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Interpretive evaluation for the northeast corner, Yellowstone National Park

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AN INTERPRETIVE EVALUATION
FOR THE
NORTHEAST CORNER

YELLOWSTONE NATIONAL PARK

by

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INTRODUCTION

Yellowstone's interpretive program began in 1887 with soldiers giving "cone talks" at Old Faithful. As the interpretive program developed emphasis was naturally placed on thermal features and wildlife. Over the years the park's interpretive program has broadened its base, undergone scientific scrutiny, and incorporated a continual stream of sophisticated audio-visual equipment and professionally prepared museum displays. Visitor centers, amphi-theaters, nature trails and many other interpretive facilities have been developed at the prime areas of interest such as the thermal basins, the Grand Canyon, and Yellowstone Lake.

Unfortunately the northeast corner of this magnificent park with the broad expanse of Lamar Valley, the stark beauty of the Absaroka Mountains and the serene calmness of Soda Butte Creek Valley, has received little attention from interpretive planners and visiting tourists.

This paper will review the geology, flora and fauna, history, climate and use of Yellowstone's northeast corner. Those items with interpretive potential will be identified and interpretive ideas for the northeast corner of the park developed.

CHAPTER I

LOCATION AND GENERAL DESCRIPTION

The greater portion of Yellowstone National Park lies in extreme northwestern Wyoming, with narrow strips extending into Idaho on the west and Montana on the west and north. The park area lies approximately between longitudes 110° and 111° west and latitudes 44° and 45° north. Included within its boundaries are 2,213,206.55 acres or 3,471.51 square miles. Essentially a high volcanic plateau dissected by streams and rimmed with mountains, the park has average elevations of 7,000 to 8,000 feet, with extremes ranging from 5,314 feet (North Entrance) to 11,360 feet (Eagle Peak) (Murphy, 1957).

As a member of F. V. Hayden's 1883 Yellowstone Expedition, W. H. Holmes has written a remarkable description of the study area.

> "The valley of the East Fork of the Yellowstone (Lamar) is one of the most enchanting in the Park. For nearly 20 miles above Junction Valley it is broad and smooth, abounding in meadows and terraced grass-lands. On the north rises the massive range of the Yellowstone Mountains (Snowy Range), and on the south the peculiarly interesting walls of Amethyst Mountain. Twenty miles above the bridge the valley narrows up and is pretty densely timbered, but the upland region about the headwaters abounds in delightful parks. The beds of the various tributary streams are generally in rather precipitous valleys from 500 - 1,000 feet in depth.
>
> "The two main tributaries from the north, Slough Creek and Soda Butte Creek, emerge from deep-canoned valleys, which they have cut in the massive Volcanic formations of the Yellowstone Range. On the south side a dozen or more small streams of clear water descent from Amethyst Ridge" (Holmes, 1883).

This valley, the Lamar and adjacent area, described by Holmes, is the most prominent feature in Yellowstone's northeastern corner. Lamar Valley is the heart of the study area which begins at the Tower Fall-Cooke City Highway junction. For 29 miles the present park visitor drives slowly through a wide variety of land forms, vegetation patterns and the spectacular Absaroka Mountains. Just beyond the northeast entrance station the Park boundary designates the end of the study area but not the end of the magnificent wild scenery. (see Figure 1)

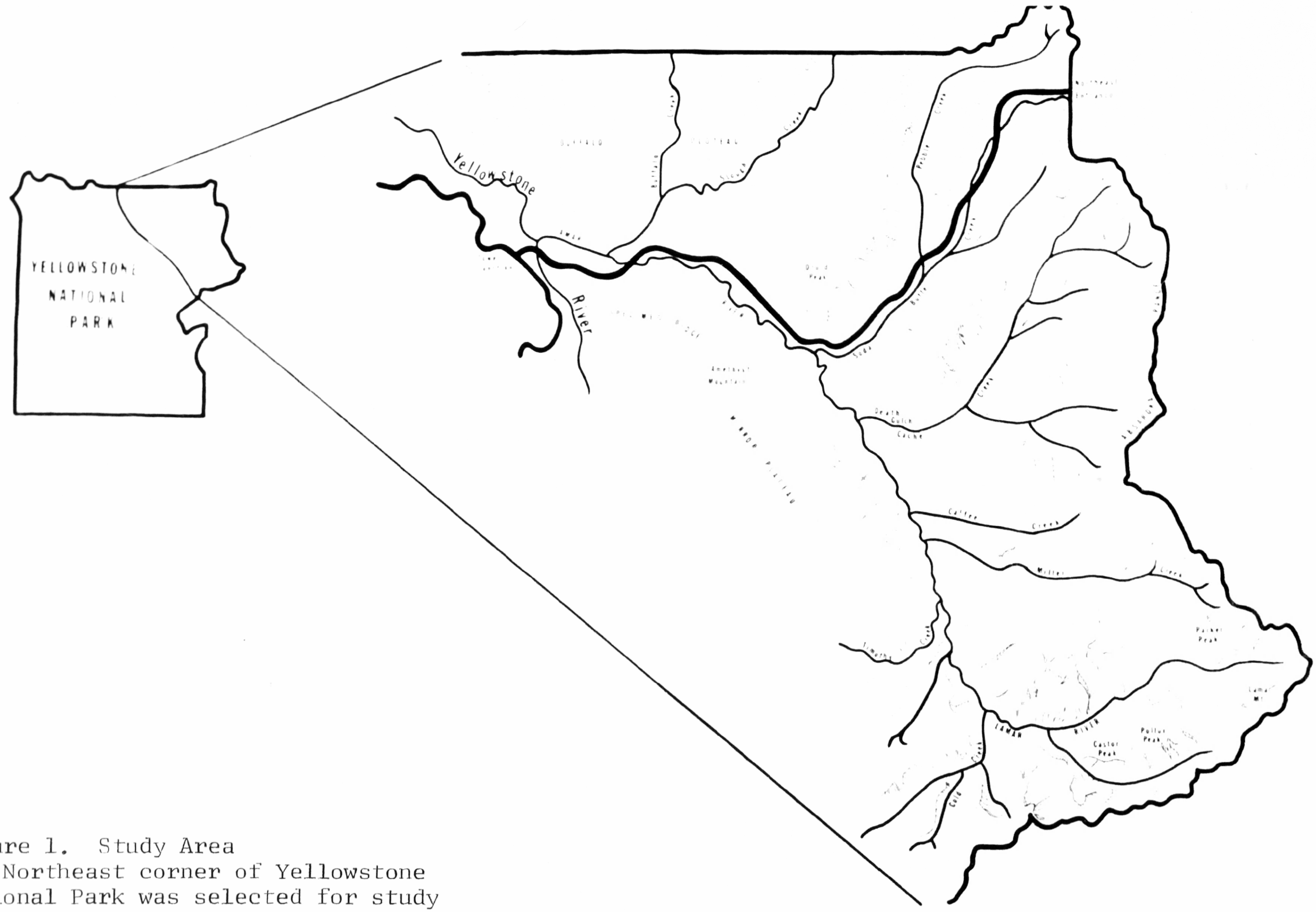

Figure 1. Study Area
The Northeast corner of Yellowstone National Park was selected for study in this paper.

CHAPTER II

GEOLOGIC ORIGIN

Tectonics

The entire Rocky Mountain chain owes its existence, structurally and stratigraphically, to the presence of ocean intrusions which occurred approximately 400 million years ago and again about 60 million years ago. This sea basin served as the receptacle for millions of tons of sediment deposited from surrounding mountain ranges. As the ocean retreated, sedimentation continued, leaving fresh water deposits rather than marine deposits (Hind, 1943).

The sedimentary deposits underwent extensive faulting and some folding during the late Cretaceous and Tertiary Periods thus elevating the entire Rocky Mountain chain (Hamilton, 1959; Brown, 1961). This extensive tectonic period is known as the Laramide. During this time the Yellowstone area proper was lifted some 2,000 to 4,000 feet (Dorf, 1964). Surrounding the Park area the Wind River, Teton, Beartooth, Gallatin and Snowy Ranges developed. Evidence indicates that this Laramide period is still under way (Fischer, 1960).

In the Lamar area sedimentary strata are visible on the north side of the valley, near the mouth of Soda Butte Creek where there are between 300 and 400 feet of Carboniferous strata exposed along the base of the mountain slope. On the south side occasional ledges of limestone appear above the detrital deposits

(Holmes, 1883).

The Soda Butte itself is an ancient hot spring cone bearing witness to unseen limestone strata below. The travertine cone has been undercut by meandering Soda Butte Creek to the extent that large sections of the cone's eastern side have broken off. Although small trickles of water still occur, no major activity on Soda Butte is known.

Volcanism

As the Laramide tectonic movements continued, faults provided avenues to the surface for numerous magma chambers. Thus, in early Tertiary (probably Eocene Period) an era of volcanism was introduced (Prostka, 1968).

Two periods of early volcanic activity both of Eocene age are represented. Lovering (1929) refers to Hague (1896) who identified the early acidic breccias which he felt were associated with numerous volcanic centers yet to be located. These vents apparently were very violently active, depositing at least 2,000 feet of detritus in some locations over several thousand years of sporadic eruptions. (See Appendix A).

A second period of activity, probably several million years later during late Eocene, saw the deposition of the basic breccia series. An abundant fossil flora exists in the lower portion of the basic breccia (See Plate I). Discovered and studied by Holmes (1878), the fossilized materials have been subjected to recent, critical examination by Dorf (1964).

Dorf suggests a much different climate for the Lamar region when volcanism first started. During the Eocene,

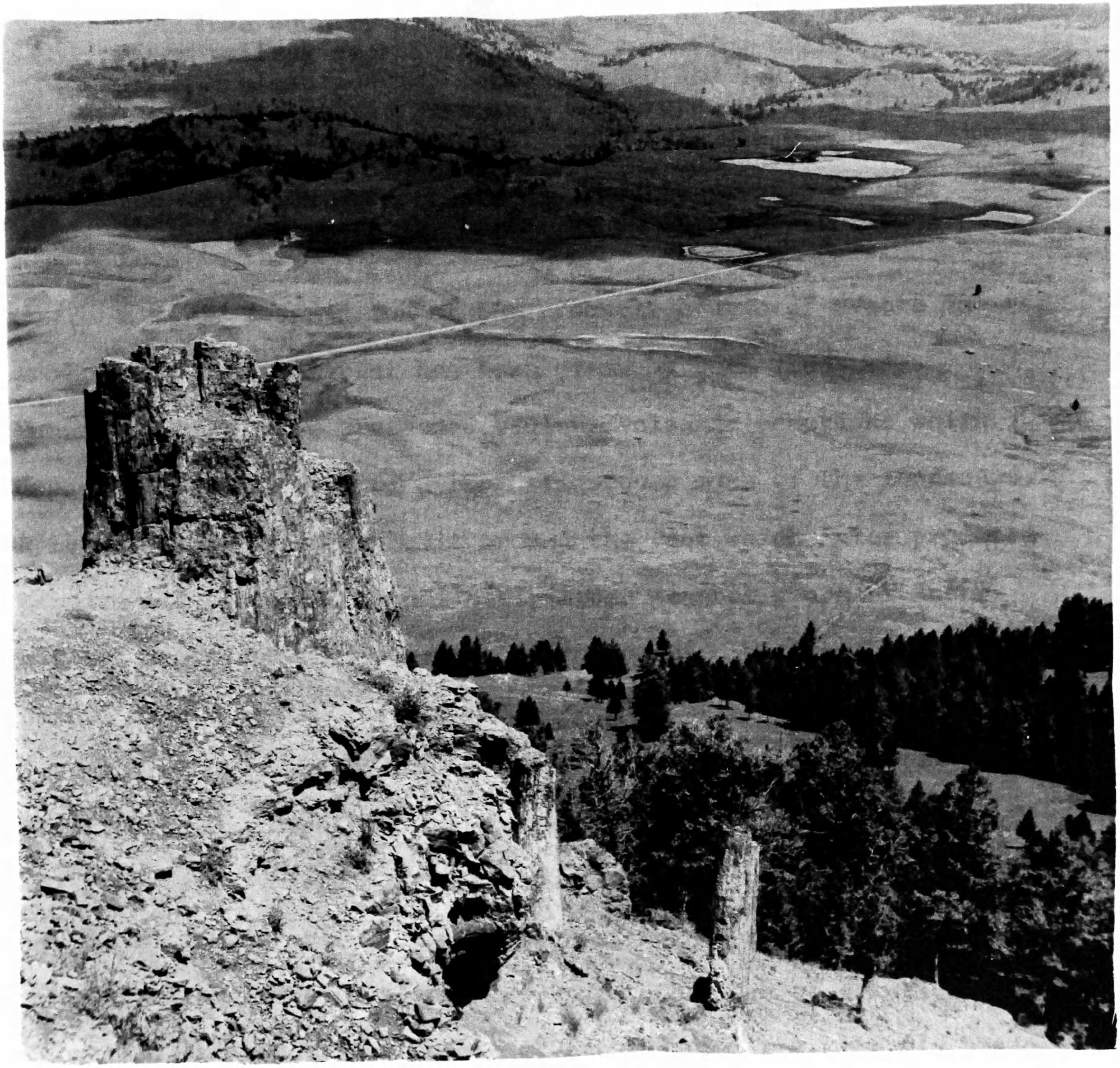

PLATE I

Evidence of Yellowstone's multilayered fossil forests can easily be seen as erosion uncovers these mammoth redwood trees on Specimen Ridge.

> "the country side was a series of broad, flat river valleys separated by gently rolling hills. The average elevation was between 2,000 and 4,000 feet and the climate ranged from warm temperate in the hills to subtropical in the valleys. Rain fall was probably between 50 - 60 inches a year. The composition of the dense lowland forests was roughly reverse of what it is today, with the hardwoods dominant and the conifers in the minority".

A vivid description of the probable course of events in producing fossil material has been given by Dorf (Undated). Numerous earthquakes preceeded violent volcanic eruptions which deposited several feet of pyroclastics over much of the landscape. A large debris cone was built around the vent which later produced massive mud flows and landslides. After several years of intermittent eruptions the volcano became dormant. Vegetation reestablished itself on the surface while petrification took place on the larger, recently buried trees. Perhaps 400 or 500 years later the process was repeated. Dorf (1964) thus identified 27 successive layers of volcanic debris deposited on a cyclic basis as portrayed in his story. Each layer has buried within it the fossilized evidence of plants growing at the time of eruption.

By the end of the Eocene at least 5,000 feet of early basic breccia had slowly accumulated in the Yellowstone Park area and was later capped by the early basalt flows (Lovering, 1929). Later periods of volcanism produced additional beccia and some basalt and rhyolite lava flows. More recently andesite lava flows occurred near Lamar Valley although few of these are in evidence in the Valley (Lovering, 1929). Lamar Valley seems to have been carved into the landscape after much of the extensive basalt and rhyolite flows were extruded.

Two authors, Brown (1961) and Macomber (1956), have published accounts linking the formation of Lamar Valley to extensive faulting. Prostka (1968), who is still working in the vicinity, suggests a much different history for the Lamar drainage. By locating specific basalt and rhyolite flows near the Mirror Plateau and their counter parts near the Buffalo Plateau, Prostka has been able to show an unfaulted profile of the Lamar region. In the upper Lamar, Prostka has been unable to find any evidence of faulting in the strata which parallel the river.

Brown and Macomber have referred to extensive faults along Soda Butte Creek being the causative force in shaping the present day appearance of the drainage. Currently, in contrast, Prostka's work shows well aligned strata on both sides of the main canyon. The spectacular cliffs and other exposures owe their existence to land slides following the Pinedale glaciation (See following topic).

Prostka maintains that existing topography in both Lamar Valley and Soda Butte Creek drainage is the result of extensive erosion by both water and ice (See Plate II). No faults have been verified.

PLATE II

Upper Lamar Valley in particular shows the effects of recent glaciations. Water impounded behind ice flows formed lakes whose flat bottoms are now being slowly etched by meandering Lamar River and Soda Butte Creek. Glacial ice originating nearby eventually ended in theYellowstone Glacier just a few miles south of present day Livingston, Montana.

Glaciation

Most of Yellowstone Park has been covered by glacial ice in the last few thousand years. Geologists agree to evidence of the following three glacial periods on the Yellowstone Plateau: the Buffalo Period, 50,000 - 60,000 years ago, the Bull Lake Period, about 27,000 years ago; and the Pinedale Period, approximately 8,500 to 10,000 years ago. Most of the current glacial features resulted from the last period, the Pinedale (Alden, 1928).

In the Lamar area, ice formation began at the Lamar River headwaters and perhaps some ice pushed over the Mirror Plateau from the Yellowstone Lake Basin to form a large glacier. As the ice pushed down the Lamar drainage, the glacier was enlarged by smaller ice flows from Slough Creek and Hellroaring Valleys. This composite glacier moved down the Yellowstone River to the Gardiner, Montana vicinity. Here additional ice coming from Swan Lake Flat over Terrace Mountain joined the main glacier to push it through Paradise Valley (Skinner, 1929). The Yellowstone Glacier, as it has been called, extended 36 miles north of the Park. The glacier's width varied from three to six miles and may have been 3,000 feet thick (Weed, 1893).

Fenneman (1931) maintains that interglacial epochs were long and the larger valleys were greatly deepened between successive invasions of ice. Since the Pinedale Period, the Lamar River has deepened its gorge in Lamar Canyon through solid granite to produce an imposing cut 500 feet in depth (Macomber, 1956). Macomber further adds

"The hummocky plain, between Junction Butte and Lamar Canyon bears evidence of the river's history since the Lamar Glacier retreated upstream from the granite spur. The highest buttes are crowned by till and large erratics left by the melting glacier.

"Below these buttes the greater part of the hummocky plain in underlain by one to three feet of fine brown clay, silt, and scattered gravel. This quiet water alluvium was deposited after lateral erosion of the plain by the river. The plain is about 130 feet above the river bed." (See Plate III).

The benches of fine texture soil in Lamar Valley proper provide evidence of past lakes in the area. Macomber (1956) suggests the river was ponded briefly at least three times during ice retreat at the termination of glacial periods.

Above the mouth of Soda Butte Creek, the Lamar Valley is predominately the work of the river. Narrow and steep walled, its floor is covered with a 50 foot basalt flow through which the Lamar River has eroded a narrow channel (Macomber, 1956).

Hydrothermal Features

Some hydrothermal features are found in the Lamar Valley area, although they are neither extensive nor spectacular. The prominent example is Soda Butte.

Numerous small hydrothermal features are found in the tributaries of the upper Lamar. One area which should be discussed is the small drainage called Death Gulch. Weed (1892) visited the site and mentioned finding skeletons and fur of numerous bears. He also mentioned the peculiar odor which lead to much speculation as to what gas was killing the animals. More recently some gas

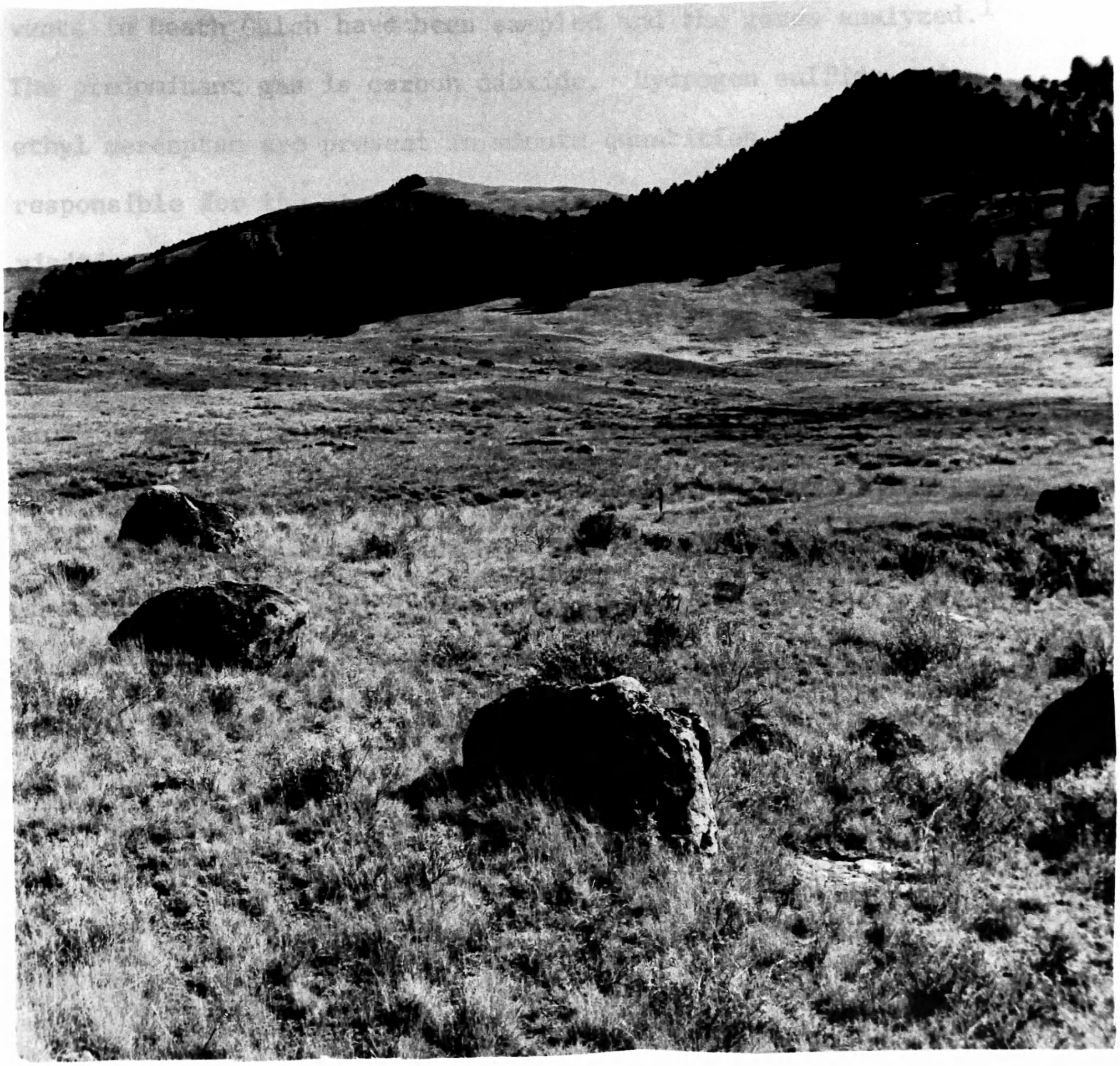

PLATE III. Glacial Erratics

These scattered boulders appear now just as they were dropped by melting ice possibly 8,000 - 10,000 years ago.

vents in Death Gulch have been sampled and the gases analyzed.[1] The predominant gas is carbon dioxide. Hydrogen sulfide and ethyl mercaptan are present in minute quantities and are responsible for the peculiar odor often mentioned by those visiting the site.

Apparently death is due to accumulation of oxygen displacing carbon dioxide, not to the strange smelling mercaptans or hydrogen sulfide as earlier speculated. Insufficient amounts of oxygen soon cause death to those animals unable to move out of the area of carbon dioxide concentration. Smaller animals often quickly succumb serving as bait leading larger predators to their death. Accumulations of dead insects around vents and fissures, a wide variety of birds and numerous small mammals have been found in Death Gulch.

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[1]Three gas samples collected by Robert O. Fournier, U. S. Geological Survey, September 19, 1963. Analyzed by National Bureau of Standards.

CHAPTER III

CLIMATE

E. H. Fletcher (1927), the first and only official Park Climatologist, has written that the chief characteristics of the Yellowstone climate are the short, cool summers, the long, rigorous winters with a tendency to linger late in the spring, and the usually pleasant, open falls. The severity of the winters is not due so much to prolonged periods of extreme low temperatures, but rather to the persistence of comparatively low temperatures and much cloudy, unsettled weather with frequently light snows. As a consequence of such unsettled weather, frost or freezing weather temperatures occur frequently at the higher levels, even in the summer months.

Fletcher (1927) points out that the weather at this place in winter, with its disagreeable features of cold, snow, wind and storm is not without its economic importance; to the contrary, the country thrives because of it. Winds drift and pile snow into deep depressions and canyons retarding its melting until late in the season. These large bodies of compact snow in sheltered places act as natural reserviors to conserve the water supply, and to diminish destructive floods, which Fletcher suspects would surely occur with the rapid melting of the snow blanket.

Fletcher's data show that prevailing winds over the park are southerly and southwesterly for every month of the year. More recent Park weather records uphold the generalizations made by Fletcher (1927).

Weather data has been kept at Lamar Ranger Station, formerly called the Buffalo Ranch, since 1931. For the 30 year period ending in 1960 the average annual precipitation was 13.43 inches. Snowfall at Lamar is abundant, averaging 101.2 inches annually from 1951 to 1960. Precipitation distribution is fairly even for nine months. June, July, and August are dry months.

Temperature records for Lamar show an annual mean of 35.6°F. Temperature extremes range from the upper nineties (94 - 98) to well below zero (-51 - -58).[2]

Scant rainfall and severe temperature are key ecological factors for the Lamar area. In fact, these factors control plant growth and distribution which in turn regulate animal distribution and population.

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[2]Data from Official Weather Bureau records. Copies on file in the Yellowstone Research Library.

CHAPTER IV

FLORA AND FAUNA

Life Zones

The story of plant life in Yellowstone and the animals associated with specific plant communities has been and still is a very complicated and controversial subject. Since the early 1900's the northern elk herd in particular has been a focal point of interest both within and outside the Park. The lower and middle elevations in the study area are key winter and spring ranges for both elk and bison. The vegetation on these ranges is critical to certain segments of the ungulate population. Therefore, plant communities will be discussed first.

Cary (1917) modified the Life Zones suggested by Merriam to fit the variety of situations existing in Wyoming. A map published by Cary shows three life zones in Yellowstone's northeast corner: the Transition Zone, Canadian Zone, and the Hudsonian Zone.

The Transition Zone, characterized by sagebrush, yellow pine[3] and grasses, occupies narrow areas in the Park for a short distance along the Yellowstone River, penetrating the valleys of the Gardiner and Lamar Rivers and other tributaries.

The Canadian Zone includes most of the extensive, undulating,

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[3]W. H. Hendrickson, "Plant Ecology Studies in Yellowstone National Park" Annual Report, 1970. Office Natural Science Studies, typewritten. Reports that ponderosa pine is not found within the Park, however: other floristic elements of Cary's Transition Zone are found within or near the area so designated on his map.

forested plateau of Yellowstone Park. The main forest composition of Yellowstone is lodgepole pine with aspen in the lower half of the zone and a heavy stand of Engelmann Spruce, or moreoften a mixed forest of spruce and fir at higher elevations.

Cary's discussion of the Hudsonian Zone is very general and although sections of Yellowstone are not specifically mentioned, his map shows the zone existing in the higher Absaroka's.

Accompanying Cary's description of each zone is a comprehensive list of mammals, breeding birds and plants (grasses, forbs, shrubs, and trees).

Conard (1929) also tried to fit much of Yellowstone into the life zones proposed by Merriam. Because of difficulties in such an application, Conard proposed a new system of biotic communities for Yellowstone. He suggested a "Sonoran Zone" to cover below 6,000 feet in elevation and an "Artic-alpine Zone" for areas above 9,000 feet. Occupying the area between 6,000 and 9,000 feet Conard discusses "Normal Communities" divided into three parts: Rocky Mountain Montane forest, Rocky Mountain forest, and Steppe.

Conard's system discusses flora and fauna simultaneously keeping in mind the fact that faunal movements often occur which cannot be accounted for under traditional life zone concepts. He concludes, "It seems fairly clear that a division of the biota of Yellowstone National Park according to the life zones of Merriam is quite impossible, without seriously distorting the "facts" (Conard, 1929).

Flora

Perhaps the most logical approach to understanding the vegetation patterns in the Lamar Valley and the Park in general is to look at vegetation as a dynamic, fluctuating unit. By referring to the Pinedale glaciation and picking up the story as the ice retreated we are in a much better position to understand the present situation with regard to plant succession in the Lamar.

Hendrickson (1970) feels that as the climate warmed, melting the Pinedale ice, vegetation moved onto the Yellowstone Plateau from the Snake River Plain. The warming trend continued until a period of very warm, dry climate gripped the region. This dry period, the "Altithermal" (Baker, 1969), was reached some 4,000 - 6,000 years ago. Altithermal vegetation throughout Yellowstone was principally dry land grass and shrubs and probably occupied all Park slopes up to 8,600 feet. A climatic reversal occurred and is still in progress which has permitted coniferous pioneers, lodgepole pine, and Douglas-Fir, to reinvade most of the Yellowstone Plateau from surviving seed sources in the higher elevations.

The current vegetation distribution in the Lamar drainage is a combination of remnant grassland-brush communities on the southern exposures and river bottoms with conifers on hilltops and protected slopes. As a consequence of 100 years of fire control, several locations within the study area, Junction Butte in particular, show conifers moving into sagebrush areas.

Hendrickson (1970) has adapted Kuchler's (1964) vegetation map to Yellowstone with reasonable success. In the Lamar vicinity, three types, as defined by Kuchler, have been identified (See Table I).

TABLE 1

SELECTED VEGETATION TYPES DEFINED BY KUCHLER OCCURRING IN LAMAR VALLEY AND VICINITY

Type	Name	Kuchler[1]	As Identified in Lamar[2]
55	Sage Brush Steppe	Dense to open grassland with dense to open shrub synusia. Dominants Agropyron spicatum Artemisia tridentata Other Festuca idahoensis	Closed ground cover. Dominants Agropyron spicatum Artemisia tridentata Other Festuca idahoensis (key)
50	Fescue-wheatgrass	Dense, low to medium tall grassland. Dominants Agropyron spicatum Festuca idahoensis	More mesic sloughs with fine soil. Sage is absent. Dominants Agropyron spicatum Festuca idahoensis
51 & 63	Foothills Prairie	Open to fairly dense grassland of usually short grasses. Dominants Agropyron spicatum Festuca idahoensis	Drier knobs, often wind blown and exposed. Lacking snow in winter. Dry out in August. Identified vegetationally because sagebrush is wanting. Dominants Agropyron spicatum Festuca idahoensis

1. A. W. Kuchler, "Potential Natural Vegetation of the Conterminous United States American Geographical Society Serial Pub #36, 1964.
2. W. H. Hendrickson, Personal Communication.

Forested areas in the Lamar conform much less clearly to Kuchler's types. In fact, Hendrickson (1970) suggests that with the aid of fires, occurring approximately every 100 years, lodgepole pine has become and will continue to be the climax type for the Yellowstone Plateau and surrounding area if natural, e.g., lightning, caused wild fires will be allowed to burn. Kuchler (1964) maps Douglas-fir (Pseudotsuga) as the potential climax type for the Park with higher areas going to a Mixed Conifer Forest (Abies, Pinus, and Pseudotsuga). Hendrickson's thesis of climax lodgepole pine is based on the palynogical record shown by Baker (1970), and the fire history of the Park as determined from existing records and personal observations. In the study area, good evidence of the dominance of lodgepole pine is shown. The tree is invading the grassland-brush types and is squeezing aspen and Douglas-fir into very narrow, restricted bands.

Fauna

Bison

Early Park explorers noticed differences between the bison in the mountains and those encountered on the open plains. The Yellowstone animals have been identified as the sub-species *Bison bison athabascae*, the Mountain Bison (Meagher, 1970).

Meagher (1970) has provided some indication of the extent to which bison once roamed the Park, but adds,

> The present wintering distribution within the park approximates that of historic population . . . . The present summering population approximates the historic distribution only in the Upper Lamar, Mirror Plateau and Hayden Valley areas . . . . Present numbers are

half or less that those of probable historic numbers. (Meagher, 1970).

The growth of the Yellowstone bison herd from near extinction to the current population size is reported by Skinner et al (1942) and Mattison (1960). Mattison's summary mentions the extreme poaching problem of the 1880's and '90's which culminated in 1884 with Congressional legislation making the killing of a bison in Yellowstone Park punishable by a fine of $1,000 or imprisonment in the penitentiary.

With the support of a number of conservation agencies Park administrators won a Congressional appropriation of $15,000 in 1902 to purchase bison for Yellowstone. An experienced breeder of bison, C. J. "Buffalo" Jones, was appointed as game warden and buffalo keeper. Under Jones' supervision, 21 bison were purchased for the new herd. Initially the animals were maintained at Mammoth.

The new animals thrived and by 1905 it became necessary to find a new pasture to care for the increase. The place selected for the new pasture was at the mouth of Rose Creek, where it flows into the Lamar River. In 1906, an enclosure was made of one square mile of pasture land and a comfortable log cabin built there. This pasture was subsequently enlarged and irrigated. Most of the bison were removed from the Mammoth pasture except for a small show herd continued for the benefit of Park visitors.

The bison herds, particularly at the Lamar Buffalo Ranch, continued to increase. The wild herd had so mingled with the tame herd that it had lost its identity. Buffalo raising at the Lamar Ranch had become a large-scale operation. (See Plates IV, V).

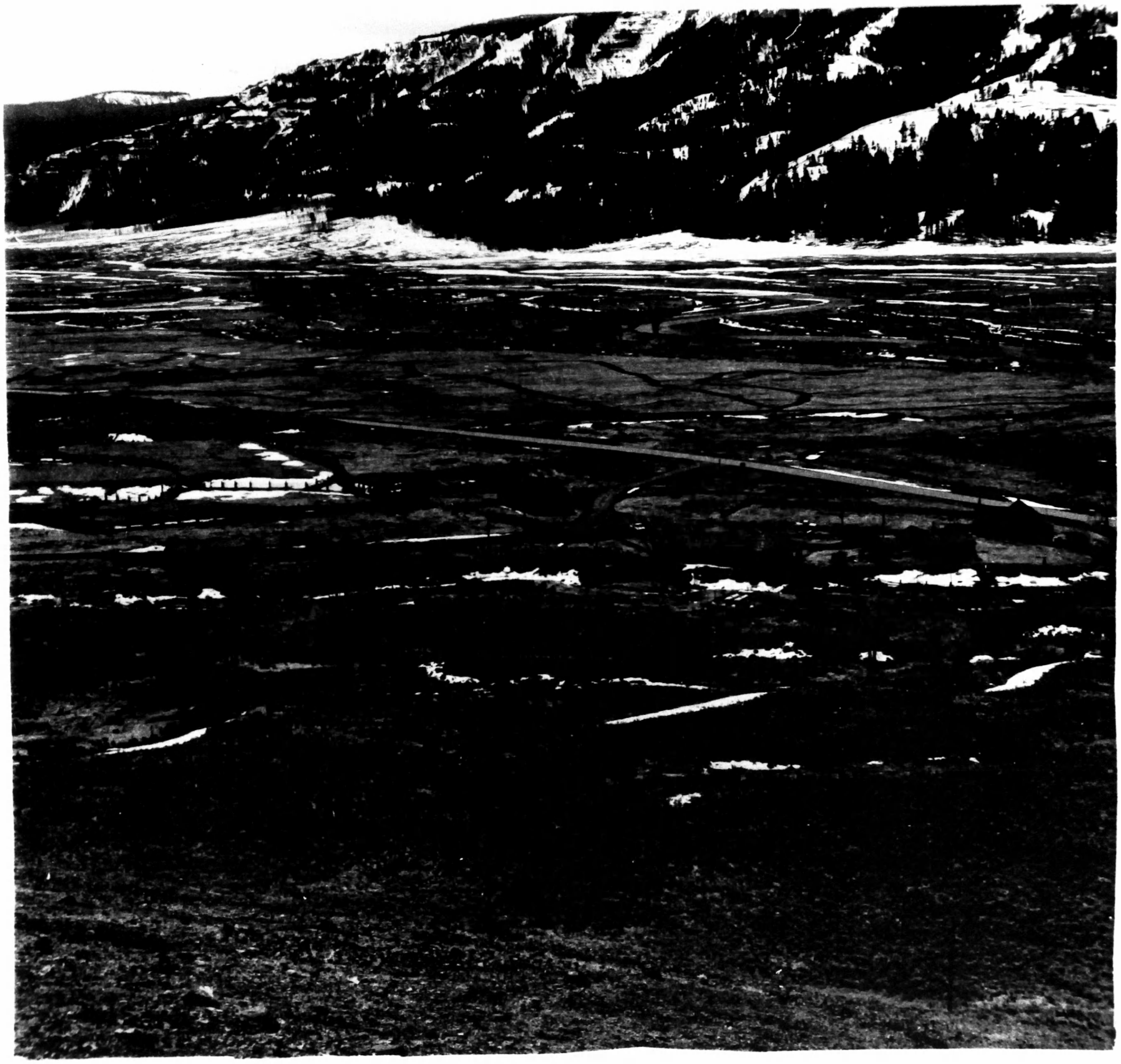

PLATE IV - Buffalo Ranch

Though many buildings have been removed, the Buffalo Ranch is still being used as a Ranger Station. Recently leveled irrigation ditches are visible south of the road.

PLATE V

Bison are unusually well adapted for winter survival. By swinging their massive heads from side to side, they can uncover grass buried in three to four feet of loosely packed snow. The long, thick, dark hair is an effective insulator against winter's freezing temperatures.

Late in the 1930's, many of the bison from the Lamar Ranch were transplanted to other parts of the Park. Herds were started in Pelican Valley, Fountain Flat, and Hayden Valley. The practice of maintaining a show herd was discontinued. In 1944, a program was inaugurated to place the bison on a self-sustaining basis as much as possible (Mattison, 1960).

The Ranch operation then switched to the breeding of horses for Service use and over the next ten years, Lamar was producing riding stock for most of the protection division's work. Hay cutting on the Lamar irrigated areas stopped in 1952.

Reduction of the ever increasing bison herds had been an ongoing program until 1966 when all artificial controls were stopped. Meagher (1970) points out that environmental factors are apparently keeping the population levels in balance with food supply. That reductions may be needed in the future is open to speculation. "Information from the present study indicates that compensatory reductions are not necessary on all populations; the need for future reductions on any population segment is less clear" (Meagher, 1970).

Elk

A segment of the northern Yellowstone elk herd is greatly dependent on the Lamar area for its late winter and early spring food supply. This same elk herd has been the source of immense controversy among professional biologists, local and national politicians and sportsman's organizations.

The history of the northern elk controversy has been written and rewritten by several writers (Skinner, 1928; Cahalane, 1943;

Rush, 1932; Pengelly, 1962; and Woolf, 1967). Numerous newspaper and magazine articles have appeared with highly emotion-laden responses to direct control of the northern elk herd. Olsen, 1962, and Denton, 1967, are good examples. Woolf (1967) presents an excellent summary of opposing viewpoints.

The problems of too many elk for the existing food supply became apparent shortly after the turn of the century (Dillon, 1911). Through the years a number of artificial controls have been used to correct elk population imbalances. Live trapping, herding elk to waiting hunters outside the park, and shooting of animals inside the park have been tried singly or in combination. Though expensive and extremely volatile politically, these methods do reduce the elk population. However, the normal reproductive capacity of elk is sufficient to build the population level to numbers requiring reduction again in 3 or 4 years. Since 1967, all artificial controls have been removed from the herd. Park Biologists are watching closely for population build-ups that may jeopardize other park values. The live-traps formerly used are still standing and can be used on short notice.

The National Park Service and the State of Montana are working together in an attempt to re-establish a migrating habit in the animals which will carry them farther down the Yellowstone Valley away from the park. When a definite migration occurs it is hoped that hunters outside the park can make the necessary reduction on herd numbers and make further artificial control measures unnecessary.

Elk and Lamar Floral Ecology

Cole (1969) identifies a "resident" segment of the northern herd which does not migrate to any great extent, but stays "within the upper portions of the Yellowstone drainage (Lamar) during even the most severe winters. These elk occur in what could be an ecologically intact portion of the Yellowstone ecosystem". (Cole, 1969).

The Yellowstone floral interpretation suggested by Hendrickson (1970) provides possible alternative explanations for current floral distribution in the Lamar.

Traditionally, intensive use of aspen and willows by elk has been cited as the predominant factor in preventing reproduction of these plants. It was assumed that reduction of elk numbers would be followed by noticeable increases in aspen reproduction. However, aspen generally failed to respond to a reduction of 50 - 60% in elk numbers (Houston, 1971).[4]

Houston (1971) cites the underestimated influence of fire, a well documented drought, a general climatic change and evolving edaphic factors in addition to use by elk as having contributed to a decrease of both aspen and willows. Baker's pollen studies (1969) clearly indicate that the genus Populus is being eliminated by the downward advance of conifers. These alternative interpretations of aspen distribution would suggest that this plant is not suitable for an elk-range condition indicator.

[4]D. B. Houston. "Elk Ecology Studies, Yellowstone Park" Annual Report Office of Natural Science Studies (1970), National Park Service, typewritten. Author's conclusions are tentative pending completion of the study.

Other Ungulates

White-tail deer, once present in Lamar, disappeared from the park in the 1920's. Both mule deer and bighorn sheep suffered population reduction during the 1930's and 1940's as habitats came under severe pressure from factors cited by Houston. Both species seem to have stable populations currently, however, deer will face greater habitat stress as coniferous vegetation continues to invade present sage brush range.

Fish

The major tributaries to the Lamar River (other than Soda Butte Creek) support several species of fish. Cutthroat trout, mountain and longnose suckers, longnose dace and mottled sculpins are native to the river. The rainbow trout is the only exotic specie present and appears to be limited in numbers and distribution (Dean, 1969).

Soda Butte Creek has very limited fish population because of extensive ferrous oxide and silt pollution. The headwaters of the creek pass through tailings of an abandoned gold processing mill at Cooke City, Montana. The mineral and silt pollution has drastically modified the fish population in the stream (Mills, 1968). The U. S. Forest Service is working with property owners in Cooke City and Silver Gate to eliminate all forms of stream pollution. Though substantial progress has been made, much remains to be done to eliminate pollution sources on Soda Butte Creek (Dean, 1969).

Yellowstone Park currently manages its fisheries in a manner similar to surrounding states. However, artificial stocking was terminated in the park in 1953 after studies pointed out the capacity of the lakes and rivers to sustain natural populations of wild fish. Fish and Wildlife Service biologists conduct a continuing program of fishery research in the park and their recommendations are used by park officials in setting fishing regulations (Sharpe, 1970).

CHAPTER V

THE RIVER

The Lamar River itself was originally called the East Fork of the Yellowstone by Hayden and others. In 1885 members of a topographical survey party officially christened the river "Lamar" in honor of L. Q. C. Lamar, Secretary of the Interior during Grover Cleveland's first administration (Bauer, 1935).

The river begins as a small creek with headwaters high in the Absaroka's between Parker and Hoodoo Peaks on the north and Pollux and Castor Peaks on the south (See Figure 1). The water course generally flows northwest for about 10 miles then swings west. Willow and Timothy Creeks are the only major tributaties draining from the Mirror Plateau into the Lamar. From the northeast, Miller, Calfee, Cache, and Soda Butte Creeks all drain to the Lamar from the Absaroka's.[5]

At the confluence of the Lamar River and Soda Butte Creek, the river trends gradually west passing through Lamar Canyon almost due west. Slough and Buffalo Creeks originate on the Buffalo Plateau and converge just before entering the Lamar from the north. About four miles below the Tower Fall, the Lamar flows into the Yellowstone. Ultimately the water arrives in the Gulf of Mexico via the Missouri River. With numerous smaller, intermittent creeks not mentioned the Lamar drains some 660 square miles

[5]U. S. Geological Survey Topographical Map. Yellowstone National Park Wyoming, Montana, Idaho - N4408 - W10948/59X82, 1962.

of Yellowstone National Park.

As noted in the section on Geology, the Lamar River was once ponded behind glaciers. This condition has influenced the present stream a great deal. Wide, picturesque meanders occur in the stream course, presenting a beautiful scene on a green background of spring growth.

Various models of water depth-flow recorders have provided a continuous record of water flow on the Lamar since April 1923. After 45 years of records, 827 cfs (598,700 acre feet/year) is the calculated average flow across the gauges near the Lamar-Yellowstone confluence. The highest flow recorded occurred on May 25, 1928, when 13,600 cfs passed the gauge. Apparently 1944 was a dry year, with 40 cfs recorded on March 16, 1945 (U.S.G.S., 1968).

Peak flow seems to be reached by mid June, with a rapid drop to one third or less of peak flow by mid July.

CHAPTER VI

MAN IN LAMAR VALLEY

Prehistoric

Numerous sites of occupancy by ancient man have been located in areas skirting the park region. Nearer the park archeological sites at Gardiner, Montana (Haines, undated), and Cody, Wyoming (Wormington, 1957), have yielded cultural material. A projectile point found near Gardiner has been typed at 6,000 years by Haines (undated). Nothing near this age has been found in or near Lamar Valley.

Garret (1962) felt that the Pinedale glaciation would have obliterated all traces of man's occupancy of the mountain valleys prior to its advances; therefore, evidence of early man should not be expected prior to 8,500 years in the Yellowstone Valley where it was glaciated. Late Pinedale glaciation corresponds to Folsom culture, however, artifacts from this culture are not expected to appear. But from there on, cultures through Early Hunter, Forager and Late Hunter, would be represented. Malouf (1958) conducted an archeological survey for two summers on behalf of the park. He reports that man has occupied the territory of Yellowstone Park for several thousand years, and the occupation has been continuous and relatively heavy. All known types of points, many knives and scrapers, plus other types of specimens give clues to the nature of this occupation. While Early Man human specimens are lacking it appears quite definite that the park was occupied in earnest following the Early Man Period by "The Foragers". The date appears to have been during the Altithermal period, perhaps some 4,000 years ago when the climate was warmer than it is at present. Heaviest concentration of the "Forager material is around Yellowstone Lake while later materials, from the Late Hunters, is most common on the north side of the park" (Malouf, 1958).

Evidence from obsidian typing and dating techniques has shown that the Yellowstone region has been occupied or at least visited by many different Indian tribes. Griffin (1969) provided evidence that through trading, obsidian used as projectile points found in Hopewellian Mounds in Ohio, came from Yellowstone's Obsidian Cliff.

Signs of ancient occupation in the Lamar drainage seems limited to a peculiar rock wall associated with an ancient hunting corral used by communal hunters. The ruins of this structure are located one half mile north along Slough creek above its confluence with the Lamar River (Malouf, 1958).

The only prehistoric burial to be discovered within the park was found near Fishing Bridge in 1941 (Condon, 1942).

Historic

Indian

A point should be made here that indian occupancy of Yellowstone is much too often doubted. It is said that Indians feared the thermal features and would not enter the region. Malouf (1958) clarifies the problem. "Thermal areas in the park were occupied. There is a current believe that such zones, especially the geyser areas, were avoided by Indians due to superstitions. Occupation sites in and around thermal areas, however, dispel such beliefs." Replogle (1956) and Bauer (1935) also point out that recent occupational sites of indians are found throughout the park. A Nez Perce Chief, White Hawk, also known as John Miller, visited Yellowstone in 1935. "When asked if the indians were afraid of the geysers or hot springs, Chief White Hawk replied that the indian used them for cooking food. They were a source of wonder, undoubtedly, but even then these startling manifestations of "Mother Earth" did not alarm them" (Kerns, 1935).

Indian occupation sites, tipi rings, fire circles, etcetera, are numerous in the Lamar drainage. The majority of these sites are undoubtedly associated with the Bannock Trail which traversed the northern end of Yellowstone Park (Replogle, 1956).

Bannock Trail

The Bannocks, a division of the widespread Shoshonean stock, were a semi-nomadic tribe living around the headwaters of the Snake River in Idaho and occasionally occupying the headwaters of the Missouri in western Montana (Phillips, 1928). About 1840 the Great Basin bison herd dwindled sharply resulting in a much reduced meat supply for the Bannocks and other Shoshonean tribes. As a consequence, a number of hunting parties, mostly Bannocks, began an annual migration to the plains in search of meat rather than adopting the agricultural pursuits of neighboring tribes. A route through the mountains was chosen probably because it offered a combination of short travel distance and safety from attacks by unfriendly tribes, especially Crows (Phillips, 1928). The first year of use was probably 1838 and 1878 seems to have been the last. Hence, trail use spanned 40 years (Haines, 1964).

Replogle (1956) relocated that portion of the trail passing through the park (See Figure 2). The Bannock Trail enters the park just north of West Yellowstone, Montana, moving generally east until the Gallatin Range is skirted. Swinging north, the trail meets the Mammoth Hot Springs then shifts east again at the Gardiner River. Moving east through the rolling foothills the trail strikes the Yellowstone just above Tower Fall. Numerous branches developed as alternate routes across the Yellowstone River were tested. After crossing the Yellowstone, all branches apparently joined at Trumpeter Lake and proceeded east along the Lamar River. Near the confluence of Slough Creek and the Lamar the trail can be traced up the south bank of the Lamar, crossing the highway eight-tenths of a mile southwest of the Lamar bridge. The Bannock Trail moves along midvalley, crossing Crystal Creek, and over the low ridge into Lamar Valley. The trail stays south of the river on the low foothills until reaching the Lamar River at the valley's upper end.

Once across the Lamar the trail made a major division, one branch forking to Cooke Pass above Cooke City and the other passing through the Absaroka Mountains to Timber Creek. The Cooke Pass route is followed rather closely by the existing road and can be traced far beyond the park boundaries. The other branch follows the Lamar to the divide between Cache and Calfee Creeks.

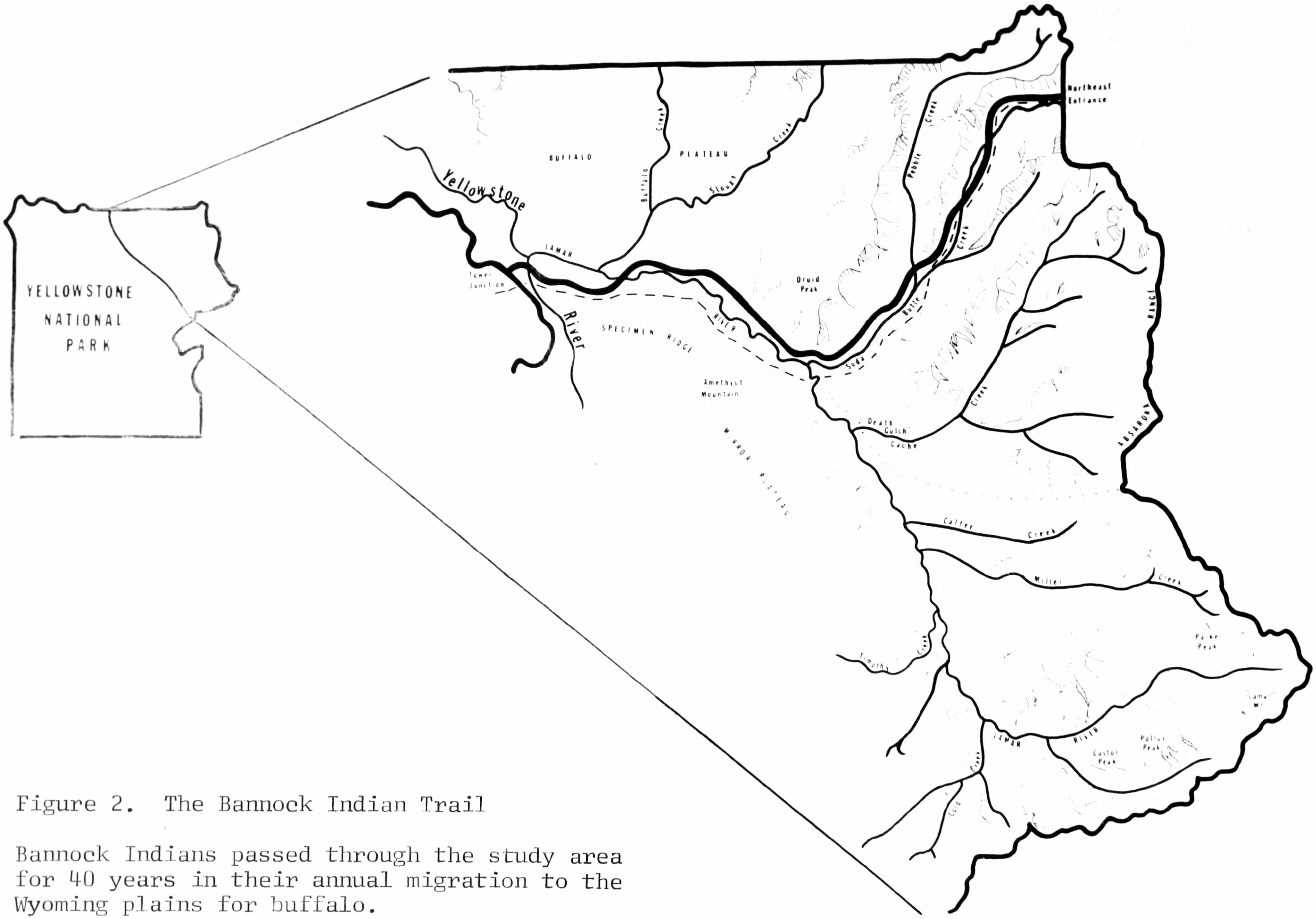

Figure 2. The Bannock Indian Trail

Bannock Indians passed through the study area for 40 years in their annual migration to the Wyoming plains for buffalo.

Near Canoe Lake just beyond the crest of the Absarokas, the trail led down the Timber Creek drainage where it joined the Clark's Trail into the Wyoming plains.

Nez Perce War

In 1878, probably the same year as the last trek of the Bannocks across the park, the brief but famous Nez Perce War erupted. The route of Chief Joseph's retreat entered the park near the Bannock Trail. The fleeing Indians followed the Madison River along its south bank and then turned up the Firehole crossing this river when shallower water was reached. Two hapless touring parties were met with some shooting and captures; however, most captives were released. A miner travelling with one party was retained as a guide and Chief Joseph led his people across the Yellowstone River and onto Mirror Plateau. The Indians moved quickly down the Lamar to the vicinity of Soda Butte Creek. The guiding miner apparently advised Joseph against his intended march up Soda Butte Creek since numerous miners at Cooke City were heavily armed. The Nez Perce then switched directions and following the Bannock Trail climbed out of the valley on the divide between Cache and Calfee Creeks. Joseph's people left the park by the passes in the Absarokas and moved onto the plains "to be finally surrounded and defeated in northern Montana after a march and a long campaign in which these resourceful Indians scored most of the success" (Skinner, 1926).

Near Mount Washburgn, 15 young bucks departed from the main body of Nez Perce and encountered another touring party. Casualties resulted and the Indians moved north to the Bannock Trail following it to Mammoth. Lootings and burnings occurred near Gardiner and a traveler was killed at Mammoth. As the young warriors departed through northern Yellowstone they made an unsuccessful attempt to destroy Baronet's Bridge across the river near Tower Fall. The braves rejoined Chief Joseph in Lamar Valley just as the entire party left over the Bannock Trail (Fee, 1936).

Sheepeaters

Very little is known about the Sheepeater, the only group living permanently within the present park. These shy, elusive people were apparently a minor off-shoot of the Shoshone or Snakes. They were known as the Tukuarika of which the English name of Sheep-eaters is a translation. They were regarded as outcasts of the northern tribe and were held in contempt by other tribes. However, the actual relationship to other tribes has never been established.

The Sheepeaters lived in perpetual terror of all men, both red and white, and took to the woods at the approach of a stranger near their lodges. They were as dependent on the mountain sheep for food and clothing as the plains tribes were on the buffalo. Their lack of horses made it necessary to travel light. Their homes were brush lodges of the materials at hand. There was no trace of any tribal organization among the Sheepeater.

After leaving the park the Tukuarika lived for a time in central Idaho on the Salmon River. They were subsequently removed to the Lemhi reservation and later to the Fort Hall reservation with the related Shoshone and Bannocks. The Tukuarika were separately enumerated in the Indian Census as late as 1904, when they numbered 90 men, women and children. It is doubtful whether there were ever more than one or two hundred individuals in the entire two million acres of the park (Phillips, 1928).

The Sheepeaters were a traveling people as their campsites have been found throughout the park. In the Lamar area, Specimen Ridge and Amethyst Mountain have occupational sites that are undoubtedly Sheepeater (Replogle, 1956).

With the last trek of the Bannock and the resettlement of the Sheepeaters at Fort Hall reservation, a unique chapter in the history of Yellowstone came to a close. The Indian residents and hunting parties have been replaced by National Park Service officials and 2¼ million mobilized tourists from every country in the world.

White Man

John Colter from Lewis and Clark's expedition is generally credited with the "discovery of Yellowstone" for the white man. Colter also has the distinction of being the first white man to pass through Lamar Valley. After travelling through the Lower Yellowstone region and seeing several important thermal basins, Colter apparently crossed the Yellowstone River near Tower Fall and traversed the Lamar Valley along much the same route as the Bannock Trail. His journey followed the Lamar River into high country, then over the passes into the Shoshone River basin. He happened to refer to the Shoshone River as the Stinking Water River because it flowed past an immense tar spring or petroleum seep. This is probably the beginning of written history of Yellowstone Park, for up to this time few white men had seen or even heard of the marvelous wonders so securely hidden away in the mountain vastnesses (Skinner, 1926).

There is little doubt that other trappers and explorers passed through sections of Yellowstone throughout the years. An extensive search for any possible diaries, letters or other evidence of Yellowstone discovery was started when Col. Norris discovered the initials and date ("J.O.R. Aug. 28, 1819") carved in a tree near the canyon. The identity of this early discoverer has never been established. Long-abandoned cabins, mine shafts and other evidence of occupancy have been detected.

> Norris summarized numerous evidences of early visitation in a report Dec. 10, 1878. Logs cut and used as foot logs across such creeks as Hellroaring, Crevice. A Corral near Amethyst Mountain and the ruins of an ancient blockhouse

near the Grand Canyon. A cache of steel marten traps of a type known to have been used by the Hudson Bay Fur Company over 50 years previous to their discovery. (Hall, 1928).

Trapper Osborne Russell accompanied a group of 24 trappers led by James Bridger in 1835. They came from the southeast and entered the headwaters of the East Fork (Lamar) River. They crossed the Yellowstone River a short distance above the Upper Fall and left the region by way of the Gallatin Valley (Bauer, 1935).

Various prospectors covered parts of the North-eastern Yellowstone. A. B. Henderson's diary for June 6, 1870, to August 13, 1870, describes the trip through the Lamar area (Henderson, 1870). Col. Norris met Adam "Horn" Miller who had just recently discovered Soda Butte and the Clark Fork Mines (Norris, 1877).

None of the early expeditions visiting the park to verify the stories told by Colter, Bridger and others, travelled through the Lamar. The area was known only to a few trappers and miners whose accounts have been few and sketchy.

Squatters made use of Lamar Valley for the cutting of hay to feed horses in the Cooke City mining area. Some cabins were built and occupied and were allowed to remain through taciturn approval of a very lenient superintendent Conger. The following superintendent, Carpenter, had direct orders to get the people out. One reluctant squatter "Buckskin" Jim Cutler was arrested.[6]

As squatters were removed and their cabins either burned or torn down, official buildings began to appear. The "short term"

[6]Personal communication with Aubrey L. Haines, former Park Historian.

stay of the Army beginning in 1886 stretched to 30 years. One military outpost was constructed near Soda Butte and with the return of civilian administrators was used as a Ranger Station. This cabin was moved to the Lamar Ranger Station in 1933. The buildings connected with the Buffalo Ranch became a part of the Lamar Valley scene and are still in use as a sub-district headquarters for the Lamar Ranger.

The Northeast entrance station was completed in 1935 and a government quarters was completed as part of the project. Currently a small administrative site is located at the Northeast entrance which is usually manned only during the summer season.[7]

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[7]Park Building and Maintenance records. Stored in the Chief of Maintenance's Office.

CHAPTER VIII

ACCESS AND USE

Early Roads

From trapper days until the first private automobile entered Yellowstone National Park in 1915, access was by horses or horse drawn vehicles. The access to and through Lamar area was limited exclusively to horses long after the first gas buggy entered the park (Bartlett, 1970).

The discovery of gold in 1870 led to a rush of prospectors and establishment of Cooke City and Silver Gate just outside the boundary of the park. Access to the mining area was directly through Lamar and the northern end of the Yellowstone Park. "The original trail from Gardiner to the Clark's Fort mines via Rescue Creek and Baronett Bridge was being used as a wagon road by miners during the periods of Norris's superintendancy, although neither he nor Conger mention it" (Obrain, 1965). Norris considered roads into that area; however, improvement of the trail to the Game Keeper's cabin at Soda Butte was the only official project (Obrain, 1965).

The growth of Cooke City and the need for an exporting route for ore led to several congressional bills to grant right-of-way to a railraod across the northeast section of the park in 1893. Railroad Planners also envisioned electric railroads for the tourists. Because the Cooke City mines produced little and tourists were so few it was doubtful if the railraod would have been built if allowed (Ise, 1961).

The Corps of Engineers made small realignments to the wagon trail from time to time up to 1899. However, the general condition of this route was unsatisfactory at best. One writer (Chittenden, 1935) considered this "one of the most difficult and dangerous to be found in all the Rocky Mountains". Since the government had refused a railroad right-of-way, residents of Cooke City and other interested parties felt there was something of an obligation resting on the Government to provide at least a respectable highway for travelers who have to follow this route. Further justification for a road lay in the need for a postal route from Mammoth Hot Springs to Cooke City. This road, therefore, was required for the double reason of forming a part of the regular tourist route and providing a necessary commercial highway across the park. Its greatest usefulness was said to be in patrolling and protecting the entire northern portion of the park, which is the most important game preserve on the reservation (Obrain, 1865).

Baronett's Bridge

This structure was the first to be built across the Yellowstone River and was completed in 1871. With the hope of quick profits, C. J. Baronett, the builder, invested some $4,000 in the bridge and a caretaker's cabin. A fifty cent toll fee was charged at the bridge though few of the users actually paid. As detailed earlier, a band of young bucks from Chief Joseph's people attempted to burn the bridge to harass pursuing cavalrymen.

Enough damage occurred to delay the troops while repairs were made so that their heavy wagons could cross.

Baronett rebuilt the structure in 1880 at the cost of $2,000 but lost possession of it about 10 years later. (See Plate VI.) A special congressional bill granted Baronette $5,000 for his bridge which continued in use to 1903 when the first steel bridge was completed. The old wooden bridge was burned down in 1905 as a safety hazard. The bulwarks on each side of the river are still present though fast losing integrity. The cabin site has been reclaimed by natural vegetation and only the grade up the northeast bank is still plainly visible (Haines, 1962).

Current Use

Until 1935 when the Cooke City-Red Lodge highway was completed the road between Tower Junction and the Northeast entrance was used primarily by the citizens of Cooke City and vicinity. The Northeast entrance is still the least used in the park although the road is kept open between Cooke City and Mammoth the year around. As can be seen from Table #2, less than 10% of the park's annual visitation enters via this route. The approach road from Red Lodge to the Northeast entrance is the last to open and the first to close of all the entrance roads.

Increased use of the Northeast entrance is expected with completion of the Sunlight Basin road from the Cody area, which will offer an alternate route to visitors coming west from Cody, Wyoming. In addition, when completed the new road will be maintained year around offering an all season entrance to Yellowstone from eastern Wyoming.

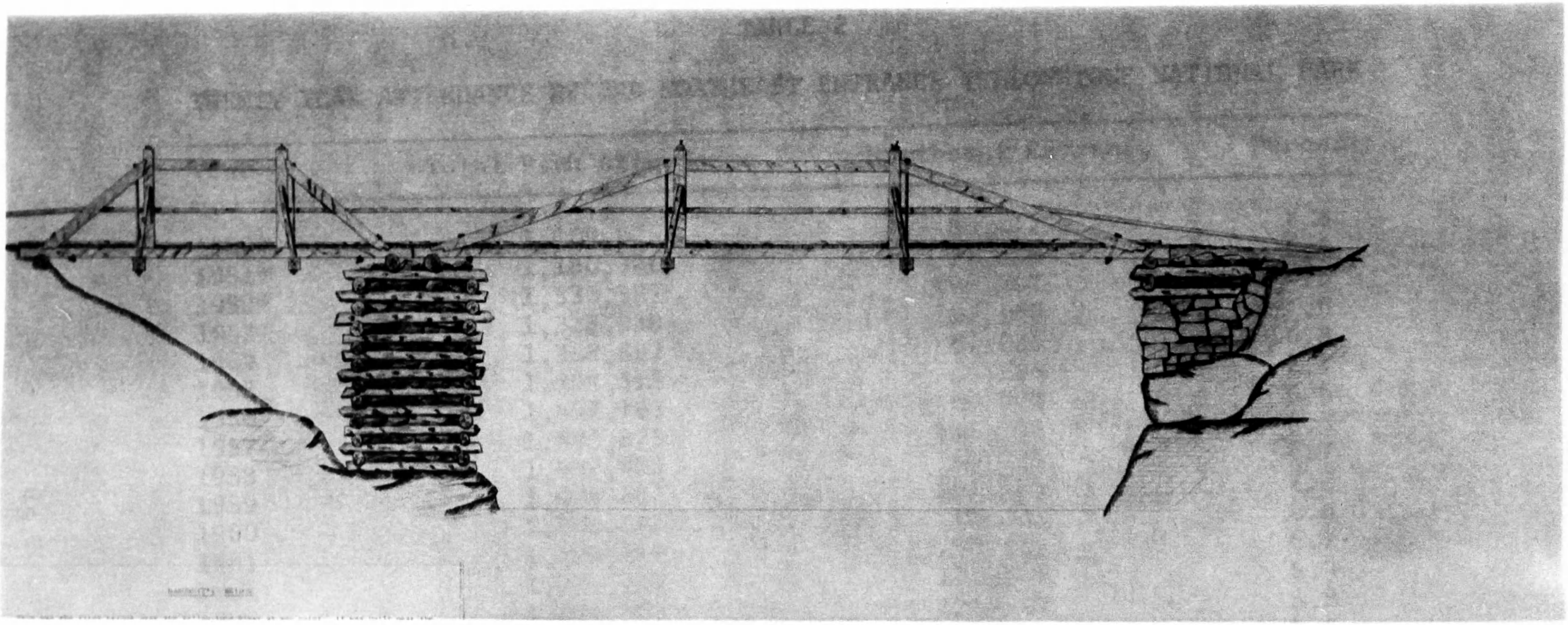


PLATE VII. Barronett's Bridge.

This bridge, completed in 1871 at the cost of $4,000, was the first to span the Yellowstone River. The attempted burning by Indians required $2,000 worth of repairs. The structure remained in service for 30 years.

(Original sketch by Lt. McNaughtin, 1889)

TABLE 2

TWENTY YEAR ATTENDANCE RECORD NORTHEAST ENTRANCE YELLOWSTONE NATIONAL PARK

Year	Total Park Attendance	Northeast Entrance	Percent
1950*	1,109,926	83,412	7.6
1951*	1,166,346	79,248	6.8
1952*	1,330,387	100,847	7.6
1953	1,326,858	92,170	7.0
1954	1,328,893	83,669	6.3
1955	1,368,515	97,813	7.1
1956	1,457,782	92,784	6.6
1957	1,595,875	101,338	6.3
1958	1,442,428	96,485	6.7
1959	1,408,667	101,255	7.2
1960	1,443,288	97,498	6.8
1961	1,524,088	97,742	6.7
1962	1,925,227	102,769	5.4
1963	1,872,365	111,614	5.8
1964	1,929,316	108,876	5.6
1965	2,062,476	111,535	5.3
1966	2,130,313	128,952	6.0
1967	2,210,023	118,314	5.3
1968	2,229,657	107,125	4.9
1969	2,193,894	110,188	5.0
1970	2,297,290	106,265	4.6

*Travel year October 1 to September 30.

Source: Public Use Statistics, Chief Rangers Office, Yellowstone National Park.

Current Interpretation

Between Tower Junction and the Northeast entrance one double faced exhibit near the Lamar Ranger Station describing fossil trees on Amethyst Ridge across the valley is the only interpretive device currently in use (See Plate VII and Figure 3). Of course, many books and pamphlets sold at visitor centers throughout the park contain some information pertinent to the natural scene in the northeast corner.

Until recently, routed wooden signs pointing out the more spectacular peaks in Soda Butte Creek Valley were occasionally seen along the road. Most of these signs were declared superfluous and were removed.

Pebble Creek and Slough Creek campgrounds are within the area of consideration, but there are presently no plans to conduct campfire programs or other interpretive activities at these sites.

For the past 5 or 6 years, a day long hike has been led twice a week during the tourist season by a seasonal Naturalist to some petrified tree specimens on Specimen Ridge. The trees visited provide an excellent opportunity to view the vertical fossil forest of Yellowstone. This activity affords those genuinely interested opportunities for guidance to an area of petrified wood without opening the rock-hound lined flood gates to those who would collect this unusual natural product.

During the preparation of this paper, a team of exhibit planners from the Service's Interpretive Center at Harpers Ferry, West Virginia, visited the park to plan the first exhibits in a series to be installed throughout the park beginning in July, 1971.

PLATE VII

A low profile exhibit more compatible with the natural scene will soon replace this rugged roadside display. A single panel display with an accompanying audio message will tell the fossil forest story.

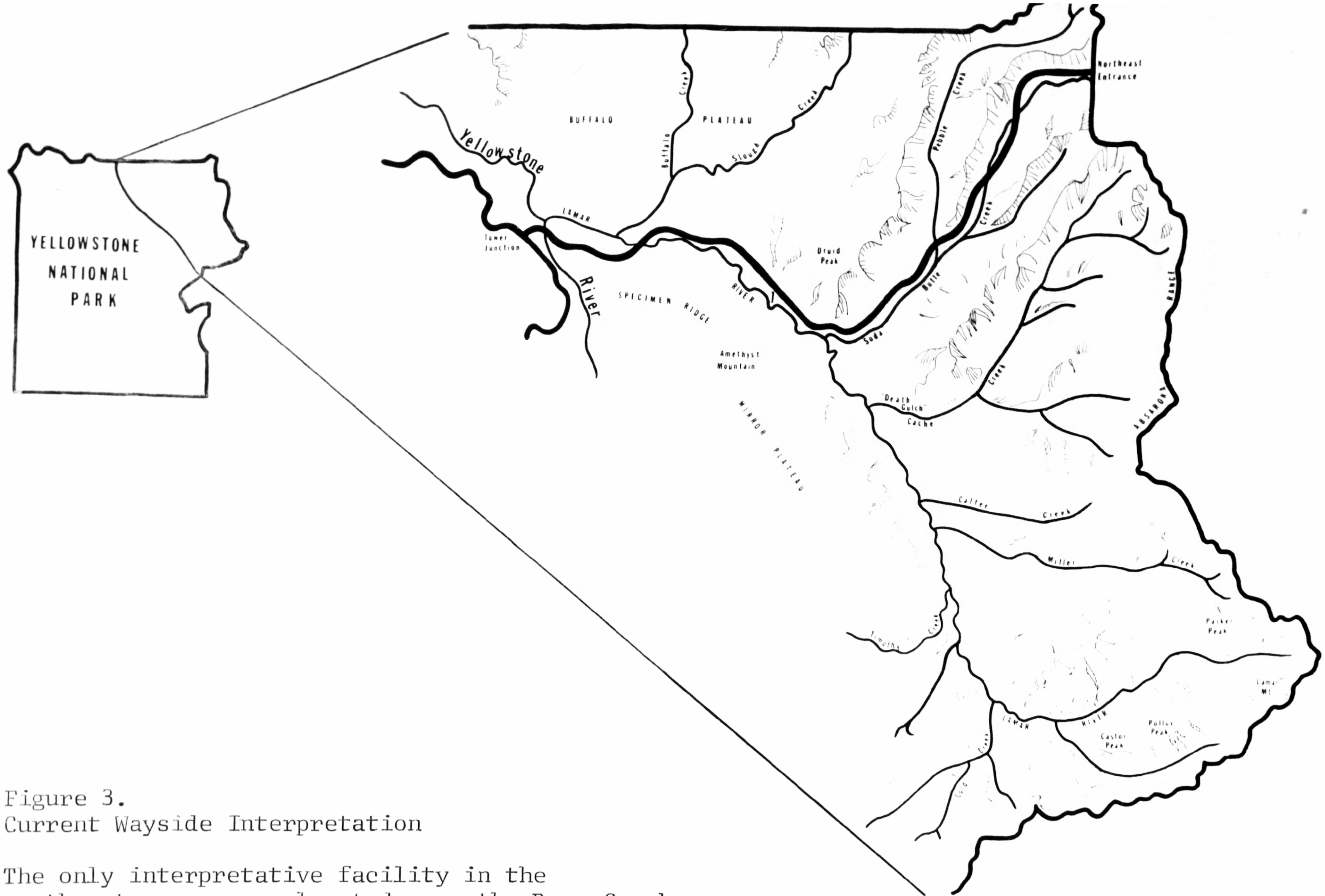


Figure 3.
Current Wayside Interpretation

The only interpretative facility in the northeast corner was located near the Rose Creek Buffalo Ranch.

Three exhibits are planned within the study area. One exhibit to be located near Junction Butte will interpret the glacial features especially the numerous erratic boulders. (See Figure 4) A second exhibit incorporating an audio message will replace the older style fossil forest exhibit mentioned above with a newer, low relief single panel display. The third exhibit will be near Soda Butte and will discuss bison ecology.

Incompatible Uses

As concepts concerning the compatible uses of land in a park have evolved, many activities formerly considered necessary to properly administer the park have been discontinued. The care and feeding of bison is a good example.

In the study area, gravel deposits at Round Prairie were used for road building. Fortunately, the site has naturally recovered leaving little evidence of the former use.

As this paper was being written an active asphalt mixing plant was located near the Slough Creek-Lamar River confluence. This site has been used as a gravel source since 1958 and asphalt had been mixed there just one spring. The asphalt mixing equipment was visible for 3 to 5 miles, as the site was on a sage brush flat. The black smoke emitted by the gravel dryer and the cluster of machinery was a definite eye sore and were obviously incompatible with the natural scene. (See Plate VIII)

In late spring, 1970, the mixing plant was relocated outside the study area but still in the park. The Lamar site is being restored and most of the stockpile of asphalt has been used.

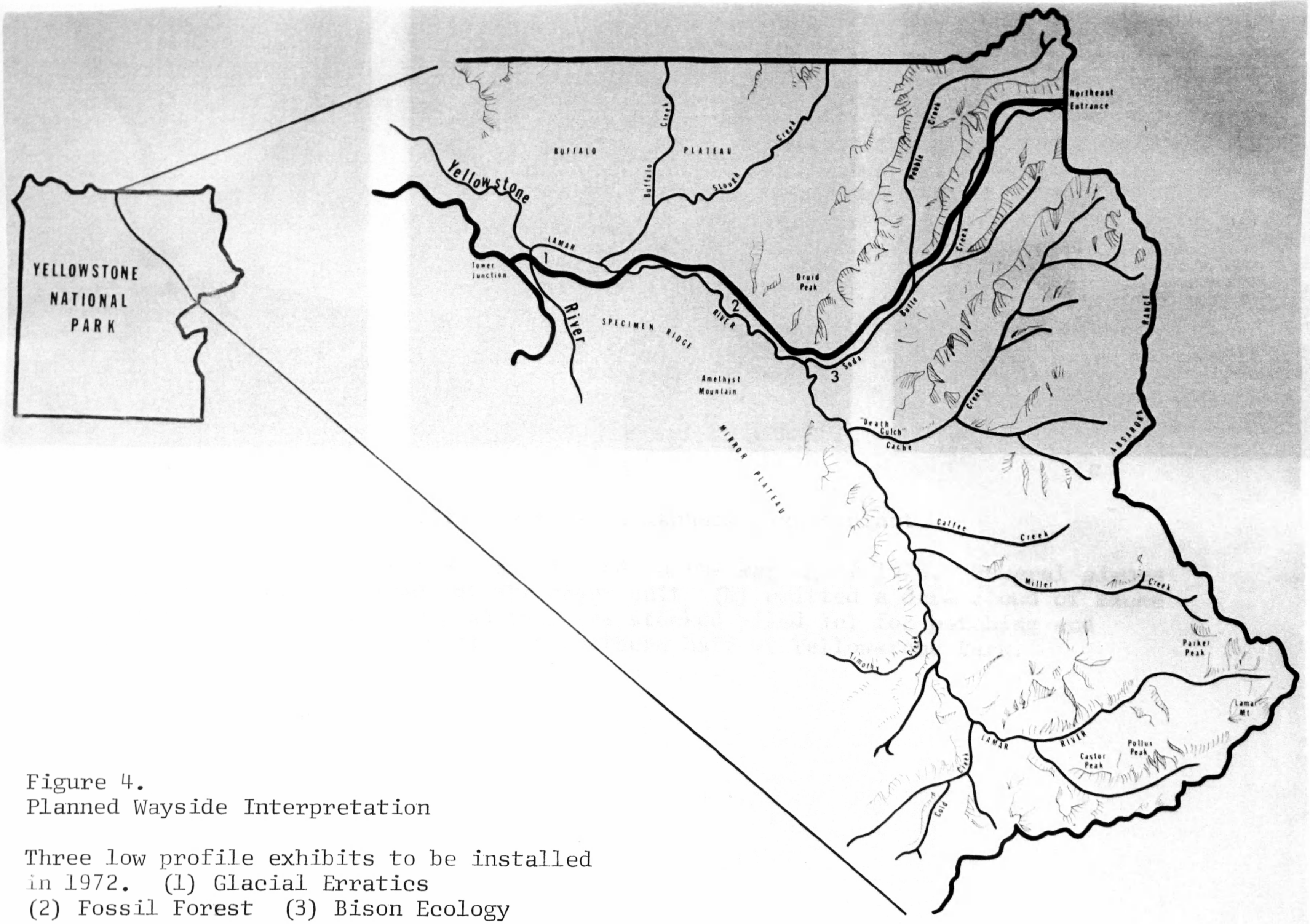
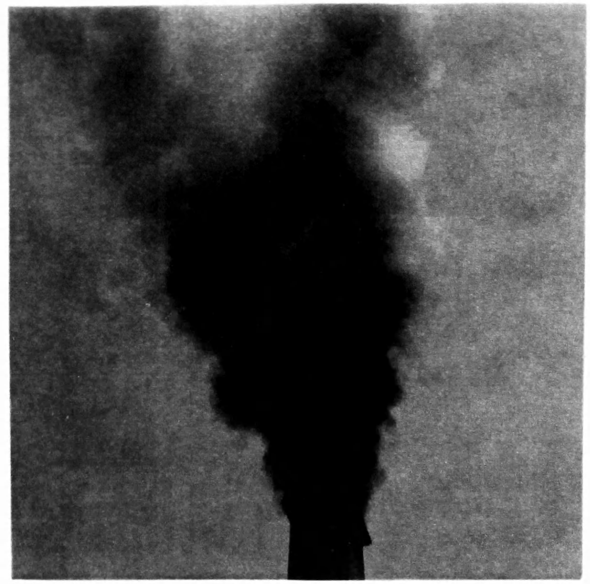


Figure 4.
Planned Wayside Interpretation

Three low profile exhibits to be installed in 1972. (1) Glacial Erratics (2) Fossil Forest (3) Bison Ecology

a



b

c

PLATE VIII. Lamar area asphalt mixing plant.

This asphalt mixing operation was started in the spring of 1970. Several pieces of equipment were involved (a) The dryer unit (b) emitted a dark cloud of smoke and dust. After mixing, the asphalt was stocked piled (c) for patching and resurfacing of roads throughout the northern half of Yellowstone Park.

Plans are being formulated to purchase all road building materials outside the park. It is hoped that all the gravel crushing sites in the park can soon be restored to natural conditions.

CHAPTER VIII

FEATURES WITH INTERPRETIVE POTENTIAL AND SUGGESTED METHODS OF INTERPRETATION

In the introduction, the point was made thet thermal geology and wildlife have become major subjects of Yellowstone's interpretive program. Such emphasis is proper. The park's endowment of hydrothermal features is unequaled anywhere in the world and scores of wildlife species are resident in the park.

Wildlife

Wildlife is abundant throughout the park; however, some areas such as Lamar and lower Yellowstone Valley are very critical to the winter population of ungulates. For this reason, a proper theme for an interpretive prospectus dealing with the Lamar Valley should be the winter wildlife range.

Vegetation patterns and climatic conditions which make the Lamar part of the prime winter range have already been presented. The entire story of wildlife and its food supply is right here for all to see. With the current popularity of ecological discussion, the wildlife-vegetation story should find a waiting, interested audience.

Much of the winter traffic is composed of local people entering the park specifically to see wildlife or to drive through to Cooke City for winter sports, snowmobiling, and skiing. This group of visitors will soon be augmented by others when the all-weather road is built linking Cooke City with Cody to the southeast. As Cooke City and Silver Gate become known to ski enthusiasts and winter vacationers, the park will experience an increasing number of visitors entering the northeast gate. These people should be contacted by a member of the interpretive division.

A visitor center located in the Round Prairie-Pebble Creek area and open year-round could serve as a focal point for winter wilflife observers. Here, general information on the location of elk and bison herds could be collected and shared with the Mammoth Visitor Center to pin point herd locations and follow daily movements. An auditorium with a slide presentation explaining the critical role of winter range to wildlife would do much to inform local area residents of wildlife management problems. These are the people who seem to have the least understanding of the dynamics of wildlife populations.

Human History

A secondary and closely related theme is the story of man, his presence in Lamar prior to establishment of Yellowstone as a National Park and his role in the re-establishment of a thriving bison population. The influence of man should rightly be one of two secondary themes for Lamar Interpretation.

Perhaps no section of the entire park has had a longer or more complicated connection with man than the Lamar Valley. The Bannock Indian Trail, the early trappers and prospectors, Baronett's Bridge, Chief Joseph and the Buffalo Ranch are significant aspects of Yellowstone's history. Providing information on each event by conventional roadside signs and displays would require construction of objects that are incompatible with the natural scene. The use of short-range radio transmitters would provide on-the-spot interpretation. Such transmitters operate on the regular AM band and can be received on regular car radios. Broadcast range is limited to about one mile. A series of five or six transmitters could easily provide key information on the human history of Lamar Valley.

The Buffalo Ranch at Rose Creek, presently called Lamar Ranger Station (housing a subdistrict Ranger year-round and several seasonal employees) played an important role in the expansion of Yellowstone's bison herd. However, it should be pointed out that the bison had been saved from extinction by the creation of other wildlife refuges and maintenance of several private herds. The Lamar Ranch was not critical in saving the bison. Though the resident park herd had been reduced to 25 or 50 animals, it is felt that with the increasing protection being given to them these animals would have made a natural recovery and would have preserved the mountain variety of Bison. As pointed out earlier, the current bison herd is made up of hybrids.

With the ultimate value of the ranching operation in question, the Ranch buildings have little historical significance. Indeed, much of the construction has already been removed and the irrigation ditches on the flats near the ranch site were recently obliterated. The entire ranch site should be returned to nature with all evidence of occupation being removed. The brief story of the Buffalo Ranch could be told by radio transmitter.

Geology

After turning left at Tower Junction on a trip to the Northeast Entrance, the visitor crosses the Yellowstone River, climbs quickly to the first segment of Lamar Valley and is probably amazed at the large boulders scattered as far as the eye can see. A few miles later the road passes through Lamar Canyon. Then within 2 or 3 minutes the visitor sees the broad expanse of Lamar Valley proper open up before his eyes. In the distance lie the shining, snow-capped Absarokas and on the right are the peculiar exposures of Amethyst Mountain. Several miles later the road leads northeast through Soda Butte Creek Valley hemmed in by the most spectacular peaks in the entire park. Certainly these scenes will spark questions about the geological phenomena of the northeast corner of the park. Geology should, therefore, be the other secondary theme for the Lamar interpretive prospectus.

Because of the time span involved, geological interpretation has posed special problems. Visitors have a difficult time trying to visualize a given area looking any different from what it is at the time they see it. Verbal or written descriptions of geological processes have no impact and are difficult to follow without visual aids. For this reason, a portion of the exhibit area in the Round Prairie-Pebble Creek Visitor Center should be devoted to the geology of the northeast corner of Yellowstone. Of particular interest is the volcanism and glaciation that combined in shaping the current Lamar Valley.

The petrified forests of Yellowstone possess the unique features of having been fossilized in a vertical position with one layer resting on another. While these two points render the fossil forest unique, petrified wood is found in every state. Fossil wood has such appeal to the visitor that the urge to collect personal specimens is overwhelming. Should undue emphasis be placed on the existence of the natural material in the park, a very undesirable law enforcement problem is introduced.

The Yellowstone Library and Museum Association publishes a wide variety of books and pamphlets featuring the significant natural phenomena of the park. Several publications currently being written, in particular a layman-oriented book on Yellowstone Geology would provide much needed information to those entering by the Northeast Entrance gate. The proposed visitor center would serve an additional function as a contact station. Currently the traveler must either go to Canyon, 48 miles away, or Mammoth, 47 miles away, before any opportunity exists to get significant interpretive information.

CONCLUSION

As human population growth continues with concurrent natural habitat reduction the value of natural, wild areas will increase. The National Park Service, as custodian of much prime wildlife habitat, should plan to greet and inform visitors of Lamar Valley's unique role as habitat for native ungulates. Using this paper as the initial thrust, the Service can be prepared to provide interpretive facilities for the park's northeast corner.

The broad expanses of the Lamar Valley present a unique opportunity to experiment with innovative interpretive media. Here, commonly used wayside structures would jeopardize the integrity of the natural scene. The suggested use of radio for conveying interpretive messages is a proven technique.

Time tested roadside interpretive devices can and should be used in areas in Soda Butte Creek Valley. The Round Prairie-Pebble Creek Visitor Center proposed in the preceeding section would become an important information station as the all-weather road connecting Cooke City with points south is completed. By stopping at this point, over 100,000 visitors annually would have the opportunity to receive interpretive information relative to the geology, human history, and wildlife use of Lamar Valley and vicinity. This information which is currently unavailable would enhance the Yellowstone vacation for visitors entering via the Northeast Entrance. National Park visitors expect and deserve this opportunity to learn something about the natural wonders they are about to see.

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APPENDIX A

A summary of geologic history for Lamar Valley. Compiled by author from Hamilton (1960), Lovering (1929), Macomber (1956), and Prostka (1968).

Era	System	Epoch	Probable Events
Cenozoic	Quaternary	Recent	Re-excavation of some Lamar and Soda Butte Canyon areas after being filled by glacial till.
		Pleistocene	Piedmont glacier carried till to fill depression, fine sediments settled behind glacial lakes. Lamar Valley filled by ice.
			Some basalt flows entered upper Lamar Valley.
			Erosion
			Rhyolites flow in several locations.
			Erosion
			Basalt flows in Lamar Valley. Major cutting by streams. Uplift and rejuvenation.
	Tertiary	Pliocene	Development of local base level. Removal of much recent Rhyolite.
		Miocene	Extrusion of rhyolite flows - some acid (low in Magnesium) lava.
		Oligocene	Erosion
		Eocene	Both acid and basic breccias formed from extensive eruptions. Petrified forest formed as the region experienced several burials.
Mesozoic	Upper Cretaceous		Area under deep water earlier, near waters edge later. Numerous beach deposits which formed sandstone.
	Lower Cretaceous		Area intermittantly under water. Shales and quartzite sandstones formed.

Era	System	Probable Events
Mesozoic	Jurassic	Area under deep saline water. Limestone, marl, and shales produced.
	Triassic	?
Palezoic	Permian	?
	Pennsylvanian	?
	Mississippian	Madison limestone - resulting from long burial of marine sediments.
	Devonian	?
	Silurian	?
	Ordovician	?
	Cambrian	?
		No record of earlier events presently found in or around Lamar Valley.