time spent away from here. Why do I feel this is such a lifetime chance, to live like this? The week after that we'll probably move the Resources trailer to Winter Ridge, as we have a couple of weeks work over there.

It seems that the farther away we get from Main Canyon, the less we find, in either direction. So far, the most stuff we've found has been around Main Canyon, which must have been a route. Hence Main Canyon, eh?

#### Wednesday, July 29, 1981

Today was pretty productive. Two moderately difficult units, one full of rock shelters, with chips, real metates and manos, in a big, old burn on McCook Ridge. Was pretty tired at the end, so this may be short. It's after 8:00, and just now finished filling out forms.

Ward just now out on the road giving the water-haulers hell about not watering the road. Yay, Ward! It's a regular dust bowl with all the oilfield trucks going by. Clouds of dust hang in the still air, even more pollution from the oilfields, and they say how clean they are! The driver tried to give Ward some excuse, the well had blown its casing (lost circulation, or CIRCA-lation as they say), to which Ward said "I don't care about the well, if you want the water (a government spring), water the road." As if the needs of the energy industry should take precedence over *every*-thing. Getting a better impression of Ward as I go along.

So anyway, we drove down Tom Patterson Canyon today. Stopped at the junction of South Canyon and Sweetwater Canyon, to look at the petroglyphs there. Very extensive panels, ranging from archaic stick figures, about 2000 years old, through Fremont anthropomorphism, to historic Ute (horses), shepherds, written in Spanish, to white ranchers (1894, 1899, 1905, 1907, 1909, to "J.D. 1980.") A regular billboard. They run up Sweetwater Canyon for about 200 yards.

Seconds ago I was looking out the window into the lighted yard and a bat—it must have been a bat—grabbed a bug right in front of my face. I had a quick impression of a rush of black wings, a face of some sort, and it was gone, and so was the bug, maybe the same big moth. Nature in your face!

#### Thursday, July 30, 1981

Long day, almost all of it spent driving dirt roads. Started out cloudy, and still is. We drove up South Canyon to the ridge road and turned east, a new route. The road

follows the ridge, I mean the road *is* the ridgetop, separating the north and south flowing canyons of the Tavaputs. The drainages were separated only by the width of the road. The road greatly improved as we drove east, toward the Colorado border, or in other words it got narrower, bumpier, and less-traveled and hence less dusty. The canyons flowing south were much steeper and shorter; you could see the mouths in some cases, opening out onto the badlands north of I-70, not to mention the La Sals. I especially loved the canyons flowing north, though, longer, mysterious, rugged, steep-sided and sage bottomed, much longer, disappearing off into the misty distances. Chipeta, Greek, Taylor, Johns, Dicks Canyons; beautiful places! We stopped on a little rise to admire the view and photograph flowers and there was a little lithic scatter, some honey-colored quartz flakes and a flake and bird point of obsidian.

So, on to Dicks Canyon, which drops down into Bitter Creek (as all the above canyons do, Bitter Creek being one of the main drainages). Thence up Bitter Creek Canyon to Fatty Canyon, in Colorado, and then up Atchee Ridge. The terrain changed as we went from mountains and Douglas fir forest to P-J and finally into sandstone badlands. We did a bit of fancy navigating and ended up right at the trailer (the point of all this excursioning). We missed the right turn, and went to Kings Well, an 80-foot, hand-dug well, a CCC project back in the '30s. We backtracked from there and found the trailer by an old pumping station and a cabin; the Seeley Cabin. There, on the cabin door, (which had been badly vandalized by shotgun blasts) was a fading note from Seeley which read: "This is my home, you shotgun-shuttin s.o.b..." and so on, to the effect that he (Seeley) would wait on a ledge nearby and "blow your head off." The note ended "I'm goin out huntin chicken and rabbit hunters." Who knows when this little drama occurred, or how it played out?

So we decided to go to Bonanza to go to the company store, Larry wanted some beer and Twinkies. It was closed. You couldn't pay me to work in a mine like that, the thought gives me the shudders. We passed several old Gilsonite mines, ten feet wide, who-knows-how-many-feet? deep, that run for miles across the desert in a straight line. Apparently Gilsonite only occurs in vertical veins like this. Most of them unfenced.

So we came back, over the White River; still lots of water therein. I didn't know it was so pretty; I'll have to float it before they flood it for oil shale water. Thence finally to the trailer and pull it back

to South Camp, so home at last without further misadventures. The forestry crew is here, and me and Larry and Ward.

#### Monday, August 10, 1981

Quite the gap, since last Friday in July. Oh well, suffice to say it was a good week, spent mostly outdoors.

Last Friday we did a half-unit up Sweetwater Canyon, then drove on up and out, with the object being the Mountain Fuel bridge. We found some more petroglyphs, these unrecorded, in lower Sweetwater Canyon. So we navigated out way out, using a compass, topo maps, and intuition. Through the desolate wilderness of lower Bitter Creek Canyon; buttes, bluffs, cliffs; not a tree. On over the Mountain Fuel bridge and into Vernal. I spent the weekend in Salt Lake City. Then back on Monday to Vernal and a week working out of the office like the rest of the drones.

Tuesday and Wednesday we went out to do a clearance on the road from Bonanza to the new D.G.&T. power plant. We walked virtually the whole way, drive and walk style; I would drive, park the truck and walk; Larry would walk to the truck, drive past me to some point, park and walk, and so on. It was *hot hot hot*, and *dry dry dry*; staggering, mind-befuddling, vision-producing hot. Found some stuff though, nice old bottles, shepherders monuments and camps, some other artifacts. It wouldn't matter if we found the lost city of the Aztecs, they would still "improve" the road anyway, for the power plant gets what it wants. Saw a couple of neat old wooden bridges over washes, built for the stage that serviced the Uintah railway; they were bulldozed the day after we saw (and photographed) them. There were surveyor's stakes with flagging all the way along the road, indicating that our "archeological clearance" was just *pro forma*. There were a lot of sheep skulls along the road, and it turned out there's a little slot in the underside of a sheep skull that just fits a piece of surveyors lathe, so I took them and put them up on the surveyors stakes as I walked along, leaving a row of sheep skulls along the road.

Thursday was my office day. I did some fire maps, some photos, and wrote a report on Louis Robidoux and the Westwater Creek-Willow Creek route. Greg Butler came by, and we had a nice chat. He's still working down in Echo Park, the lucky dog.

Friday, then was a long and busy day. We went out to walk the last stretch of the road clearance, from the top of the ridge down to the river. The bottom, where the

new bridge is being built, was beautiful and of course, full of old Indian camps; must have been a ford there. Lithics all over the place, and of course that's just the spot they're going to dig up for fill for the bridge. Oh well. We also went out to the site of the power plant, to look at another fill site, which turned out to be full of fossilized turtles. A shallow basin, a whole bunch of turtles must have gotten trapped there millions of years ago, cause there they were, about thirty of them; you could pick up whole pieces of shell.

#### Tuesday, August 11, 1981

Raining at South Camp, so we're staying in today. The roads get too difficult when it rains this much. Must be the late summer storms starting, just like over the Uintas. It's easy to forget we're almost as high here as the Uintas, it's such a long gradual climb to get here. Spent the weekend with Mike and Dennis and Butler, staying by the rangers cabin in Echo Park, had a great time. What a beautiful place!

Yesterday we got out here, through some rain and mud on Seep Ridge, and did another unit out on Tom Patterson Point. It was a dark and gloomy canyon, the place almost *felt* of bears; bear feces, scratches on the trees, even tracks. It was steep, rocky, choked with brush. Perfect place, if I was a bear it's where I'd live. Real forest primeval. It was kind of spooky, I was glad to get out of there without meeting Mr. Bruin. Came back to camp and ate and talked with the fire crew.

I love these cloudy days, rain and mist in the deep forest. Yesterday we found a hidden stand of ponderosa pines in the forest primeval; just walked over a rise and there, all around a little sandstone ledge that was carved with a run-off channel, was the grove. A couple of dozen tall, beautiful ponderosas reaching up to the winds above the P-J. Also a good cave with a lot of cultural material, maybe even a grave.

#### Wednesday, August 12, 1981

Sitting on the ledge down from South Camp about a quarter mile. Nice spot, just out of sight of the cabin. Looking back up-canyon to the draw the cabin sits in (Cabin Draw? Camp Draw?). It's probably 7:00 PM, the sun is down but not gone.

Big crowd at the camp, the reason I'm hiding out down here. A new crew of fence-builders has shown up, with yet *another* trailer (KOA Draw? Road Ranger Draw?) Pancho Villa and his crew brought one up yesterday, so it was quite noisy, lots of drinking, playing horseshoes, laughing.

Sunlight is slanting through the pines and aspens, the clouds are dispersing slowly and reluctantly. There was even thunder this afternoon. I hope the clouds disperse enough to see some of the Perseid meteor shower. I'm going to try and stay awake for part of it. The moon is about 3/4 full, so that should wash some of it out.

A breeze stirs the bushes that shield me from view of the road. Must be ten different species there, scrub oak, service berry, rabbit brush, cheat grass and some other bunch grasses, some sort of mustard, some Oregon grape, and about three or four other herbs I can't identify. Never was very good at that, i.d.-ing plants.

Never even related the day, did I? We set off for Winter Ridge again, both in a funk. I haven't had any strength all day, just sort of plodded, and Larry was hung over. The road out there was muddy, rutted, and beset with deep puddles and sliding compressor trucks. Withal, it was a striking morning. Wisps of mist in the valleys (this job is going to spoil me on views!), racing clouds and sun-dappled forests. We found, so of, our first unit, in an area of rolling hills covered with sagebrush, which smelled *wonderful*, just where the road dropped into V Canyon. Appropriately named, as it turned out. We looked for one of Larry's "cadastral markers" in vain. I felt damp and chilled and weak, must be coming down with something. The first unit crossed about three drainages diagonally, up and down, each with a pour-over with rock shelter on the side. The first had a definite fire in it; pieces of charcoal, burned rocks in a rough ring. How old is anyone's guess (and some people's field of study). Up above there I found a little lithic scatter, about 7 or 8 chips, in a P-J forest, like someone had stopped, knocked a couple of rocks, and went on. I was disoriented all day, now knowing west from north. We finished it up and went on down the canyon a quarter mile to the next unit, much steeper and harder. Up, across a ridge, to find a small canyon. We were stopped by a ledge of sandstone topped by a thick layer (up to 20 feet in places) of crumbly, horizontally bedded shale. The shale was softer and undercut, so there were few places to get down. Down we finally did get, though, and across. *Nada* in the whole unit. Too much shale. We climbed back up through a break in the ridge, a continuation of the ledge, isolated by the break. On top of the ridge, overlooking the canyon, we found the most gigantic juniper trees I've ever seen, their trunks, all gnarled and twisted and broken, six people couldn't reach around. Absolutely huge!, I've never seen junipers that big. Somehow, because



the ridge is so isolated, they've escaped being chained/burned/ chopped for firewood. One of those pockets of wildness that are so precious. The view beyond was superb, rolling ridges leading to gentle points, with meadows and forest covering all. Beyond those must lie mysterious, siren, woman-river, the Seeds-kee-dee. We walked down and drove to the bottom of V Canyon, where it meets meadow creek, aptly named. We stopped to look at the creek, a fair-sized stream, and a big bat flew right over our heads and circled us, and then moved on. With that omen, so did we.

#### Thursday, August 13, 1981

Long and hard day. Up to work, to do units 22 and 23, which we've been dreading and with good reason, it turns out. They looked difficult on the map; close-drawn nets of contour lines, no space at all between them, indicating steep slopes. And so it was. They were both out on Saddle Horse Ridge, one (22) which crossed Black Horse Canyon. Five hundred feet down, 500 feet up, 500 feet down, and back up, all in a half-mile.

So at any rate, it was a workout. About 70 to 80 degree slopes, fallen trees, rock ledges. Found nothing, either, any native would be too smart to spent any time on that steep ridge top. So on to the next unit, more of the same, with the added attraction of Gambel oak thickets. Up and Down and Up and Down. We finally gave up on it, since it also appeared to be zilch for the same reason as the previous one. In the first unit I did find a nice .30-40 Krag cartridge case, a real find, someone in the '20s? '30s?, out hunting deer, probably a bootlegger since I've heard they were pretty common around here. But, I subsequently lost it, much to my disgust.

A nice little thunderstorm and rain this afternoon, I loved it, sitting in the cabin with the stove going and listening to the rain, really listening. So often rain is just an inconvenience but when you really listen to it, it's music.

Later. Just back from sitting on the rock across the road. Great spot. Sort of out of view (is that a goal of my life, to be out of view?). Anyway, had to come back and write something down. This is a discipline like everything else. I was admiring the clouds and sky and especially the aspens. The grove down the road is so neat and orderly, no undergrowth, each tree seems to have an assigned space in a nice circle. I know they grow like that because they come out from a single root *blah blah blah*, but still it seems magical. I'll bet groves of trees that grow in a circle like that are the

origin of the fairy circles of Celtic myth. Who could live close to nature and not be a spirit-worshiper? The colors, too, are so soothing, like the pastels in a dentist's office. The pines are much more somber and dark, although I like them none the less for their probity. Clouds are the remnants of the earlier storm, and drift and swirl and reform, goldish-gray.

It's as silent at a grave in the kitchen, like a library more though, with the air of silent but intense study; a conscious quiet. The only sounds are the ever-present generator and my pencil scraping on this notebook and the occasional sound of a turning page or a shifting position. I'm sure my constant scratching has made people uncomfortable, but ah well, it's the way I get along.

Later, in the loft. To my surprise, the spider was out, repairing her web. Too cold for many bugs, even the squirrels that usually run up and down the roof are quiet. Quite cold and drizzly all week, although it's gradually clearing.

Originally tonight I only started writing to record a buzzard today, one of the few we've seen up here. It flew right by, into a strong breeze when I was on a ridge top, side-slipping into the wind so it could eye me as a potential meal (aren't we all?). Also a mountain chickadee, and a nice redtail hawk, which are fairly common up here. Also the usual Clark's nutcrackers, about the most common bird, it seems. Pretty colors, a distinguished gray body, black wings and a white tail, but the manners and deportment of a crow.

#### Tuesday, August 18, 1981

Morning, got reluctantly out of my too-warm and cozy sleeping bag and out into the chill air. Brrr! Quite cold. So on to way out to Winter Ridge we scared up a big young buck, still with velvet on its antlers.

The first unit was a walk through sage flats to a fringe of juniper and then a cliff, looking down into upper Bottom Canyon. In the junipers, I saw a chert flake, so we began to look around and found, not artifacts, but a 14" rattlesnake. I didn't even hear him, he sounded like a bug, as he had only small rattles. So we coaxed him out of his sagebrush to pose for a portrait, and let him go unmolested. It's his country, after all, not ours. So we walked to the edge of the cliff, where I idly kicked off a couple of flat stones and behold, a big scorpion. One he got warmed up in the sun he struck at a proffered stick. Then storms brewed up in the distance, with lightening. Charming place: snakes, scorpions, lightning; kind of made you feel unwelcome!

So we did the unit and found a few chips. The next one we did was chained, partly, a disgusting sight. So on to the next unit, another sagebrush flat with a P-J forest fringe, this one untouched. There I stopped to admire a fallen pinyon, millions of branches broken off, slowly decaying away, nurturing the forest floor and its progeny; a dignified end, not ripped out by the roots by a chugging bulldozer. Wandering that patch of forest I really felt warm, at home, protected somehow; I love P-J!

On the way down here the other day we stopped by Louie's by Pelican Lake (formerly Hoot's, a much more picturesque name). Sitting at the bar, facing the Twinkies display, was a grizzled old-timer. Gray stubble, lined, weathered brown face and clothes to match. He was staring off into space, with a somehow pleased look on his face. I said "Hello there," and his eyes focused for a minute as he look at me, mouth open. He didn't say anything, just sort of smiled at me then dropped back into his reverie. Burned out with too much time and desert and sun and wind, I suppose. If it's my fate to be a bum like that, I want to be one somewhere like this, not crashed in an alley or under a freeway bridge.

#### Thursday, August 21, 1981

Decided en route to do units 51 and 52, as both lay in an east-west line about a half mile apart; 51 bordered on Main Canyon. So we drove out past Winter Ridge to Bull Canyon, an entrance into upper Willow Creek. We parked in the canyon and climbed out, no mean feat in itself. It was broken, rocky, boulders and trees, a standard refrain here I know but this was even harder. So up on top we found, what else?, tire tracks. Webb's Law of Hiking. On through a P-J forest, over a rise and through a sage bottom, to the edge of the unit. We hadn't walked into a few feet before I found a piece of worked chert. So we looked around and sure enough, a nice lithic scatter. Spent an hour there. It was kind of nice to spend time in one spot, instead of hurrying through it. The scatter turned out to be the biggest we've found, about 600 meters square, full of flakes, cores, scrapers, all sorts of things. It's nice to actually find something after long spell of seeing nothing but dirt and rocks. Also came on a small snake, about 8-10" long; not a buzztail but still amazingly aggressive. Guess you've got to be in his position.

So on down a slope to a drainage, across it, up another slope, to a bigger drainage; down it—a little lithic scatter at the bottom, washed in maybe? up the other side, to a perfect bench overlooking the

canyon. Steep climb up, but well worth it for the view. So we walked up canyon from there, as the top was the edge of the unit, and swung north to avoid another drainage.

Just past the bench, we found a formation of rocks that oozed asphalt, a good place to find artifacts stuff, they would have used the asphalt for lots of things. On and on, to the next unit, much like the previous one; two small canyons leading down to Main Canyon. Rolling P-J covered slopes, some cliffs but not as bad. Untouched, virgin forest, not even human tracks. The advantage of clambering around to find our units, we get to see places a hunter or cowboy wouldn't go. In a small side drainage we sat out a quick storm in a big rock shelter, very pleasant. In the meantime we dug out a nice little firepit, complete with charcoal, that was about a foot down. Quite old. We walked out to the canyon bottom and across, to the big event of the day. I stepped over an old rotten log, and almost onto a rattlesnake. My weight leg (the other was in the air) gave a sort of *twitch!* and I jumped right over him. It was cold and cloudy, so he didn't even notice us until I poked him with a stick to see his tail and sure enough he buzzed, very menacingly.

The walk back through the units was much the same story, without the rattlesnake. Hot, except for brief, passing showers, and tiring. I was dragging and so was Larry. More flakes, all the way across; the whole area was littered with them.

Up and out Bull Canyon to Willow Creek. What a road!, or lack thereof. Most of it was just down the wash bottom, rocky and rutted and amazingly twisty, with steep dirt walls. Finally got out to Willow Creek, then we had to backtrack through a ranch to avoid going through the creek, where the vehicle would have gotten stuck for sure. The rancher was a typical, grizzled, burned out type, with the typical pack of mangy dogs. We drove on to our unit, a small side drainage at the base of a long protruding ridge. Climbed up a wash and took one look at it and bagged it; rough, rocky ledges, steep dirt slopes in between, a real butt buster. So since that one was so short, we drove back down canyon and looked at unit 55, more of the same except for the mouth of Little Bull Canyon, which has a nice pictograph panel. Pictographs are always more exciting than petroglyphs, somehow; like there's real artistic intent; the painter had to have paints, be prepared, where with petroglyphs anyone could just sit and knock a rock on the wall.

After a strange interlude encounter with a rancher and his dog pack—I don't know who was more truculent, him or the

dogs—we went on. The canyon of Willow Creek has steep, broken sandstone walls, very twisty, that gradually changed as we went north; it got more barren, open and on a grander scale. We passed the mouths of Main Canyon, Wild Horse Canyon, Buck Canyon, Wood Canyon, and a host of others, all unnamed. We drove on and on, the road seemed endless. Hot, tired, cramped in the little cab of the truck, I soon fell into a state of misery and dejection. Finally, after a 20 mph tour of Willow Creek Canyon—enlivened by some neat Ute petroglyphs including horses, houses, a train!, and a sailing ship!, we emerged out into the hot, depressing, bleak, ravaged land known as "south uh O-ray." Wrecked cars, oil wells, burned up bushes, little else.

#### Monday, August 24, 1981

Today, went to the office, got everything together, and headed south. Drove down Hill Creek, a carbon copy of Willow Creek, save for "NO TRESPASSING: THIS IS INDIAN LAND!" signs. It was quite pretty canyon, though, with lots of old cabins and even a cliff dwelling ruin, although we didn't stop to look at it, being a bit nervous about trespassing. Past Toenave Reservoir, and up a little canyon onto Flat Rock Mesa.

A beautiful view from there, in all directions, to the misty distances. We found our unit, #56, after driving down an atrocious road down Agency Draw. It was quite a nice unit actually, a neat flat mesa, in between two washes. Found a broken point on top, but that was all. Places like this have been picked over for years. A big storm brewed up and we left in a hurry, not wanting to be stuck in Agency Draw with the chance of a flash flood. Detoured in Willow Creek to drop off some maps to the rude rancher we met last week; thence back through Willow Creek with a great *SPLASH!* and home to South Camp.

#### Wednesday, August 26, 1981

We walked down into the head of upper Bottom Canyon to do unit #41—broken, cut by gullies, choked with scrub oak and fallen pines then I continued on over the ridge to a workover rig we could see from the airstrip. What a familiar scene that was!, the rig, the trucks, the dirty, tired crew.

We drove down Pine Springs Canyon to Main Canyon, and stopped at the mouth of Pine Springs. Found a really neat little ranch there, cabin, corrals, well; a great place, in a beautiful canyon. Walked down the canyon a way, and then drove on up Main Canyon and over to Whetrock Canyon to do unit 46. Since most of the unit had

1000 foot elevation in about a third of a mile, we decided to drive down V Canyon to Meadow Creek, thence to Willow Creek.

Found an old rickety bridge there, which we gingerly crossed, and drove about two miles, through six-foot high brush, until the road ended. Then we walked another three quarters of a mile to the unit, which was a big "0"—nothing in it at all. The big discovery of the day was a waterfall in Willow Creek; the whole creek drops about ten feet over a ledge, then another ten feet. Quite beautiful. I stuck my head in the waterfall and just shouted with glee at the rush of cold water gushing onto my body, it was exhilarating, especially since the hot weather has returned with full force.

So we went back up on top, to the plateau above V Canyon. We wandered around there for a while, from this ridge to that, for an hour; 15' maps (all we have for this area) are useless for cross country navigation. Whilst meandering I was looking south at plateau and mountain vistas, and saw a big lightning strike on a distant small grove of trees; a puff of smoke ensued, then it grew and smoked and finally blazed merrily. Pretty cool, I've never seen a fire start like that before. I called it in later and found out it was on state land, so let it burn, the office said, who cares? Nice attitude.

#### Thursday, August 27, 1981

Drove out to Winter Ridge, to do units 39 and 49, and 45 as it turned out. 39 was down an old road, past a nice stand of ponderosa and into a P-J forest. The road was blocked, so we walked, and saw some wild horses out there; at least I assume they're wild. So we followed horse trails out into a sagebrush flat, ringed by P-J. We followed it out almost to its end, which was where the unit was, then back and forth through the unit—nothing—a lot of unworked chert, but save for one flint scraper outside the unit, not a thing. We walked back out to the truck and drove on.

Unit 49 was about a mile east of the Bull Canyon road, through P-J and sagebrush flats (Sage, sage, sage! I've walked through so much sagebrush lately I can smell it even now). Most of the unit turned out to be shale slopes, barely at an angle of repose, with giant slabs of sandstone sitting on crumbling pillars of softer shale—hoodoos. The slightest step caused the shale to start sliding; needless to say we didn't find anything in the unit. We took a break in one big rock shelter, but there was too much rockfall in it to find anything. We sat and reflected on the obscure territory we had been through this



summer; who had ever sat in this rock shelter, for instance? No one, I'll bet. So Larry took one side of this impossibly steep drainage, and I the forested side, but we soon gave up on it. Way too steep. Back we walked, through the P-J and the sagebrush, and I found myself in a state of exaltation, exulting in the beauty of the forest.

Speaking of, a big wind is really making the aspens and pines whip around; raining too, so I'll move back inside the cabin.

We drove on to north of V Canyon to do unit 45, but couldn't find a road into it, so we bagged it. Going to substitute another later, which we haven't yet done. Drove back to South Camp just in time to catch a deluxe hail and lightning storm.

In the one unit, I saw a lot of little horned toads; when I tried to pick one up he ran and cringed under my boot. When I touched him, he closed his eyes, and somehow I could see him, in his little horned toad way, preparing himself to meet his maker, ready to die. I stopped then, thinking that while I only wanted to look at him, he of course couldn't have known that.

To him, something a thousand times bigger trying to grab him must have seemed like the stuff of horned toad nightmares. So I left him, and all his little brothers and sisters, alone after that.

Rain stopped, so I moved back outside. Hard to believe it's almost September, and we only have a week left out here.

The rig down the road, in Railroad Canyon, is moving out. We've seen truckloads of equipment and rig parts going up the road for the past two days. It's early fall up here and the scrub oak is already starting to turn, and the aspens will soon follow. Sure will be pretty when they do, but I don't think I'll be here to see it.

#### Tuesday, September 1, 1981

September!! Even the very air seems nicer, cooler, fuller; the birds sing more sweetly, the vistas beckon; September is really the start of the year for me, guess I spent too many years in school.

We're out at Massey's Cabin, a BLM trailer set up in a clearing in a P-J forest just off the Atchee Ridge road. Nice little spot, different from south camp since we seem to be lower in elevation and it's more out in the open. We got a late start out to here, and still got two units done. One we bagged, as it was about a thousand foot elevation in a quarter mile, almost a cliff. The other was a sheep grazing area, totally trampled and overgrazed. What little wasn't was so thick with serviceberry and scrub oak as to be

nearly impossible to traverse. We drove out through Bonanza and down Evacuation Creek to Dragon, of which nothing but some foundations and ruins remain. Thence up Dragon Canyon, a ten mile jeep road, that was half-in and half-out of the wash the whole way. Harrowing at times, especially with Larry driving! That brought us up to the Atchee Ridge road and here we are.

So that was today, now to bring notes up to date. Friday, up and off, me in an awful mood. Up to the Wood Canyon turnoff, thence to the head of Jim's Reservoir Canyon. We walked across it, up the ridge, across innumerable drainages, until we finally reached a high point we thought was the unit. So we started down, only to discover that it wasn't the unit at all, so we had to scramble back up the ridge to the highest point and start over. After a coin toss, we were that turned around, we went back down into Jim's Reservoir Canyon, and up and out. A hot, hot, tiring walk, I was burned out by the time we got back to the truck.

The weekend was fun if a bit rushed. On Saturday up to absolute confusion and turmoil, isn't that always the case before a river trip? It was a nice trip, though, with Mike, Bob, Rodger, Kim from Salt Lake, and another guy, Dan, a friend of Bob's, but who's also done some river trips. It felt good to be back in a boat; the ramp below the dam was bedlam, as always, lots of boats and lovely boaters from a Mormon church group from Salt Lake. It was cold and drizzly, with occasional thunder, and I felt quite the vet as I rigged gear, with all these scared and nervous folks standing around waiting to be told what to do.

So on to the Seeds-kee-dee. I must admit a lack of confidence at the oars, Warm Springs last year really put the fear into me. I rowed a bit, through one nice little rapid, a regular chicane, and felt the old soaring feeling of exhilaration come back, so maybe it will come back in time. We camped below Little Hole, the same place Rodger, Bob L., and I had camped previously, but now it's trashed, disgusting.

We spent a couple of hours cleaning it up and still didn't get it all. Next day, we got up, ran Red Creek, and came home. Nice trip.

#### Wednesday, September 2, 1981

End of long day. Burned out! Not much sleep last night, I often sleep fitfully out of doors. At one point we started hearing coyotes, packs of them, all around the camp. It made me wonder about how safe humans were from coyotes, they seem to be filling

the ecological niche left by the decimation of the wolf population, but they are just as efficient as predators and scavengers. Just because it would take ten of them to take you down instead of two wolves doesn't mean they're any less dangerous.

Anyway, those were the random thoughts I had as I lay there, watching the brilliant stars. It was really a nice place, coyotes and all.

In the morning we went on to Rathole Ridge, on an atrocious road; a trail, really, about five miles long. Utter confusion—we never knew where we were until we found a guzzler, a water catcher for stock, with a project marker on it that had a legal description with township and range and so on. It was a nice ridge, with great views down into the canyon, but the brush! Scrub oak, mountain mahogany, serviceberry; thickets, and I mean thickets! I tore my pants, my shirt, untied my boots, knocked off my hat, scratched my skin. We renamed it Bushwhack Ridge. As we left, we looked back and there was a whiff of smoke, right out on the point where we had been. So we called it in and the fire crew headed out there; I don't envy them trying to find it, even, in that thicket. They're still gone so it must have been a real fire. While I was waiting for the fire crew at the bottom of Bitter Creek, to give them directions, Larry went up to the Cripple Cowboy Ranch to get permission to go into some canyons on their land, and promptly got stuck in a mudhole right by the ranch. It took us an hour of hard, dirty work, and a lot of cursing, to get free.

From there we drove down Bitter Creek to see if we could see the fire (couldn't). Bitter Creek is a beautiful canyon, superb canyon walls. The drive back, along the overlook road, produced wonderful views! This summer is really going to enrich my school year; I'll go back with a spring in my step and a gleam in my eye and a smile for all the lovelies!

#### Thursday, September 3, 1981

The farther it gets into September, the better I like it. We drove out to the head of Dicks Canyon (Dick Thompson?), and walked NW along a ridge to unit 5. Thick brush again, so frustrating to walk through it drives you nuts. We did unit 5, then started to do unit 6, about a mile and a half farther out, and bagged it. The brush is more daunting than climbing cliffs. So we drove back to the Cripple Cowboy Ranch to talk to Melba Hill, the matron of the place she wasn't there yesterday—to secure permission to go into Chipeta Canyon. Interesting lady. Thence back to South

Camp where I promptly passed out in my sleeping bag.

The projectile point I found yesterday was only 30 feet or so from a plastic nock, or string end, of a modern arrow. Neat little cultural link, that was, spanning a thousand years or so.

Whew, too tired to write anything productive so better close for now.

#### Saturday, September 5, 1981

Sitting in the radio dispatch room at the office. I know I don't normally write on Saturdays, but I'm here on duty so thought I would record it. It's a delightfully rainy day, cloudy, drizzly, reminiscent of the coast. I love days like this, thoughtful, moody, introspective. Just like me, as it turns out.

Yesterday was a nice change from our usual Friday morning rush. We got up, had a couple of leisurely cups of coffee and chatted. Quite nice. Off to Main Canyon, where we had decided to do a unit to make up for unit 45, which we didn't do the other day. We were looking for the inscription panel that George Stewart told me about, and we looked and looked, on both sides of the canyon, to no avail. Stewart said it took him ten years to find it. An any rate, we found some other petroglyphs, and also found, just past where we got stuck, a neat old cowboy camp up under the ledges around a big isolated rock on the floor of the canyon. Old jars, beds, cans, bottles; pretty nice. From the cans, bottles, and so on, looked like it would date from the 1930s. Must have been a lonely place indeed back then.

#### Tuesday, September 8, 1981

Didn't go out to South Camp today (yesterday was a holiday, Labor Day) as the roads are complete quagmires. It rained all weekend so I just sat around and brooded. This job is coming to a close, and it's almost time to go back to school, so been thinking about that and what the future will bring. *Que sera que sera*, as the song says. Also thinking about wilderness and survival therein and Thoreau. What drove him into the woods? he was a successful, if discontented pencil maker, yet he obviously felt he had to prove something, somehow "justify his existence" to himself, to Concord, to the Transcendentalists, to Nature, his light and symbol. As much as I like Abbey, Hoagland, McPhee, they all, in my opinion, build on the foundation started by Thoreau. "I went to the woods because I wanted to live simply."

#### Thursday, September 10, 1981

Last night in South Camp. Got down here late yesterday and didn't have any time to write. We went up to do unit 6, over by Atchee Ridge and the Colorado border. Walked up a double canyon into a forest canyon. A hard, hot steep climb up the side to a brushy ridge. Nothing there. So down the side of the ridge to the bottom, a forest glen with fallen trees, mossy bottom; the very air in the place was like a drink of cool water, the sort of place elves would live. At the mouth we found a homestead site, a burned cabin with much trash, farm machinery, bits of harnesses. Obviously someone had spent a great deal of time there. Up in the canyon above were axe-cut trees. It seemed a shame to just fill out a site report, it seemed inadequate.

We drove on over to the Cripple Cowboy Ranch again, and had another nice chat with Melba Hill. She had a litter of seven border collie pups, and four new kittens, and was quite thrilled with them all. I filled my lap with pups and sat back and really admired her lifestyle. So quiet, such a nice place; five or so ranch buildings, a creek, aspens rustling.

Anyway, must finish out today.

We took off to meet Gary, the Hill's cowhand, at Chipeta Canyon. We met near the mouth of it, and followed him (at breakneck speed!) to their cow camp by the mouth of Taylor Canyon. *Que can-ones encantadas!* I was utter enchanted, in a daze, at the beauty of Taylor and Chipeta Canyons. Enjoyed visiting (and envied a little bit too, I must admit) Gary, who is a "\$500 a month and found" cowhand, content with, at peace with, his world. How many others can say the same. Not I. We looked at the units in Chipeta Canyon (public land at the end, private at the mouth) but nothing in either one, as both were quite steep. Their cow camp up in Chipeta Canyon was a typical homestead, lots of clutter and junk and cow poop, but I loved it. I love that ranch feeling of homeliness and no hurry.

At the spring were two old, deteriorating cabins, which were well on their way to being reclaimed by the forest.

So that was the end of the project. Maybe that's why I feel so rootless, so lost. A sense of being deflated, finished with something you've really enjoyed, like the end of a romance. And it really has been a romantic summer, living out here in this cabin, walking these remote forests, seeing things few if any have ever seen (or at least I like to tell myself that). And that's the charm of the place, you do still get that feeling of being the first person to see it.

So goodbye South Camp! It's been wonderful, I'll never forget my summer in the Tavaputs.

#### About the Author

Roy Webb works at the University of Utah as a curator of rare manuscripts archived at the Marriott Library. He is an author of three books that deal with the history of river running on the Green and Colorado rivers: *If We Had A Boat*, *The Story of Bus Hatch and Call of the Colorado*. He gives regular lectures throughout the state of Utah for both the public and for the interpretive training of professional guides in the upper and lower basins of the Colorado River. Roy was a contributor to the *Canyon Legacy* for the special issue on River History (#5).

#### About The Author of the Following Article

Fran A. Barnes was kind enough to provide a "camera ready" article for this issue of the *Canyon Legacy*. Mr. Barnes, and his wife Terby, own and operate a publishing company called *Canyon Country Publications*. The following article is copyrighted and will soon appear as text in their upcoming publication about the Book Cliffs. Mr. Barnes is one of the most frequent contributors of the *Canyon Legacy*.



# THE BOOK CLIFFS

## THE MOUNTAINS THAT ARE NOT MOUNTAINS

by F. A. Barnes

### MOUNTAINS?

The Book Cliffs are visible to the north of Interstate 70 or U. S. highways 191 and 6, from Grand Junction, Colorado, to Price, Utah. They loom high above the arid desert terrain, then phase on upward into the Roan Cliffs and still higher to the convoluted highlands of the Tavaputs Plateau.

This whole assembly of rugged terrain takes on the appearance of mountains, and has often been given this label, but the term does not truly fit this unique geological assemblage.

Most dictionaries of land forms define mountains as any highlands that stand significantly higher than the surrounding terrain, whether produced by tectonic activity or erosion. Some define "significantly" as 1,000 feet or more, provided the top of the highland is pointed and not flat-topped like a plateau. By this height standard, the Book-Roan Cliffs are, indeed, mountains. Wilcox Point, at 9374 feet elevation, looms high above the Book Cliffs to the northwest of Moab. There are peaks north of Price that are almost 9600 feet above sea level, and many others in this height-range nearby. Even so, the Book and Roan Cliffs are topped by Tavaputs Plateau, which disqualifies them despite their height.

There is still more to it. In southern Utah's canyon country, if height above the surrounding terrain alone is used as a definition, then there are sandstone domes that would become "mountains." Zion National Park would become a "mountain valley," rather than a

cliff-walled sandstone canyon.

The Book Cliffs - Roan Cliffs - Tavaputs Plateau complex is also quite different in several other ways from most conventional mountain ranges, and thus the term should not be applied to these extensive highlands that dominate central Utah and western Colorado. They are not mountains, despite their height and rugged appearance.

Then what are they? That's what this article is about, and the best way to answer that question is to describe the unique geology of this scenic highland in some detail.

### THE GEOLOGICAL STRATA

With a few exceptions, the highways that travel near the base of the Book Cliffs are built on the lowest geological unit that comprises the cliff complex, but the story actually begins a bit earlier. Ninety-five million years ago, the entire central part of what is now North America lay beneath a shallow inland sea. As the world sea level fluctuated, so did the continental inlands covered by this sea. A relatively minor change of global sea level brought major changes in the area of land it submerged.

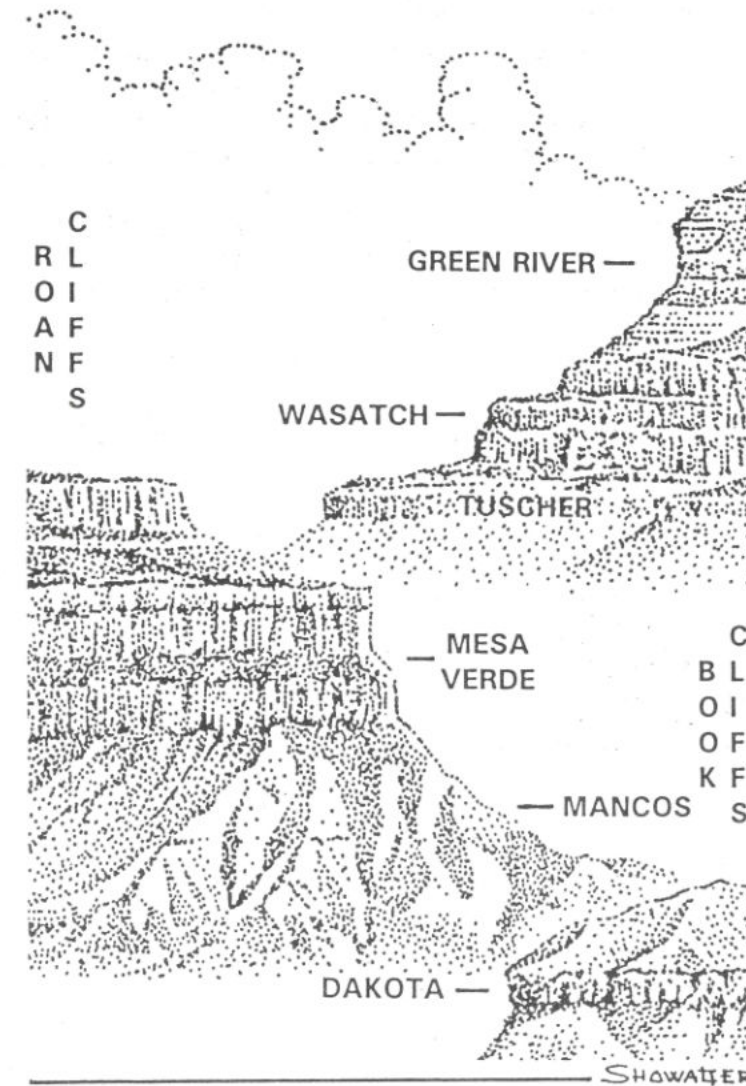
With the major change of sea level that next occurred, the inland sea's coastline slowly thrust westward, invading the present canyon country region. The sea's wave-washed beaches and tidelands, mixed with some coastal-plains freshwater deposits, became what is now called Dakota Sandstone. This new deposit marked the beginning of a major and long-lasting change in the region's deposition record and accompanying life.

### MANCOS SHALE

During the succeeding millions of years, fine sediments slowly accumulated in this deep sea, leaving the present gray Mancos Shale that dominates much of the terrain that stretches out southward from the base of the Book Cliffs. As this sea was slowly invading this region, various climatic changes resulted in periods of heavier precipitation which, in turn, brought exceptional flow of the rivers and streams that entered the sea here. Some of these rivers thrust major deltas of sediments far out into the sea, leaving somewhat different deposits that were eventually called members of the Mancos Shale seabottom deposit. One was the Ferron Sandstone member. This light brown, fossiliferous deposit originated in the west, but came as far east as U.S. 191. Other members did not, but complicated the sea's basic deposit farther west.

In open areas, as now exposed by several million years of erosion, Mancos Shale erodes into low hills runneled by rain. At the base of the Book Cliffs, it forms the gray-hued lower slopes, which are also ridged by water. Mancos Shale is rich in certain types of marine fossils, including sharks' teeth, but when exposed by erosion its mineral content leaves it inhospitable to most plant life. Even so, in wetter springs it is sometimes carpeted by certain species of tiny flowering desert plants.

In time, the great inland sea that drowned this region retreated as the global sea level lowered, again in response to changes in continental drift and associated tectonic activities.



MESAVERDE

As the sea retreated from canyon country, it left behind another complex, interlayered seashore deposit, this one now called the Mesaverde Formation. This deposit consisted of shallow-marine and coastal tideland sediments. As presently exposed in the Book Cliffs, it erodes into the light brown cliffs that lie just above the gray Mancos Shale slopes. In time, as the sea continued to retreat, the flat coastal plains were dominated by freshwater rivers, streams and shallow lakes. These left somewhat different sediments. Some geologists call these a member of the Mesaverde Formation. Others consider them different enough to be given their own name and have

designated them as the Tuscher Formation.

Either way, the coastal Mesaverde country hosted a wide variety of life, including numerous species of trees, ferns, horsetails and other plants. Animal life included shallow-marine mollusks and crustaceans, fish, and a few amphibians, turtles and crocodilians.

### UNCONFORMITY

This period of lush forests and animal life was brought to an end by a series of meteorite impacts. The first two space rocks were relatively small, but nonetheless brought extinction to certain species of marine life and dinosaurs. As each meteorite struck Earth, the

resulting side-effects included serious but temporary climate changes that some species of life could not survive. Then, the third meteorite struck, in the Gulf of Mexico, near what is now the tip of the Yucatan Peninsula. This was a big one, and its aftermath wiped out the remaining dinosaurs and numerous other forms of life. It also brought the canyon country region a period of erosion that lasted for millions of years. This third impact occurred about 65 million years ago, while the two smaller ones impacted within the preceding two million years. Geologists call this gap in the deposit record one kind of unconformity, or a major break in deposition.

### WASATCH

Some seven million years after the big Yucatan impact, the erosion period ended in this region and freshwater sediments once again began to accumulate. This new deposit is now known as the Wasatch Formation. Once again, the region was dominated by freshwater rivers and streams, but these were sparsely inhabited. Life on planet Earth had not yet recovered to the level it had reached before the triple-punch impacts. The waters hosted a small variety of mollusks and the land was inhabited by a few of the primitive mammals that were gradually filling the ecological gap left by the missing dinosaurs, pterosaurs and many other species. The thick deposits that represent the Wasatch Formation occur in the Book Cliffs just above the Mesaverde-Tuscher cliffs.

### GREEN RIVER

Next, and still higher is the Green River Formation. This is a very unusual complex of deposits. Basically, it consists of lake-bottom sediments, but the details get



complicated. Geologists named this ancient body of water Lake Uinta. At times it was joined with other lakes into a huge body of fresh water that completely surrounded the Uinta Mountains, leaving them quite literally an island range. In time however, as the region's climate became dryer, this superlake separated into several smaller lakes and huge Lake Uinta, which lay to the south of the Uinta Mountains, filling the immense Uinta Basin. Over the succeeding millions of years, as the Uinta range continued to rise, the same tectonic activities caused the Uinta Basin to sink. Thus, as Lake Uinta grew deeper and deeper, it accumulated more and more sediments from various sources which, in time, became thousands of feet of Green River Formation.

Lake Uinta was immense, complex and long-lasting. Major parts of it were deep, yet it was bordered by vast shallow swamps. The lake was rich with life, as were the surrounding swamps and shorelines, including numerous kinds of fish. The swamps hosted species of crocodilians and turtles, primitive reptile types that survived the big extinction. The land was a jungle of trees, ferns, horsetails and other vegetation, in which at least lizards and marsupials lived, still other survivors.

Of the many rivers that fed into Lake Uinta, one of the largest came from the south, from what was then the expansive higher terrain above what is now the canyon country south of the Book Cliffs, the present land of deep, complex canyons. It is thus quite possible that the lake's shores extended as far south as Moab. At the very least, the Moab area contributed sediments to the Green River Formation.

Lake Uinta's bottom and shoreline sediments were rich in organic decay products. The biochemistry

of these deposits varied with the water's depth, its changing salinity, and the types of bacterial life that was trying to reduce these plant and animal decay products to basic inorganic minerals. As in the oceanic depths, this biological reduction process was seldom completed. Great masses of incompletely reduced organic matter accumulated in Lake Uinta sediments, in Green River Formation deposits. In time, this organic matter became a complex of unique petroleum-like materials, special kinds of "fossil fuels."

Thus, the present Uinta Valley became the repository of a stupendous reserve of various kinds of fossil fuels ranging from natural gas to tars, oils, and a unique material called Gilsonite. The region's tar sands have long been used for various purposes, including road construction. The natural gas has been tapped for industrial and domestic use, and Gilsonite is still used in a variety of products and for many purposes. The early development of Gilsonite mines and its transport to various railheads is a long and fascinating story in itself.

Another product of Lake Uinta was oil shale. Technically, this material is not a petroleum type of oil. It is a kerogen, but it has great potential value because it can be converted into useful fuels by special processing. The problem is, the kerogen is so tightly bound within its rock matrix that it is uneconomical to extract, at least by present technology. Greater Uinta Valley, however, still remains one of the world's largest known petroleum repositories, thanks to Lake Uinta and its Green River Formation deposits.

#### UINTA

Then, once again, moderate-sized meteorites or comets struck Earth, all three of them on land. The time was about 44 million years ago. These impacts and their

after-effects produced permanent changes in the planet's biosphere, and significant changes in the general canyon country region.

The meteorite impacts and their side-effects made short-term changes in global climate that brought extinction to certain species of marine life, and temporary, world-wide changes in precipitation patterns. This is what brought to an end the long reign of Lake Uinta and its Green River Formation deposits.

While Lake Uinta had been very slowly filling with sediments carried into it by rivers and streams from the Uinta Mountains and surrounding plains, it would have taken a very long time to fill it completely at that rate. The temporarily increased precipitation brought on by the meteorite impacts, however, drastically accelerated this lake-filling for a time, perhaps decades. When studied megayears later, the new deposits this rapid filling brought were inevitably less rich in fossil remains than earlier sediments had been, an indication of rapid deposition. There is evidence that a large proportion of the new sediments filling Lake Uinta came from the east, from the slopes of the relatively young Rocky Mountains, as well as lesser amounts from the Uinta range and the open territory surrounding the immense lake.

Later deposits of the new Uinta Formation, of course, did contain much the same spectrum of life that had dominated the region before the deluge. The impacts that had brought extinction to some marine species had not caused as much biological destruction on land. If any land species died out, this is not yet known because this extinction of 44 million years ago has yet to be studied in depth by paleontologists who specialize in land life of that age.

Subsequent to the flooding that immediately followed the meteorite

impacts, a slower rate of lake-filling resumed and, after still more centuries, Uinta Lake eventually filled and the region became open plains -- until later major climate changes started the present erosional cycle, the one that created the present Book Cliffs and the higher terrain that looms over the land to their south.

#### RIVERS AND GLACIERS

Geologists have charted the climate changes in the canyon country region, and have studied the courses and ages of the dominant river, the Colorado, and its major tributaries. The earliest positive traces of the Colorado, where it originates in the Rocky Mountains, date to about ten million years ago. Thus, they have based their best estimates of the river's age on this figure. Other studies indicate that the river and its tributaries did not cut very deeply into the terrain now surrounding Moab until much later. Even as recently as two million years ago, the Colorado River flowed into and across the high terrain of this region, only to disappear into the arid wastes to the southwest. The main river, with its waters primarily from the Rockies, had cut a fairly deep, narrow gorge, but the present canyon system had not yet formed. There was little drainage from the young, low-profile La Sal Mountains, and the land surrounding the La Sals was too arid to provide much local drainage into the rivergorge.

This changed, however, about two million years ago, when global climate variations began that produced cyclic glaciation of the entire North American continent. The Rocky and La Sal mountains became sources of greatly increased runoff. The altered climate brought on repeated periods of greater precipitation, plus warming periods between glacial episodes that

melted these enormous ice masses. Such cyclic changes produced greatly increased run-off and flooding during rainy periods, and vastly heavier flow in the rivers during glacial melting cycles. This periodic but heavy run-off created the present canyon system. It cut the region's river gorges still deeper, sculpted its myriad tributary drainages, and removed from the general region a total of about 5,000 feet of ancient sediments and rock, leaving it as it is today.

It was these cyclic periods of heavy erosion that created the present Book Cliffs, the Roan Cliffs and the still higher Tavaputs Plateau. The region is still coming out of the ninth glacial cycle, and there may be more to come.

#### THE BOOK CLIFFS FORM

During the period when Lake Uinta was finally completely filled and about two million years ago, the region south of the Uinta Mountains was transformed from a high plain sloping gently northward, with no trace of the present Colorado River system, into what it is today. This drastic transformation took place in stages and was strongly influenced by the lithified sediments of that vast lake. The enormously deep Green River and Uinta deposits had by then turned to rock, with the lake deposits much harder and more resistant to erosion than the surrounding river and stream deposits.

Similarly, the shoreline deposits of the invading and retreating Mancos Shale sea were harder than those of the sea-bottom itself. All of these differences became part of the formation of the Book and Roan cliffs and surmounting Tavaputs Plateau. It is significant that the top of this lofty highland is rock of the Green River Formation, rock that was once sediments in the bottom of Lake Uinta.

As erosion progressed, the softer rock strata eroded more easily than the harder ones, and it is this factor that shaped the region's landscape and created the Book Cliffs and the steep and rugged slopes above them. The lithified ancient lake deposits were hardest, so resisted erosion as the lands to their south melted away. Once the Colorado River developed, the terrain that drained into it eroded rapidly, while Lake Uinta deposits continued to resist erosion. Thus, the land to the south of the ancient lake soon became lower, with the edges of the lake's harder deposits becoming a ridge separating the local drainage basin of the Colorado River from the Uinta Basin.

As erosion progressed over the millennia, through one glacial period after another, the resistant ridge that was once the shoreline of Lake Uinta became higher and higher when viewed from the south, but was only a vast upward slope as seen from the north, with that slope representing the general contours of the original lake bottom, after it had been deepened by basin-sinking over the ages.

As the land to the south of that ancient lake eroded away more rapidly, the cliffs grew higher and higher as viewed from the south. The harder, older strata revealed by this process also resisted and became prominent but lesser cliffs within the ridgeline. These subridges were given names by early settlers. The lower cliffs of Mesaverde Sandstone were called the Book Cliffs, from their supposed resemblance to a row of books on a shelf. Still higher differentiated cliffs were named the Roan Cliffs after their distinctive color. The highest, relatively flat reaches of the massive ridgeline's summit were called Tavaputs Plateau East, to the east of the Green River gorge, and Tavaputs Plateau West to the west of the river.



## NOT MOUNTAINS

Thus, it can be concluded that the Book Cliffs complex is not a range of mountains, but the present expression of the shoreline of an ancient lake and of the older deposits below the hard rock that those lake sediments became over the following millions of years. Travelers who view the Book Cliffs from the south are literally viewing that lake's basement rock, the ancient strata that were laid down before the lake existed. The gray, gullied slopes at the base of the cliffline are ancient sea-bottom sediments. The sandstone cliffs above this are the shoreline Mesaverde deposits left behind when that sea eventually retreated, and here and there the still older ridges and layers of light brown Dakota Sandstone are what is left of the seashore sands that the invading sea buried beneath the gray, anoxic silts of Mancos Shale.

## METEORITE IMPACTS?

Are the six meteorite or comet impacts mentioned in this article actual fact, or just some far-out astronomer's fantasy? Yes, they are fact. The major impact that caused the extinction of the dinosaurs, and many other forms of life at the same time, has recently been brought to the attention of the general public. That impact has by now been so thoroughly proven that only a few die-hard, ultra-conservative scientists still doubt it.

The other impacts are also well documented and supported by considerable scientific evidence that can only be explained by the impact of several smaller meteorites or comets. Two struck not long before the big one about 65 million years ago, and each did its part in extinguishing the dinosaurs and most of their relatives. Of the immense variety of reptile species that had long dominated the planet, only lizards,

turtles, crocodiles and snakes survived. Three others hit 44 million years ago and caused limited extinctions of certain marine life forms -- and brought to this region the climate changes that produced the Uinta Formation deposits.

These two separate sequences of impacts are still not well known to conventional geologists or paleontologists, who do not always keep up with the state of research in the associated fields of astrogeology and astrophysics. The paper that describes these five smaller impacts was first published in the respected scientific journal, *Nature*, in 1987, but its implications have yet to be studied widely, and this author is the first to relate these impacts and their after-effects to the geological strata of canyon country.

Readers interested in knowing more about the various major and minor extinctions of life in this region should refer to the book, *Canyon Country Prehistoric Life*, by the author of this article. This description of the geology of the Book Cliffs is based on the extensive literature and field research that went into the writing of that book.

The text of this article is copyrighted by its author, F. A. Barnes, and its illustration is copyrighted by Canyon Country Publications. Both appear here with permission. The sketch showing the erosional profiles typical of the Book Cliffs strata is a part of a complete column of regional strata that appears on the wall chart, *Geology of Canyon Country*, by the same author.

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## Books of Interest

by John Weisheit

*The Green River Formation in Piceance Creek in Eastern Uinta Basins*. 1995. Edited by Walter R. Averett. Grand Junction Geological Society. c/o William Chenoweth, 707 Brassie Drive, Grand Junction, CO, 81506.

Besides a detailed description of the topography and Tertiary geology at the Piceance Basin of the Colorado Plateau, this book also discusses the massive oil shale and coal deposits of this area and the history of their extraction and development. A very interesting history is also provided about the of the Gilsonite (asphalt) industry. William Chenoweth, featured in this volume of the *Canyon Legacy*, wrote a fascinating article about the Uintah Railway. This railway, completed in 1904, was used to transport Gilsonite from the extraction sites to the main railway line near Grand Junction; people and freight also used this railway. The locomotives were of an articulating-type and designed to negotiate sharp turns up to 64 degrees and grades up to 7.5%. A look into the fascinating flora and fauna of the Tertiary Period is also featured.

*A History of Grand County* by Richard A. Firmage.

*A History of Emery County* by Edward A. Geary.

*A History of San Juan County* by Robert S. McPherson.

Utah Centennial County History Series. 1996. Utah State Historical Society, 300 Rio Grande, Salt Lake City, UT, 84101-1182.

If you live or enjoy southeastern Utah, these three books must be in your library. I include Emery County in this list because in the days precluding statehood Grand County was annexed from Emery County and includes discussion of the Book Cliffs. San

Juan County is one of the largest counties in the United States. These books discuss geology, prehistory, history, economics and politics. Typical Western Americana. Yahoo! All three authors make for a good read but I especially enjoyed Edward A. Geary. Robert McPherson included more photos than the others and so his book is more visually satisfying. Grand County is a case study of the Western melting pot. These books have useful Endnotes for researches and a good Index. Reading these books makes me proud even though I have only lived in southeastern Utah for ten years. I can only imagine how those who were born into this landscape must feel!

*Utes: The Mountain People* by Jan Pettit. Revised Edition, 1996. Johnson Printing Company, 1880 South 57th Court, Boulder, CO, 80301.

This book has an Introduction by "Red Ute" Eddie Box, Sr. of the Southern Ute Reservation. There is a great Bibliography, Index, and a glossary-like section for Ute leaders and place names. It abounds with rare and historic photos. The book is high quality and very comprehensive. I bought my copy at Canyonlands Natural History Association and so it was accepted by their tenacious review committee. Jan Pettit is the founder and executive director of the Ute Pass Museum in Colorado.

*Glen Canyon Revisited* by Phil R. Geib. 1996. University Of Utah Press, Anthropological Papers, Number 119, Salt Lake City, UT, 84112.

I was visiting the Canyonlands National Park staff one day and Nancy Coulam, resident archaeologist, showed me this book with a big grin on her face. Must be good, I thought.

So I am on the U of U campus on a research tour-of-duty, mention this book to my friend Bob Stevens, and he presents it to me as a gift. "This book was meant to be", I said to Bob. I have not been disappointed. I am, however, very disappointed with the mindset of the 1950s for allowing water burial (Lake Powell) of Glen Canyon and disregarding the scenic and cultural value of the place "no one knew". Glen Canyon rightly deserved to be the national monument it was proposed to be by the Roosevelt administration in the 1930s (Escalante National Monument). Sorry for this diatribe, but Lake Powell is one of the Top Ten ecological tragedies of the 20th Century and it makes me very sad. This book makes me feel a little better though. Phil Geib largely discusses sites in the vicinity of Lake Powell that are not inundated by water. Get this book if your a serious student of Southwestern prehistory.

*Charting the Colorado Plateau: An Economic and Demographic Exploration*. Prepared by Walter E. Hecox with Bradley L. Ack. 1996. Grand Canyon Trust. Route 4, Box 718; Flagstaff, AZ, 86001.

This report culminates a year-long effort by Grand Canyon Trust to examine and measure the economic and demographic transformation affecting the Colorado Plateau. This report is designed to improve our understanding of the human and cultural dimensions of the region's changing economy, as well as the economy's changing relationship to the natural environment. The report comes with excellent graphics; maps, tables, charts, and graphs. I personally think it would be a great classroom text for students in Social Science curriculums. It would also be very useful to professionals who speak at public or private events.



### • Upcoming volumes

Volume #30, edited by Jim Page, will discuss **aviation over the Colorado Plateau**. If you have a contribution to make concerning this theme, please call Jim at (801) 259-6472.

Volume #31, edited by Kris Johnson, will discuss the **founding and founders of Moab**. If you have a contribution to make concerning this theme, please call Kris at (801) 259-7247.

### • Upcoming events at the Dan O'Laurie Canyon Country Museum

The annual **Yard Sale** conducted by the Friends of the Museum will be held July 19. Please consider donating some of your unused household items to this fund raising event.

The annual **Ice Cream Social** will be held on Pioneer Day, July 24.

### • Speaker series

The speaker series, held at the Moab Information Center on Main and Center Streets, will continue through the summer months of 1997. Watch for announcements in the *Times-Independent* and the museum's newsletter.

### • On display

Old furniture of Grand County. Includes Moab's first piano, a 200-year old rocker, 100-year old cradle, and a Singer foot-treadle sewing machine.

### • Temporary exhibit for the month of June

Jean Akens, long-standing past editor of the *Canyon Legacy*, currently has on display her private collection of Anasazi ceramics. This pottery came from the ruin found on the land owned by Ralph and Claudia Haynie. Ms. Akens describes how the pottery was made, highlights the styles, and correlates them to specific time periods of the Anasazi Culture in the Four Corners region.

Look for Ms. Akens' new novel *Kotoya: Witch Woman of Wuuyoyq-a Kiihu* and published by Commonwealth Publications. The novel is prehistoric fiction set in an Anasazi village 800 years before present (Pueblo III).

### • Temporary exhibit for the month of July

Photographs of the Civil Conservation Corps (CCC) at Dalton Wells, Grand County.

### • Other announcements

We regret to inform the membership of the passing of Sue Graves, who was a Life Member.

The Board typically meets every third Wednesday of each month.

Friends of the Museum meet every other month on the first Monday.

### • Museum hours

The Dan O'Laurie Canyon Country Museum will be open from 1:00 to 8:00, Monday through Saturday (closed Sunday), till October 31, 1997. Winter hours will be announced.

### • Phone (801) 259-7985

# Canyon Legacy

The *Canyon Legacy* is available by subscription for \$25.00 per calendar year and includes full membership to the Dan O'Laurie Canyon Country Museum. Please see Museum Membership Benefits on the inside cover.

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