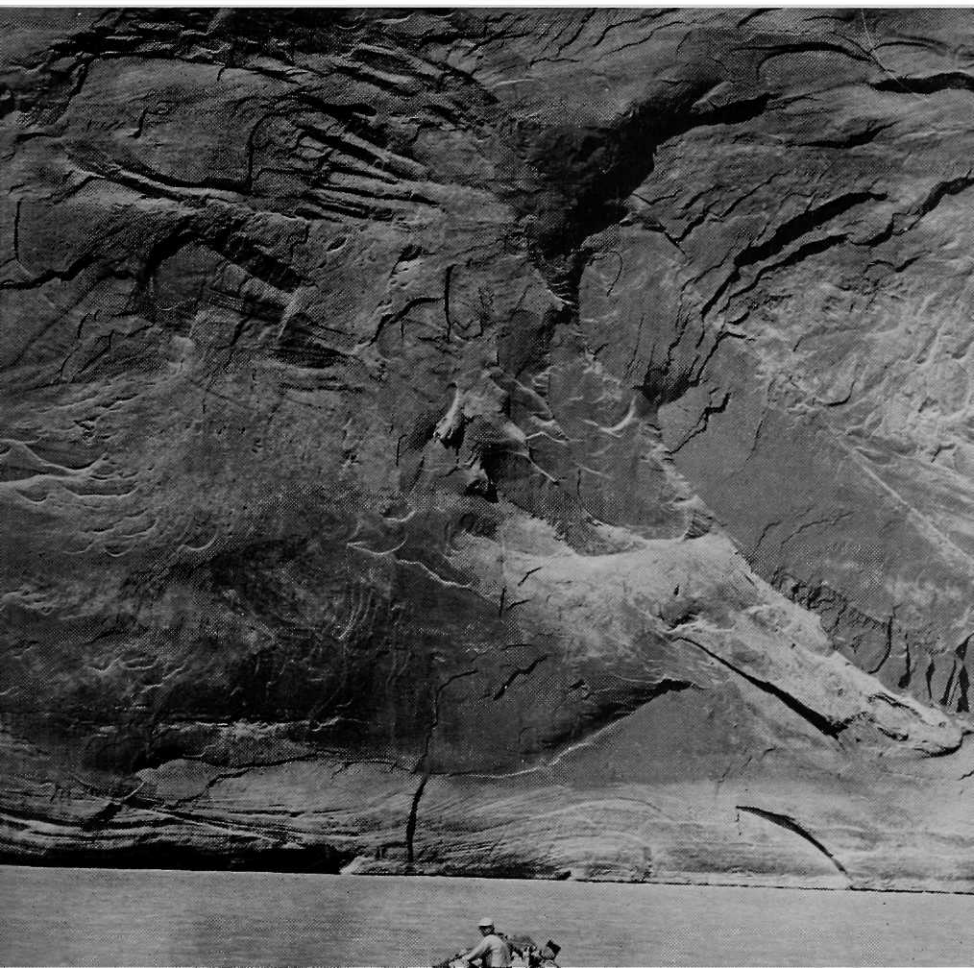
UTAH

HISTORICAL QUARTERLY

The Colorado... River of the West



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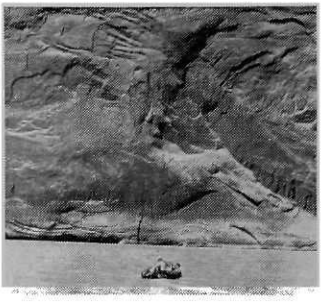
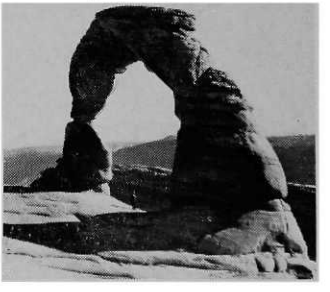


Tapestry-like walls rise perpendicularly from the Colorado River bed.

PHOTO, JAY HESLOP



"Delicate Arch" in Arches National Monument, Grand County, Utah.

PHOTO, P. W. TOMPKINS

UTAH

HISTORICAL QUARTERLY

A. R. Mortensen, Editor

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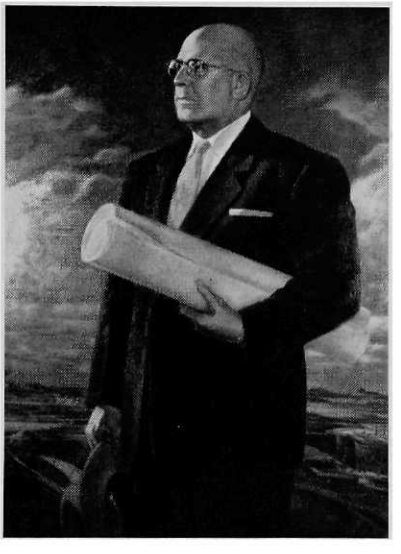
LAND OF SPACE ENOUGH

Vastness of Upper Colorado River country is here depicted by scene across Monument Valley.

AN INVITATION



GEORGE D. CLYDE

Colorado in Spanish means red. Father Escalante in seeking a short route from Mexico to Monterey in California crossed a wild and turbulent stream which had, over the centuries, cut a deep gorge across a high plateau. The water, heavily laden with silt, was reddish in color. That was nearly two hundred years ago. For a hundred years after the white man's first recorded crossing, the river was master over man. The fantastic terrain through which the river flows made it difficult to cross, and its wild and violent seasonal fluctuations made it impossible to control and use.

Late in the nineteenth century, the white man attempted small diversions along the lower reaches of the river. Near the beginning of the twentieth century a bold attempt was made to divert water from this mighty stream on to the vast desert lands in the Imperial Valley of California. During the same period numerous attempts were made to divert water locally along the main stream and its many tributaries. None of these were large nor wholly successful.

The river, some 1400 miles long and draining one-twelfth of the United States, was still its own master and at will, during periods of high flow, washed out the simple, crude works built to control it.

The picture of Governor Clyde is from an oil portrait by Everett C. Thorpe, which hangs in the Board Room of the State Capitol and illustrates the governor as a builder and engineer concerned with the development of Utah's natural resources.

By the end of the first quarter of the twentieth century, it became evident that if the mighty resource of the Colorado River were to be made available to man, it must be controlled. The high spring floods must be put in storage for use during the periods of low flow.

The Colorado River drains all or parts of seven states and Mexico. The United States, Mexico, and each of the states of Colorado, Utah, New Mexico, Wyoming, Nevada, Arizona, and California had a vital interest in its development because in this area, the Pacific Southwest, water is the limiting factor to economic development, and even if all the water in the Colorado River were utilized consumptively, there would not be enough to meet all needs.

As early as 1916 a master plan for the total development of the Colorado began to evolve. By 1922 a compact between the United States and the seven Colorado Basin States was agreed upon, and a later treaty between the United States and Mexico was consummated. The compacts divided the waters of the river between the Upper and Lower Basins of the Colorado with the dividing line located at Lee's Ferry. The treaty specified the amount of water to which Mexico was entitled.

The master plan proposed a total consumptive use of the waters of the Colorado for domestic, agricultural and industrial purposes, and for such nonconsumptive purposes as power, navigation, recreation, and wildlife as could be developed in harmony with the major uses. The plan included control of floods, storage, regulation, and conveyance to points of use. It provided for the capture and conversion of the energies of falling water into electrical energy and its sale to help pay the costs of construction. It was a bold plan and nothing like it on a similar scale had ever before been attempted.

The first unit of the comprehensive development of the Colorado was the Hoover Dam started in 1928 and completed in 1935. The construction of this dam placed the mighty Colorado from Boulder Canyon, the damsite, to the sea under the control of man. Other dams below Hoover (Parker, Davis, Imperial, and Morelos) followed in succession.

The river above Hoover Dam was still wild, unruly, and uncontrolled. Twenty-one years after the completion of Hoover Dam, the Congress of the United States authorized the Upper Colorado River Storage Project and Participating Projects, initial phase. This project includes the construction of four storage dams, many power plants, and several participating projects. At the present time, three dams, two power plants, and two participating projects are under construction. It is estimated that it will require forty years to complete the initial phase of construction.

The final phase of the Upper Colorado River Storage Project and Participating Projects will include all remaining projects necessary to fully control and utilize the waters of the Colorado. When complete, no waters from the Colorado will be wasted into the sea. The ultimate development will no doubt include the conversion of sea water to supply the lands within reach and the transfer of rights to the natural flow of the river upstream to insure maximum use of the water resource.

The plan for the development of the Colorado, which is now under way, is unique in all the world. In size, in cost, in difficulty, and in potential, it exceeds anything man has yet attempted. It will make possible ultimate use of the land, water, power, minerals, scenic, recreation, and other resources of this area.

The articles which follow tell the history of the discovery and man's increasing acquaintance with the Colorado Basin and define and bring into focus the detail and plan of development of this unique and great resource — the Colorado River. A greater acquaintance with the scenic and economic potential, both through a perusal of the literature and by personal visits to this vast and colorful region, is a rewarding experience which I heartily recommend.

GEORGE D. CLYDE

Governor, State of Utah

WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO

The topographic features and drainage area of the Upper Colorado River Basin are shown in the section of a relief model map here reproduced, courtesy Upper Colorado River Commission.

THE COLORADO RIVER — THE PHYSICAL AND BIOLOGICAL SETTING

By Angus M. Woodbury *

During the westward expansion of the nineteenth century across the continent, the easy diffusion over grassy plains and along wooded streamsides was interrupted by the high Rocky Mountains, which funneled travel through low mountain passes into devious pathways that threaded the great "Rough Country" of the American Southwest. One route led westward through southern Wyoming; another across New Mexico and Arizona, both leading to the Pacific Coast.

West of the Rocky Mountains, between these two parallel routes lies the great bulk of the Rough Country. The heart of it lies in the Colorado River Basin in eastern and southern Utah. This region was largely bypassed by the plodding migrations moving westward toward the Great Basin and the Pacific Coast. During that period, its reputation as the Rough Country shunted large-scale development in other directions.

Into this region sparsely inhabited even by Indians, slowly filtered pathfinders, explorers, scientists, stockmen, rustlers, prospectors, and others. Here were born the great government agencies, the U.S. Geological Survey and the Bureau of Ethnology. A few hardy settlers penetrated the region bent on exploiting the scattered spots of fertile land nestling in isolated nooks among the rugged erosion-scarred landscapes.

* Dr. Woodbury is professor emeritus of biology, University of Utah. His "A History of Southern Utah and its National Parks" was published by this Society in 1944 and is still in print.

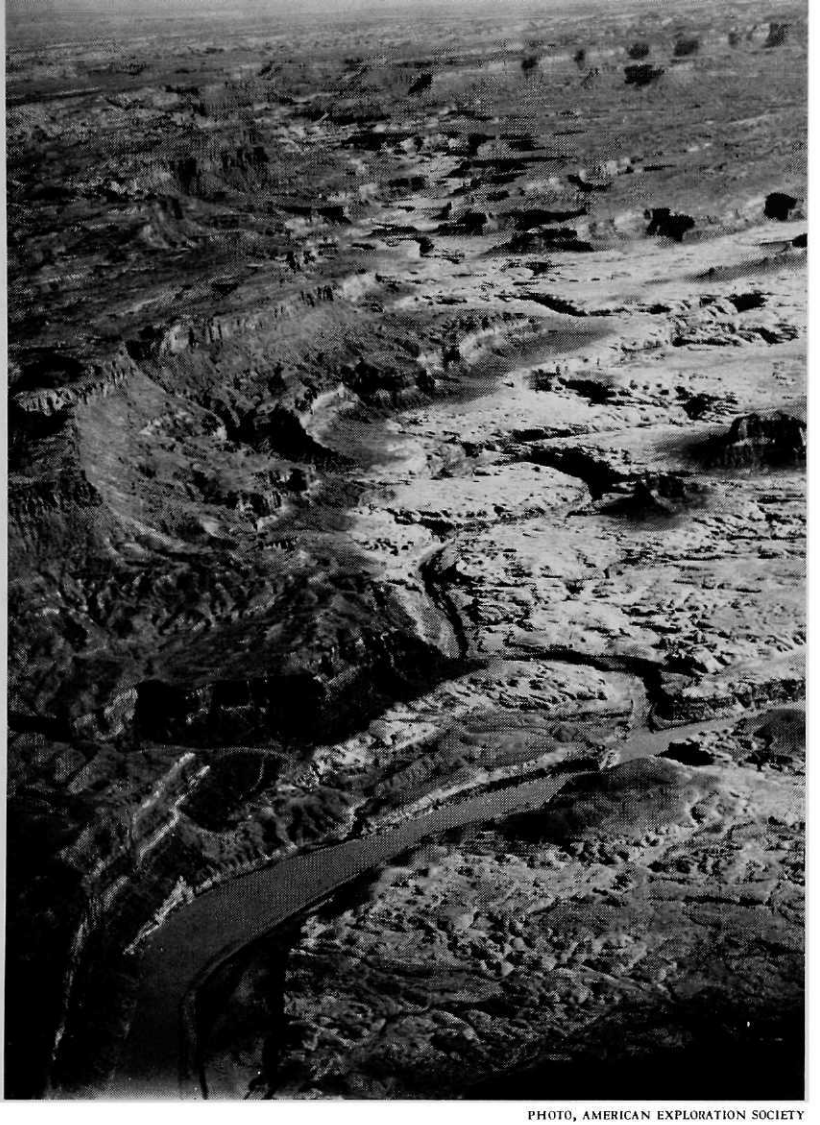
These fertile spots served largely as centers from which livestock were managed on the range of this difficult terrain. It was not until the great westward-moving human tide was blocked by the Pacific Coast and rolled backward toward the rugged interior that erstwhile resources began to receive the recognition to which they are justly entitled.

These resources are peculiarly unique because they arise out of the peculiar environment (ecological conditions) of the arid landscapes of the area. The backbone of the continent, the high rugged Rocky Mountains, running roughly southeastward from Canada through Montana, Idaho, Wyoming, and Colorado into New Mexico, divides the continental drainage between the Atlantic and Pacific oceans. The west slope, from northwestern Wyoming to northwestern New Mexico, is drained by the Colorado River, which descends more than 10,000 feet along its 1400-mile course southwestward toward the Gulf of California. On its way, it passes through more than a thousand miles of deep, colorful winding canyons and gorges cut through headwater mountains and high plateaus of Utah and northern Arizona.

Most of the headwater tributaries rising in mountains above 6,500 or 7,000 feet coalesce into rivers that flow through arid basins. They have cut deep chasms and canyons through upland areas that lie in the path of the onrushing waters on their way to the Gulf. This interior continental basin, roughly one-twelfth of the United States, contains the great bulk of the arid and dissected colorful desert terrain of the rugged Southwest.

The precipitation for the lower portion of the region during a half century of records has ranged roughly between five and sixteen inches, which alone is ordinarily inadequate to maintain a heavy stand of vegetation. The reason for this scanty rainfall is found in the nature of the winds that bring moisture laden air into the basin and their interaction with the irregular topography. The dominant feature, especially in the summer, appears to be the influence of the tropical planetary winds which carry little moisture as they descend in the northern hemisphere. These are modified by local conditions that may help direct the development and movement of local violent thunder storms in summer.

At other times, storm fronts may come in from the Pacific Ocean bringing storms of more general distribution which ordinarily, because of the cooling effect, drop more precipitation at higher altitudes as they move farther inland. These are relatively unusual occurrences because most of these Pacific storms start across the continent farther north, usually being shunted in that direction by high pressure cold air accumulated over the interior mountains.



PHOTO, AMERICAN EXPLORATION SOCIETY

Aerial view of the Dirty Devil River entering the Colorado at the head of Glen Canyon. As the soft materials on top wear away, erosion resistant surfaces protect softer material below, and the canyon walls along stream-cut channels are formed. Channels cut faster than erosion can wear away banks.

Some of these storm fronts bear such little moisture that only highlands and mountains "wring out" precipitation. The general effect is that the scanty vegetation of the deserts increases in density at higher altitudes, but this is greatly modified by details of the physiography which affect the precipitation. The sparsely vegetated desert lowlands

are interspersed with more heavily vegetated nooks and coves of canyons or north-facing slopes where soil moisture is better conserved, while the more heavily vegetated highlands are interspersed with spots of sparse desert vegetation on south-facing slopes and canyon walls, where soil moisture is rapidly depleted.

The principal streams of this basin, the Green River rising in the high mountains of northern Wyoming, the main stream of the Colorado River draining the western slopes in central Colorado; the Dirty Devil River rising in the Wasatch Plateaus of central Utah; the Escalante River flowing from the Aquarius Plateau of southern Utah; and the San Juan River draining the southern end of the Rocky Mountains in Colorado and New Mexico — all have had sufficient fall to cut deep river channels faster than erosion in this desert climate could wear away the banks.

The master drainage pattern of the region consists of this series of rivers flowing in places through deep gorges or canyons, together with many lateral tributaries, both with and without permanent streams that usually enter through deep side canyons. These also have numerous laterals that enter through smaller and shallower channels. This whole system cuts much of the terrain into an intricate pattern of extremely rough physiography inimical to easy travel. Many narrow places in these canyons form natural damsites for reservoirs.

Complicating this drainage pattern are a series of mountains and uplifts that lie across the paths of the rivers or alongside the streams and give impetus to their tributaries. The Green River in northeastern Utah and northwestern Colorado has cut deep and winding canyons through the east end of the Uinta Mountains, and after traversing the Uinta Basin it cuts through the high Tavaputs Plateau. Beyond this, it is again entrenched in deep canyons before it joins the Colorado, also in a deep canyon. Beyond the junction, the Colorado traverses the deep narrow Cataract Canyon and leaves Utah through the colorful winding Glen Canyon.

These streams are flanked by a series of remarkable laccolithic mountains which have been lifted by subterranean igneous intrusions. These include the Henry Mountains west of the river, the La Sal and the Abajo mountains on the east side, and the Navajo Mountain south of the junction of the San Juan and Colorado rivers. These extremely interesting geological phenomena illustrate the ways by which the igneous masses have lifted the sedimentary strata up into domes or have broken through and piled the igneous rock in high mountain peaks, leaving broken strata tilted up the slopes. All of these mountain slopes

are drained by washes or deep canyons with steep gradients down to the river in the bottom.

The character of the cliffs and canyon walls varies largely in accordance with the characteristics of the rocks through which they are cut. Soft rocks usually erode into slopes, harder rocks into ledges and cliffs. Some rocks are gray; others are brilliantly colored shades of yellow, brown, red, or purple. Most spectacular cliff maker of all is the Navajo red, yellow, and white sandstone which lines the walls of Glen Canyon throughout its 170 miles of meandered length, forms the majestic walls of the "towers and temples of the Virgin River" at Zion Canyon, and forms the higher elements of the Vermilion Cliffs that stretch much of the way across country from Tuba City, Arizona, to St. George, Utah, broken here and there by folds and faults that shift the rock layers into irregular and spectacular positions.

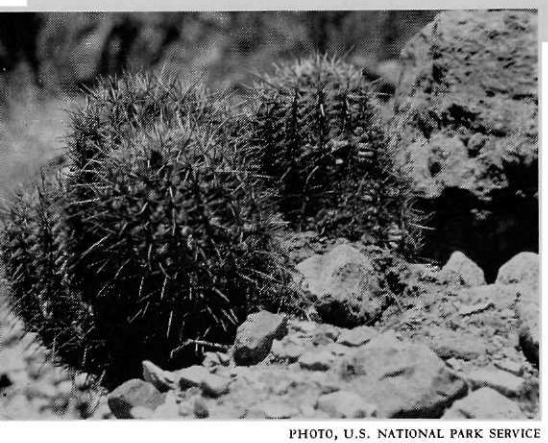
Other rock layers both above and below the Navajo also erode into interesting cliffs and canyons. Some of the rougher and more spectacular canyon and cliff lands are found along Green River where it cuts through the east end of the Uinta Mountains, the Tavaputs Plateau, and the Colorado Plateau where it joins the Colorado River. Others occur along the Colorado River almost all the way from the Colorado-Utah border to the Utah-Arizona line, much of the way being dissected by side streams entering through deep gorges. Some of the rougher areas on the east side are found along Indian Creek, Gypsum Creek, Dark Canyon, and the San Juan River. On the other side, similar spectacular areas are found along the Frémont-Dirty Devil streams, the Escalante River, and a score of smaller drainages. These form the heart of the Rough Country in Utah.

The sparse precipitation of the lowlands is usually stored in the soil, except when rain falls faster than it can be absorbed in the ground and some of it runs off. Sandy soil usually absorbs all the water that falls on it. Bare rock absorbs water slowly, and much of the rainfall runs down the slopes. Other bare soils are intermediate. Vegetation adds to the absorbent quality of soils, and usually the more vegetation and litter on the ground the better they hold water.

Below 6,500 or 7,000 feet altitude precipitation is usually inadequate to supply enough water to fill the soil reservoir, but above that altitude there may be more water than the soil can hold, and some of it may run off the surface or be drained away underground to emerge at some distant place in seeps or springs. Wherever these underground channels (aquifers) are cut by washes or canyons, there the water emerges and helps to swell the streams flowing down the channels.

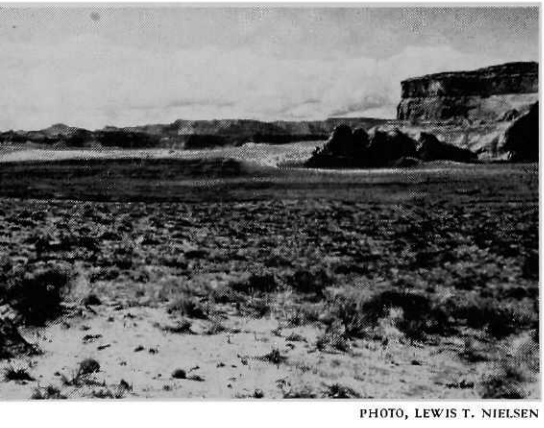
PHOTO, BUREAU OF RECLAMATIO

Streamside plants use wate profusely but those on terraces abou the water are more parsimonious



PHOTO, U.S. NATIONAL PARK SERVICE

Desert plants must be mor than parsimonious



PHOTO, LEWIS T. NIELSEN

Blackbrush — typical desert scru vegetation on th Glen Canyon mesas

Where bare soil or rocks are exposed, the energy from sunshine rapidly evaporates the soil water near the surface, but that at deeper levels is available to plants whose roots penetrate the soil to that depth. Plants that cover the soil and protect it from sunshine reduce this evaporation but must deal with the sunshine energy themselves. Many of these plants, such as the cacti, are adapted to resist heat-induced evaporation. The water flowing in stream channels saturates the soil along the banks. The amount of soil moisture available for plant use is one of the most important regulators of the kinds and distribution of plants and their associated animals in this region.

In the mountains and alongside the streams that flow downward through the desert region, where water seeps into adjacent soil, many kinds of plants occur, especially those that use water profusely for internal use and for evaporative cooling. Farther down the mountain slopes and farther away from the streamsides where water is more restricted, plants that survive must be more parsimonious in the use of water. Those on the lowland deserts which depend entirely upon erratic desert precipitation must not only be parsimonious but also must be equipped to provide conservation measures and water storage facilities within themselves. Associated animals also must be equipped to meet severe water shortages.

Consequently, lush forest vegetation and shrubbery are found in the mountains, along the streamsides, and in shaded north-facing nooks and narrow canyons protected from the intense desert sunshine. In the foothills below these lush forests occur pigmy forests of juniper and piñon pine, often mixed with the ubiquitous sagebrush of foothills and lower mountain slopes. Behind the streamside trees and willows that line riverbanks are usually found old stream terraces now several feet above high water mark covered with semidesert bushes whose roots obtain capillary water drawn from the water in the stream banks.

Below the extensive belt of sagebrush and pigmy conifers and behind these old terraces are the scrub desert plants. In the northern part of the basin in Utah, the scrubby shadscale type of vegetation occupies the low foothills and valleys except where they have been displaced by cultivation. In the southern part of the basin, the blackbrush type replaces much of the shadscale and dominates the scene on most of the mesas and benches overlooking the canyons. The irregular physiography breaks these generalized belts into thousands of irregular patches that remind one of the pattern of a crazy quilt.

These groups of vegetation have characteristic animals associated with them. The green vegetation along the streamsides has large num-

bers of beavers, several kinds of other rodents, a few lizards and snakes, and many kinds of birds. The lush vegetation of the mountains is the favorite haunt of the mule deer in summer, but these game animals generally move down into the pigmy conifers of the foothills for winter. A few straggling bands of mountain sheep still linger in some of the isolated rough spots of the Rough Country.

The low desert areas are much less productive of wildlife than the highlands. In the open desert areas, where vegetation is sparse and low, there is little chance for shelter or protection for animals of ordinary size. Such areas are usually occupied by animals such as lizards, snakes, birds, and rodents that are specialized for life under extremely harsh conditions of the environment. These reptiles and rodents ordinarily find shelter in underground burrows usually made by the rodents. One bird of open deserts, the burrowing owl, also finds shelter underground but usually makes its own burrows.

The outstanding denizen of such open deserts with low scrub vegetation is the horned lark, that ubiquitous bird, seen singly, in small, or in large groups by nearly all desert travelers everywhere in the basin. This lark, colored to match the desert vegetation, lives mainly upon small seeds of desert plants available nearly all year round and is equipped to meet both the harsh environment of intense cold and chilling winds of winter as well as the burning desert heat and drought of summer. A common visitor of significance is the little desert sparrow that comes north to spend the summer in the blackbrush on the mesas.

Where low desert areas are interspersed with large rocks, ledges, cliffs, or canyons, other interesting combinations occur. Hawks, eagles, owls, swallows, swifts, and wrens are some of the more conspicuous or common birds, and bats that emerge at night are common mammals of the cliffs. Wood or pack rats are especially worthy of mention. There are at least five kinds in southeastern Utah, and their telltale mounds of sticks and rubbish betray their presence in many places, especially among scrubby trees, bushes, or rocky places. One who has not heard the melodious descending trill of a canyon wren perched in a crevice in a high cliff has missed a thrilling experience of the Rough Country.

The coyotes, foxes, ring-tails, skunks, and the long-clawed digging badger are some of the wide ranging carnivores not confined to one type of vegetation. Small lizards are occasionally seen almost everywhere. Of special interest is the yellow rattlesnake which ranges through most of the Colorado Basin in Utah where there is much yellow sand in its environment. On the east side of the river where there is much more red sand, the same snake has more pink in its color.

The main rivers themselves contain several species of fish, mainly catfish, suckers, chubs, and carp except in the higher and cooler waters, especially in the mountain tributaries, where trout abound. Ducks and other water birds alight on streams and ponds, and shore birds wade along the banks.

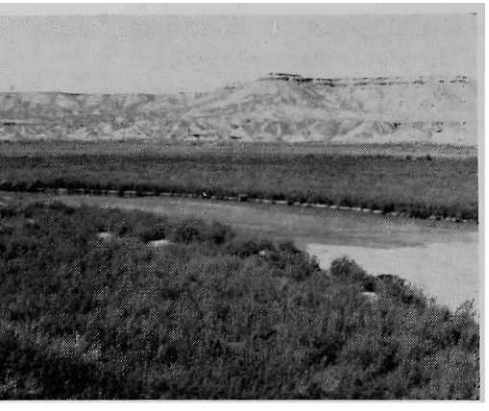
This is the physical and biological setting into which the development of the Utah portion of the Upper Basin of the Colorado River is projected. Both will be changed by the development. Roads and reservoirs will make paths of travel into regions formerly inaccessible. Power lines leading from damsites will traverse the region and make power available in many places where mining or other industries may use it. Water may be diverted from the bottom of deep canyons onto lands where it can be used for many purposes — culinary, industrial, mining, agricultural.

Reservoirs can provide sport and recreation facilities that will take many people into magnificent scenery and enchanting landscapes otherwise unavailable to the public. At present, settlements are perched on the brink of the Rough Country ready to follow any opening that will permit penetration of heretofore inaccessible regions. In addition, there is a human tide from our whole country, and even the world at large, that will follow any opening into this scenically remarkable region.

In a world of great paradoxes, where on one hand populations are increasing at such unprecedented rates that the threat of overpopulation is called a "population bomb," and on the other hand people are gaining more and more leisure time and demanding more and more recreation opportunities, something must be done in both directions. It is well known that about one third of the earth receives an inadequate natural water supply. Anything that can be done to supply arid lands such as those in Utah with supplemental water will help to ease the threat of the "bomb" until such time as research can bring better regulation of population numbers.

Development of the Upper Basin can help supply water for arid lands and can also help supply the demand for recreation, thus serving a double purpose. Both roads to the damsites and boating on the reservoirs can open travel to great aesthetic scenic areas, such as those of Glen Canyon and Flaming Gorge. The reservoirs not only serve other functions but create additional problems.

Reservoirs will turn silt-laden streams into clear-water lakes which will trap and hold cold water of winter and transform the fauna of muddy-water stream fish into a fauna of clear-water lake fish and make new habitat for waterfowl. When the cold water of the bottom is

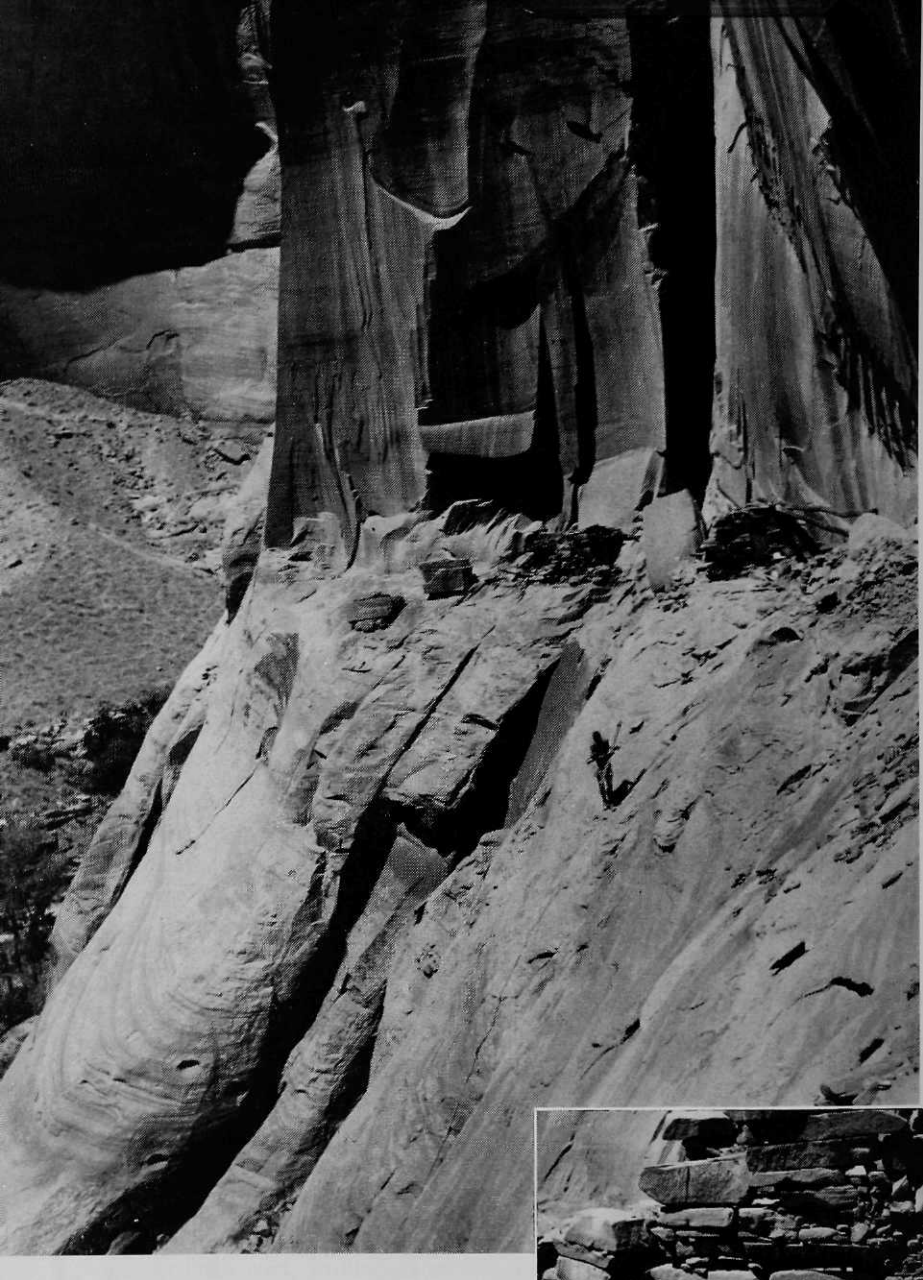


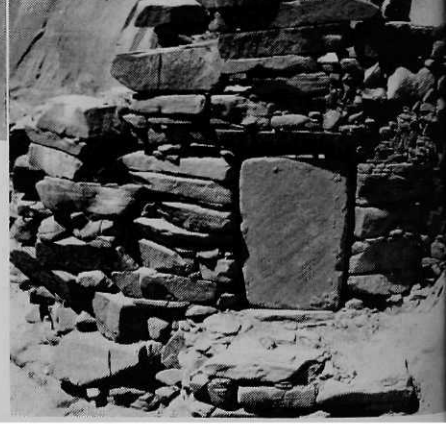
After twenty-two years the Virgin River delta in Lake Mead, extending from hill to hill across the valley, stretches many miles in length and is densely covered with tamarix.

drained from the reservoirs, it will transform the formerly warm muddy streams below the dam into cool-water streams habitable for trout.

The reservoirs that transform muddy streams into clear-water lakes usually trap most of the sediment at the points where the streams enter. As the years pass, deltas at the mouths of these streams will push farther and farther into the reservoirs, leaving long stretches of relatively level land in their wake as was done in Lake Mead at the mouth of the Virgin River. It has been estimated that a reservoir would fill with sediment in two or three centuries, but the building of more reservoirs will distribute the sediments in more places and lengthen the life of each. It is possible that some of them will last three, four, or even five centuries before they are completely filled.

Long before the last reservoir is filled with sediment, the lengthening deltas may be used for something else. What use will be made of them remains for the future to decide. If they are maintained as parts of national parks or monuments, they may well serve as centers for visitors, from which splendid scenic features could be viewed or other forms of recreation enjoyed. If not needed for these purposes, the question might arise whether the water-loving willows and other streamside plants with roots immersed in soil water, lavishly dissipating moisture into the air from the deltas, might well be replaced by more purposeful use. If so, such deltas could well become scenes of pastoral beauty filled with fertile farms, prosperous homes, and rural towns situated among the beauty spots of the rest of the Rough Country surrounded by some of the most scenic areas of the world.





Fence Ruin in Wilson Canyon
and a close-up of one of the structures.

Along all the major tributary streams of the Upper Colorado River, the remains left by many centuries of Indian history can be found. Cave and overhang locations were generally favored for settlement.

ALL ILLUSTRATIONS COURTESY DEPARTMENT OF ANTHROPOLOGY, UNIVERSITY OF UTAH

THE ABORIGINAL PEOPLES

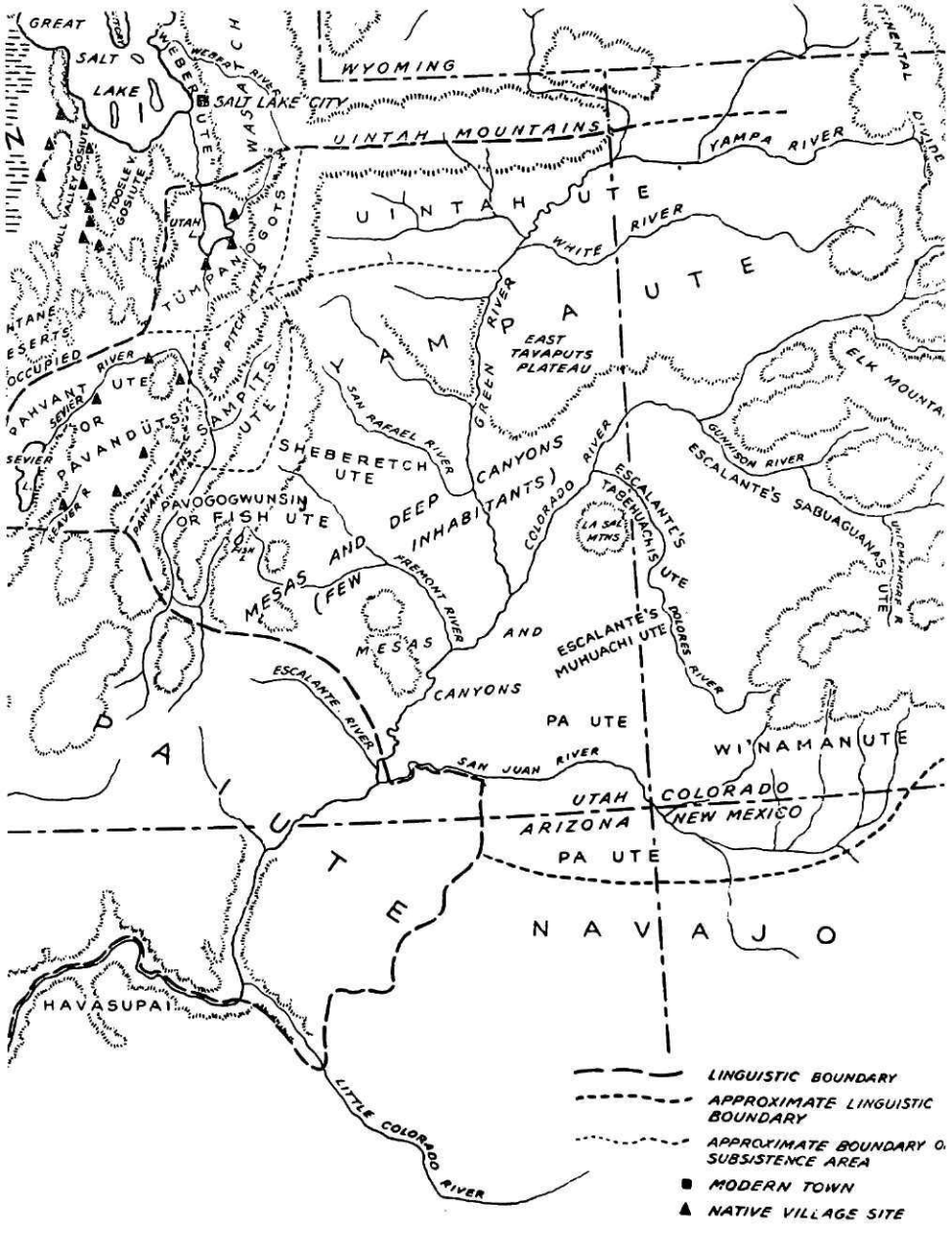
*By Jesse D. Jennings**

From fabled Flaming Gorge on the Utah-Wyoming line to Lee's Ferry just below the Utah-Arizona line is a distance of over 425 river miles. In this distance nearly all the major tributaries of the Upper Colorado River may be found. The Green and Yampa Rivers join just east of the Utah-Colorado line; the Green continues southward to lose its identity as it merges with the Colorado near Moab, Utah. With the addition of the San Raphael, Dirty Devil, San Juan and Escalante rivers, and scores of shorter streams, the Colorado collects all the Upper Basin waters as it traverses the rough country of southeastern Utah. Along the banks of all the streams the remains left by many centuries of Indian history can be found.

The latest in time, of course, were the historic Indians (now on reservations or scattered over the state in the general population) largely displaced by the pioneers after 1850. In most of eastern Utah, where the Green and its tributaries flow, the territory was held by the several Utah bands. By regarding the various bands shown on the map as one people, the Upper Colorado River Basin can be shown as dominated by the Ute tribesmen. In extreme southeastern and south-central Utah along the San Juan River and Glen Canyon, the Southern Paiute were found.

The differences in custom between the Paiute and the Ute until

* Professsor Jennings is former head of the department of anthropology, University of Utah. Under his authorship a related piece, "Early Man in Utah," appeared in the January, 1960, issue of this magazine.



Map showing eastern Utah tribes, taken from Julian Steward, "Basin Plateau Aboriginal Sociopolitical Groups," Bureau American Ethnology Bulletin 120 (*Washington D.C., 1938*).

about 1650 were negligible. Both were typical Great Basin tribes. Their languages were similar, belonging to the same Uto-Aztecan stock. They were dependent upon the same food resources, which they exploited with similar technologies, although the better watered Ute country was richer in food stuffs than the Paiute range to the south. By the time of white contact, however, the Ute had taken on a veneer of Plains culture such as the horse and the furnishings (saddle, blanket, etc.), the tipi, some semblance of large band organization, the lance and shield as weapons, as well as some warfare tactics. A recent student of the Ute divides Ute history into five periods which mark the continued reduction of the tribe as an effective aboriginal force.

The pre-horse period was characterized by a subsistence economy which was based primarily on gathering. Hunting was an individual undertaking rather than a communal one, and large game animals had to be eaten where they were killed since no adequate method of transporting the carcass of a bison or an elk, or a bear, existed at that time. Basketry, the wickiup, the bow and arrow, the net, and the rabbit-fur cloak were material culture elements in the Ute pre-horse culture.

The primary social group was the biological family unit. Larger groupings occurred in the fall when wild seeds could be harvested, and in winter when family groups lived near these caches of food. Spring and summer found the family groups scattered over a wide expanse of territory, since the inhospitable environment could not support large groups with the technological equipment for exploiting the natural surroundings possessed by the Ute at that time.

Ceremonial life was restricted to the Bear Dance, held in the spring just before the temporary winter villages broke up, and certain social dances such as the Round Dance, which were held whenever conditions permitted. Crisis rites were emphasized. For women the onset of menstruation was marked in a ceremonial fashion. There were restrictions on both the mother and father when a child was born. Burial practices were designed to carry the family through the period of readjustment that the removal of a member would entail.

The principal religious figure in pre-horse culture was the shaman. Through [the] supernatural powers [which] he controlled, the shaman was able to cure the sick, discover witches, control the weather, and predict the future. The shaman was a specialist in the sense that he filled a special role in the culture, but there probably was not enough demand for his services for him to procure a living thereby.

The post-horse, pre-White-contact period was marked especially by changes in the subsistence economy, and in social organization. The acquisition of the horse allowed new and more efficient methods of hunting to be practiced. Hunting communally, a number of mounted men were able to surround, kill and transport back to a central location small herds of large game animals. Out of communal hunting practices grew bilateral bands, somewhat nebulous in character at first, but eventually crystallizing. They

were composed of unrelated families and were not landowning, but they were named, and had a political unity, strengthened by need for protection in warfare.

As the new methods of hunting reduced the game herds, competition for hunting grounds grew. Horses were needed to exploit what hunting there was, and horses came to be regarded as wealth. Eventually the Ute were forced to seek the bison herds in the Plains to the east of the Rockies, where they came into unfriendly contact with Plains tribes. They were raided both for their horses and for trespassing by Arapaho, Cheyenne, Sioux, and Wind River Shoshone, and the Ute learned the Plains war patterns in this fashion.

Leadership qualities in men came to be recognized, both for civil and war activities, and individual leaders became known outside of the small band. Occasionally small bands associated themselves together under the leadership of one of these widely recognized men for purposes of raiding or defense. Hatch mentions the Uintah being organized into four subbands all under allegiance to one man.[1]

Religion met a new need during this period. The growing importance of warfare gave an impetus to seeking individual powers for warfare. Guardian spirits gave individuals protection against enemy bullets, as well as luck in hunting, gambling, and love. Supernatural powers came in dreams, and such dreams were often sought by sleeping in places inhabited by the spirits controlling the powers. Shamanism continued to be important in combating sickness, and wounds received in battle were treated by shamanistic individuals.

Period 3, the White-contact period, was foreshadowed by the influx of fur traders in the 1830's. The Indians received rifles about this time and met the incoming Mormon settlers in 1847 on equal terms. The settlers took over the fertile, watered valleys for their farms and consequently reduced the number of food animals and plants upon which the Ute had subsisted. Some of the bands turned to raiding the settlements as a substitute for hunting, and between 1850 and 1870 occasional trouble broke out between the two peoples. By 1870, however, the Ute had become dependent on Government rations for a large part of their subsistence and were kept in check fairly well by the threat of withdrawal of this support, and period 4, the reservation period, began.

By 1880 almost all of the Ute north of the Colorado River were on the present Uintah and Ouray Reservation. They turned to farming . . . to make up the difference between the amount of Government rations issued and the amount of food needed to stay alive. In this period consolidation of the various bands of Northern Ute into three large bands was accomplished. The present Uintah, White River, and Uncompahgre bands are a result of this consolidation. . . .

Peyotism was introduced about 1916 by a Sioux medicine man. This religion was underground until 1937 when it was legalized and protected,

[1] T. W. Hatch [Communication in] *Rep. Comm. Indian Affairs for 1862*. Cong. Doc. series #1157. P. 204.

but informants say that 20 years previous to this most of the fullbloods were members of peyote groups.

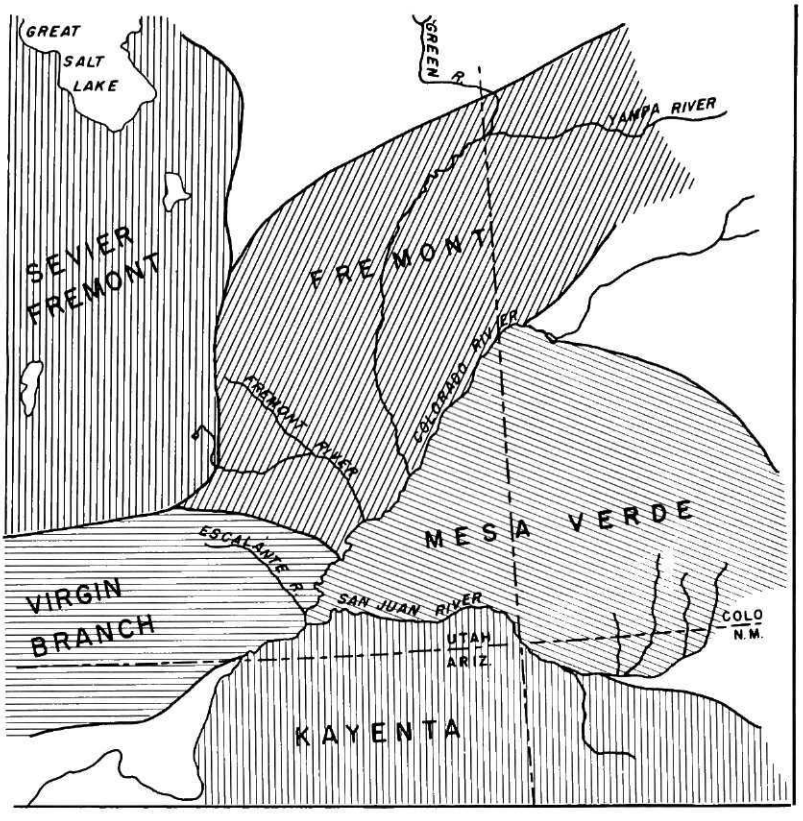
The reorganization period started in 1937 after the ratification of the Ute Constitution, and the subsequent election of the Tribal Business Committee. Since its inception, the Tribal Business Committee has been controlled by the mixed-blood faction on the reservation, and has become more and more unpopular with the fullblood majority in the tribe. For the first time in the history of the tribe, the political power was placed in the hands of a group who were activated by a desire to conform to White culture standards. . . .

Peyotism functions as a year-round integrating factor for fullbloods, and is the principal mechanism to combat disease on the reservation. The Sun Dance has become a political integrator, and is the dramatic symbol of the native culture around which a revivalistic movement is growing.[2]

The Southern Paiute held much less favored land. Prone to wander and visit, these tribesmen are known to have been fewer and more impoverished than their Ute relatives. Even though Southern Paiutes were farmers as early as 1776, they nevertheless remained weak and scattered and were in reality the typical desert gatherers or foragers seen all over the Great Basin (as were the Utes before getting the horse). Professor Omer Stewart, who has studied the Paiute extensively, finds that they were skillful exploiters of a hostile land, adapting their annual diet to seasonal resources of all kinds. They hunted large game if available by means of traps, falls or surrounds; small game, especially rabbits, were taken in nets by means of communal hunts or by single hunters. But no animal was safe. Food included wolf, coyote, fox, badger, cats, skunk, beaver, ground squirrels and gophers, even down to rats and mice, and fish where they were available — all were taken and eaten. Vegetable foods ran into scores — seeds, roots, blossoms, nuts and fruits and stalks were collected, gathered, and eaten. Surpluses were stored and used in winter or other times of scarcity. The Paiutes, by some standards, lacked color. Impoverished and feeble as their culture was there was a simple religious system, focused on the Shaman or "spiritual specialist." There were dances — the bear dance and round dance — invoked both socially and ritually. Society was simple and the tribe was weak, but the Paiute ability to exploit an empty land and survive therein excites our admiration and respect even today.

The historic period is not well understood. There was little sympathetic contact during the early periods of white use of the state; hence the record is really quite hazy and inexact. When one turns to prehis-

[2] J. A. Jones, Anthropological Paper No. 47, *Bureau of American Ethnology Bulletin 157* (Washington, Smithsonian Institute, 1955), 236–39.



PREHISTORIC CULTURES OF EASTERN UTAH AFTER I A.D.

toric times, however, he finds that more is known about the early prehistoric periods than about the poorly documented era of historic contact. For example, the well-understood Pueblo cultures of the Southwest are represented all along the Upper Colorado system.

There are, of course, several regional variants of the Pueblo culture in the American Southwest. The northern Pueblo groups in Colorado, Arizona, and Utah are called Anasazi; the Anasazi are in turn divided into smaller local groups which differ from each other enough to warrant, for study purposes, separate designations. Specifically, throughout most of eastern Utah there is the Frémont culture. Nearest to it is the richest and best known of all—the Mesa Verde—the variant found most heavily in San Juan County; south of the Colorado and San Juan rivers is the Kayenta of northern Arizona, while to the west is the closely related Virgin River Branch, and in the whole of western Utah

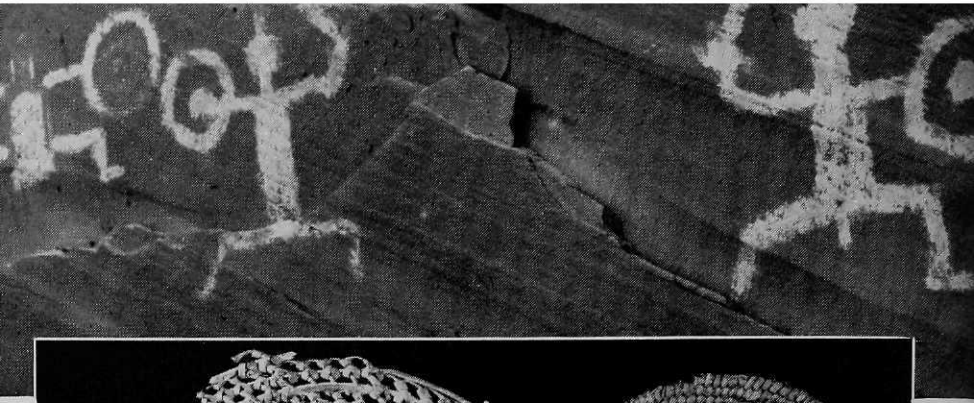
is the Sevier-Frémont variant — the latter much resembling the Virgin Branch but also very reminiscent of the Frémont of the eastern half of the state.

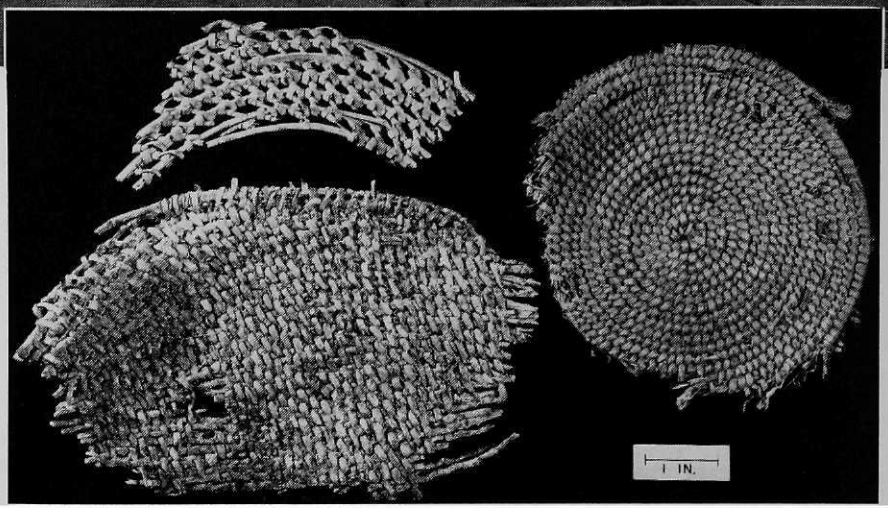
These cultures, which existed during the period from about A.D. 100/200–1300, can be described in general terms as follows: Descended from earlier desert peoples, these Anasazi cultures were primarily focused on horticulture. Greatness and strength rested on three great plants domesticated by American Indians from indigenous plants — maize, beans and squash — rich nutritious plants superbly suited to the semiarid plateau climate, a trio providing a stable food supply. These reliable crops permitted an increased population and the consequent building of towns and villages of ever-increasing size. Through successive historic culture stages the dwellings evolved from single pit houses to vast communal masonary structures where dozens and dozens of families lived. The mature culture was rich in things both spiritual and material. Religion and complicated rituals focused on crops and fertility. *Kivas* (Key-vahs) were sacred, reserved for men and their performance of ritual. Craftsmanship in all technological skills was prized. Utensils of pottery, wood, and basketry were abundant and well made. The Mesa Verde potters excelled in black and white wares of exquisite formal beauty, to say nothing of quantities of textured (corrugated) gray pottery wares for both cooking and storage. Work in turquoise, imported sea shells, and feathers adorned many pieces which would today be classed as jewelry or other costume ornament. In engineering and architecture—using only mud mortar and local stone—these people achieved results seen nowhere else north of Mexico. Their crude irrigation practices concentrated upon spreading flood run-off or diverting water to terraces built on hill sides. Large dams or complex distribution canals seem never to have existed.

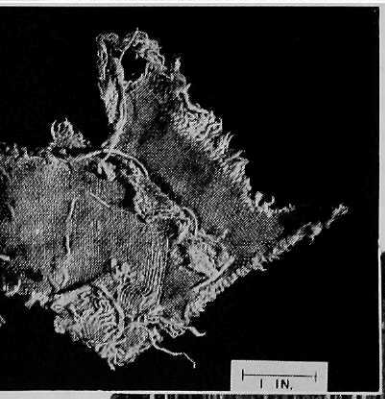
Peaceful and numerous, the people appeared to have had no strong political or social alliances, and rarely is evidence of warfare found.

The Mesa Verde peoples and their cultural achievement are usually used as a high standard, against which other peoples are measured. The other cultures differed (to mention but a few of the specific details in each case) from the richer and more elaborate Mesa Verde in these ways.

The closely related Kayenta and Virgin branches are generally regarded as being simpler with less concentrated populations. Architecture is less skilled and the villages are smaller. Red pottery, made from different materials, is characteristic. Cooking vessels were often smooth and plain, not corrugated; pit houses, stone masonry and post-mud





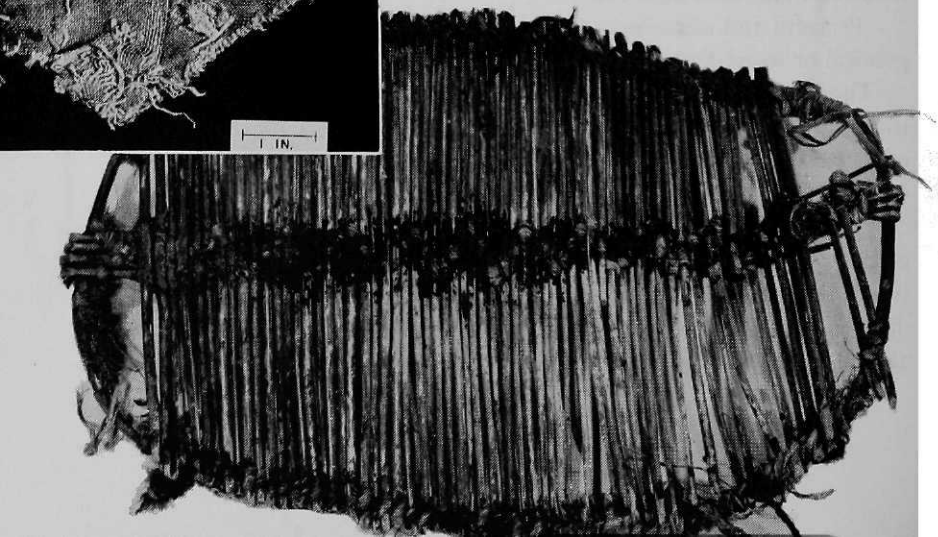


Anasazi artifacts. Top, pictographs nearly four feet high which give the name to Defiance House in Forgotten Canyon.

Basketry fragments from various Glen Canyon sites.

Cotton cloth from the Alvey site on Escalante River.

Cradle Board from Catfish Canyon.



(called *jacal* — pronounced Hah-kahl) were built and occupied contemporaneously, as if there were no preferred architectural style. The *kiva* construction was less rigorously held to the formal pattern seen in Mesa Verde. Settlements were usually small, presumably housing only one clan or lineage; these villages were customarily on low knobs or other eminences overlooking the farmlands, which exploited ground waters or surface run-off waters, channeled onto fields, in what has been called "diversion irrigation." Recognizably puebloan in all things — pottery, agriculture, basketry and other things — these local specializations are distinctive and interesting in their own right.

The Frémont culture is found, in varying degree, over all east Utah. Whether it is most nearly related to Mesa Verde or Kayenta is not easy to decide. In its earliest form about A.D. 200–400 in Mantle's Cave on the Yampa River, it seems to have had traits about equivalent to those seen in the Mesa Verde of Basketmaker times. But it, perhaps by being remote from continuous contact, fell behind the fast-moving Mesa Verde development, and it always remained simpler in form than the Mesa Verde. By A.D. 900 the Frémont along the Glen Canyon of the Colorado and northward seems to have resembled the Virgin Branch in pottery techniques and decoration, in the mixed architectural tradition, the choice of homesites and in other ways, but the Frémont peoples never gave up a fairly heavy dependence on game. This persistence of the use of game and wild foods may possibly represent a sparcer population and less pressure on the game supply or it may very well represent a conservative retention of the foraging subsistence techniques of the earlier desert lifeway. In any case, the Frémont has several diagnostic characteristics (workers in different parts of the area see distinctions from one Frémont province to another) which lend a distinctive interest to the study of this mixed but oddly stable culture. Villages are usually small and on eminences; architecture is varied — *jacal,* mud and stone-shaped adobe, "turtle" shaped adobe elements, pit houses with stone slab lining, or above ground structures — all are found. Pottery techniques, decoration, and form seem to resemble the Virgin Branch Kayenta more than the Mesa Verde. All of these local cultures — Mesa Verde, Kayenta, Virgin Branch and Frémont — are under study at present in the salvage program (which includes archeology, history, and ecology) now going on in the Glen Canyon of the Colorado River.

Before the time of Christ, however, the country was not deserted. Archeological work on the Yampa River in the vicinity of Vernal on the Green, in the La Sal Mountains near Moab and in Colorado reveals

the presence of a longlived, very simple culture called the Desert culture, found over most of the West.

After A.D. 1 the higher Pueblo cultures actually developed from this archaic stage after the introduction of corn agriculture, pottery and stone masonry from the south — through Arizona from Mexico.

The eastern Utah version or variant of the Desert culture is called the Uncompahgre complex. Cliff overhangs and caves were the preferred dwelling places for the Uncompahgre peoples. Their culture, like all Desert cultures, was a highly specialized though simple way of life geared to exploitation of all nature's biologic resources. The traits by which we know the Uncompahgre complex are almost entirely hand tools and utensils. Characteristic of the complex were slab-lined storage cists for surplus foods, hearths or fireplaces of several simple styles, small polished stone pendants and other ornaments, a variety of chipped stone points, knife blades, and scraping-cutting tools. One special style of scraper, made from a thick flint blade and an adze-like form are regarded as unique to the Uncompahgre complex. There were also hammer stones, crudely shaped grinding or milling stones, for crushing grass seeds, bone awls for basketry work, bone beads and rabbit fur robes. A simultaneous dependence on both plant and animal food is implied by the grinding stones on the one hand and a wealth of animal bones (such as mule, deer, mountain sheep, rabbit, lynx, pronghorn, and prairie dog) on the other. Both kinds of debris occur on all the sites so far investigated. At the Hell's Midden excavation on the Yampa River, the Uncompahgre complex is seen to blend smoothly with, and be displaced by, the early Frémont culture of the area.

In the Glen Canyon of the Colorado, a part of the river soon to be inundated, all the cultures mentioned have been identified in varying strength. The Colorado River has actually seemed to form a kind of boundary, but no real barrier to contact and exchanges between all these separate subcultures.

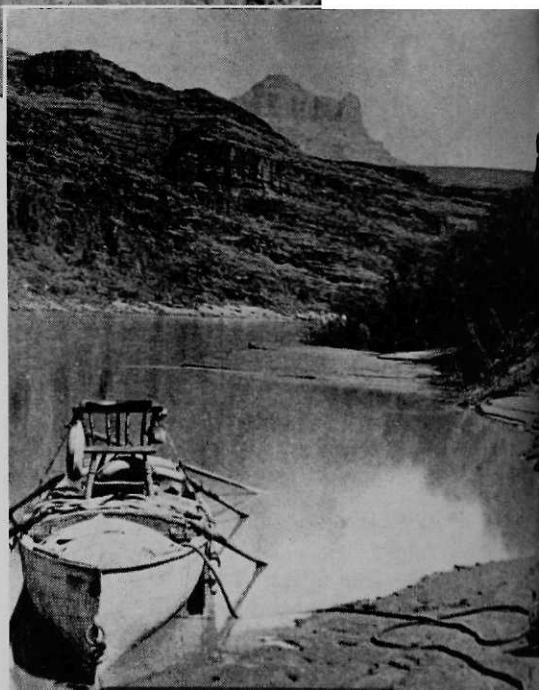
In summary it can be said that the Upper Colorado River Basin of Utah has been exploited for millenia by aboriginal Americans. These were (1) the foragers of the Desert, here called the Uncompahgre complex of the Desert culture. (2) These desert people were either displaced by, or may even actually have evolved for themselves, the far-better known and elaborate Anasazi (Pueblo) cultures of general knowledge. (3) With the disappearance of the Pueblo cultures by A.D. 1300 there is a gap in knowledge until 1776 when Father Escalante penetrated the area, to report for the first time the presence of scattered Ute and Paiute bands over the entire area. These bands roved and roamed,

never developing any significant strength in numbers or in political organization. These poverty-ridden tribes and subtribes were displaced by the Mormons in Utah and by the miners and stockmen in Colorado, finally to come to rest on reservations in the Uinta Basin by 1870. By virtue of their weakness and their scanty numbers the basin tribes were subdued and displaced by the white settler with no significant hostilities except for the "Walker War" in which only a handful of persons were injured or killed.

Today, in addition to the Ute reservations, there are Navajos in the Navajo Reservation in the Utah lands lying south of the San Juan, but these are recent comers whose lifeway has been omitted from this account.

PHOTO, J. K. HILLERS

Major John Wesley Powell (1871 expedition) inquiring for the location of a water hole of a native near the Grand Canyon.



The Emma Dean, *Powell's especially constructed boat named for his wife, in which he led the river expedition of '71.*

From his knowledge gained of the Colorado Plateau country, Powell attained a concept of the land in relation to water needs which became the basis for the irrigation and later the conservation movements so vital to the settlement of the West.

POWELL OF THE COLORADO

*By William Culp Darrah**

"Civilization was born in arid lands. Taking the world at large, most of the agriculture of the world has depended upon irrigation for more than four thousand years. The largest populations have depended upon irrigation, so it is an old problem." So spoke Major John Wesley Powell, director of the United States Geological Survey to the North Dakota Constitutional Convention on May 5, 1889. Continuing, he said, "Through the years I have watched the march of progress across the continent and have seen all of the western half of America grow up as it were from wilderness."

America, born in the humid East, had grown into the arid West.

When the white man crossed the wide Missouri and occupied the West to build a future for himself and his posterity, he was faced with a challenge-land with scant water. Forests covered the mountains, grasslands spread below them, and vast expanses of arid land stretched across the high plains. How desert, how fertile, how reclaimable were these dry lands, no one knew. Streams there were, and many of these were soon taken up by homesteaders, cattlemen, and miners. When the high tide of emigration from the humid East forced settlement of less favored

* Mr. Darrah is associate professor in botany at Gettysburg College, Pennsylvania, but has spent years in research and writing on the career of John Wesley Powell. He edited and annotated Powell materials used in volume XV of this magazine, "The Exploration of the Colorado River in 1869" (1947), and prepared introductions and edited the "Journal of John F. Steward" which appeared in volumes XVI–XVII, "The Exploration of the Colorado River and the High Plateaus of Utah in 1871–72" (1948–49). His book, *Powell of the Colorado*, appeared in 1951.

land, the nation, not only the settler, was face to face with the age-old problem of land use.

The growing pains of the young nation — or to use the slogan of the conservationist, "the greatest good for the greatest number" — could not be alleviated by platitudes or promises. Conflicts of interests, ignorance of facts, inexperience and misbeliefs — these were the obstacles to fulfillment.

When, in 1868, Major Powell crossed the great divide to explore a route to supply his proposed exploratory survey of the Colorado River, he met for the first time the Mormons in Utah. He recognized at once that these people were adjusting themselves and their institutions to a new environment. New customs, new laws, and new techniques were gradually developing out of experience and necessity.

Major Powell, during the next nine years, crisscrossed the Colorado Plateau country and adjacent highlands, and became acquainted with the Mormon settlements, the Indian tribes, the land, its vegetation cover, and the river system. Gradually there emerged from his thinking a concept of the land which became the basis for the irrigation and later the conservation movements. This concept involved the capabilities and limitations of land and man's utilization of land in accordance with those capabilities. Powell more than anyone else in the nineteenth century sensed the unity of man and his environment.

On April 24, 1874, Major Powell appeared before a congressional committee to express an opinion concerning the reorganization of the various rival geographical surveys of the western territories then in progress. In the midst of the discussion Powell made the following statement:

> About two fifths of the entire area of the United States has a climate so arid that agriculture cannot be pursued without irrigation. When all the waters running in the streams found in this region are conducted on the land there will be but a small portion of the country redeemed, varying in the different territories, perhaps from 1 to 3 per cent. Already the greater number of smaller streams such as can be controlled by individuals who wish to gain a livelihood by agriculture, are used for this purpose. The larger streams which will irrigate greater areas, can only be managed by co-operative organizations, great capitalists or by the General or State Governments.

This was the first public utterance on the limitation imposed upon the public domain by the scarcity of water. Powell argued that settlers, even in groups, could utilize only small streams and that some novel approach had to be found to utilize water from large streams to bring under cultivation other areas. Nothing came of this flurry in 1874; in-

deed, during the next fifteen years Major Powell had many occasions to repeat his arguments but found very little understanding or sympathy for his views.

In 1877 Major Powell was invited to address the National Academy of Sciences, a distinguished body organized during the Civil War years to advise the government on matters of technical importance. The title was simply "The Public Domain." Although but one of many papers on the program, it caught the attention of alert newsmen in the metropolitan newspapers of the East. The New York *Tribune* for April 28, summed up Powell's remarks in this fashion:

> The present land system of the country is not at all suitable for the area of the arid region. In the whole region, land as mere land, is of no value. What is really valuable is the water privilege. Rich men and stock companies have appropriated all of the streams and they charge for the use of the water. Government sections of 160 acres that do not contain water are practically worthless. . . . All the good public lands fit for settlement are sold.

There were many allusions in this address to the divergent interests of cattlemen and homesteaders, but the core of the argument was simply, no more good lands were available for a homesteader under the existing system of separation of the public domain. Late in 1877 Powell completed his *Lands of the Arid Region,* though it was not until the following April that the manuscript was submitted to the General Land Office for publication. This work, a highlight in American conservation, is one of the classic philosophical approaches to the problem of man and the land. The first edition of only eighteen hundred copies was quickly exhausted. A year later a second edition of five thousand copies was printed and distributed.

The primary purpose of Powell's report was to classify the lands of the semiarid West into three types based upon potential use, irrigable lands, timbered lands and pasturage lands. He regarded irrigable land as limited to stream bottoms, or to low elevations to which water could be easily conducted. The timbered lands were forested areas generally restricted to high elevations which were natural timber producers. Pasturage included all of the land which supported a greater or lesser grazing coverage.

By far the most revolutionary aspect of Powell's report was the series of proposed laws intended to bring man, land, and water into close union. He suggested that the minimum size for a grazing ranch should be four sections or 2,560 acres. To a congressman from a humid eastern state with generous rainfall, where a farm of 80 acres would pro-

vide a good living for a large family, this was a monstrous travesty. Furthermore, Powell recommended that these range units be organized into self-governing pasturage districts, with settlers so grouped that schools, churches, and other community services could be provided even in remote areas. Similar to the pasturage district was the proposed irrigation district based upon available water supply and ignoring the usual surveyor's boundary lines—topography not geometry, utility not symmetry.

These proposals passed through the hands of Powell's superiors, arriving ultimately in the Public Lands Committe of the Senate where they died quietly without action.

To say that nothing was accomplished during the period 1870 to 1880 would be an injustice as well as an inaccuracy. Irrigation grew in scope and complexity in Utah, Colorado, and California. Nearly all of these enterprises involved private capital and a considerable degree of co-operation. Yet conflicts between grazing men and homesteaders dependent upon agriculture led to violence and antagonisms which continue in some degree to the present time.

In 1879 the competitive geological and geographical surveys of the western territories were abolished, and in their place was organized the United States Geological Survey, a service developed mainly along the plans suggested by Major Powell. The distinguished geologist, Clarence King, was appointed the first director, but it was generally understood in Washington that King had merely accepted this position temporarily. Major Powell assumed the directorship in 1881.

Once in the administrative chair, Powell used the power and the machinery of his office to push for a survey of the public lands which would include water and soil resources. He campaigned actively in public and in private for the creation of an irrigation survey extending over the arid and semiarid West. There is no point in this brief story to relate the many contributing factors that made this an almost impossible objective. Perhaps the American people were not ready to accept the responsibility, perhaps they were not yet educated to the problem. At any rate, in March, 1888, through the efforts of a small group of scientific men and interested congressmen, the latter under the leadership of Senator William Stewart, of Nevada, a joint resolution was submitted to Congress calling upon the Secretary of Interior "to make an examination of that portion of the United States where agriculture is carried on by means of irrigation as to the natural advantages for the storage of water for irrigation purposes, with the practicability of constructing reservoirs together with a capacity of streams and the cost of construction and the capacities and such other facts as bear on the question."

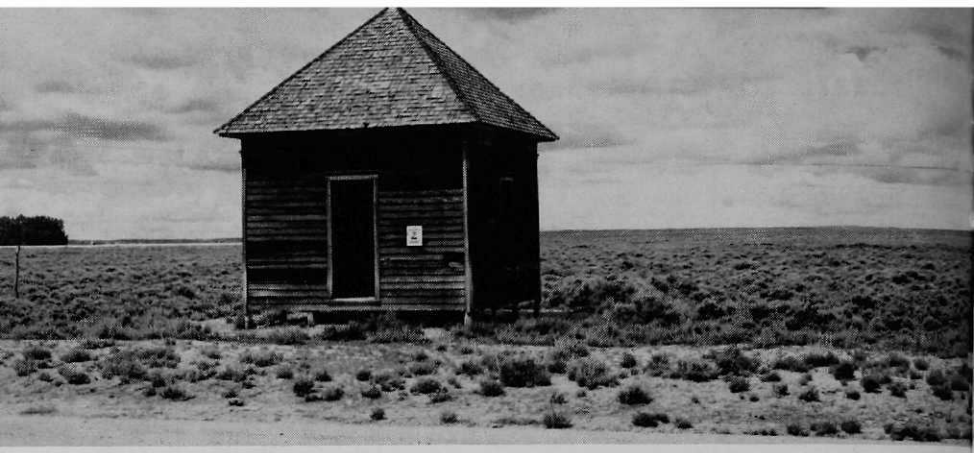
The words were Powell's. The plan was Powell's. The philosophy was Powell's.

Since the United States Geological Survey was the only organization qualified to undertake such a project, Congress charged the survey to do the work and appropriated $100,000 to commence an irrigation survey. Field work was begun immediately in New Mexico, Colorado, Nevada, and Montana. A training camp was established on the Rio Grande River at Embudo, New Mexico, to instruct men in the technical methods to be used the following year.

Let us look at the scope of this survey! It did not specifically authorize the construction of a single irrigation work. All it really did was to authorize an investigation of the water capabilities of the various streams and the types of engineering constructions that could utilize the water. Here again was the heavy hand of Powell. He realized that it would be "penny wise and pound foolish" to throw up dams until the most advantageous sites could be determined. On the other hand, there was keen disappointment and bitter resentment among settlers and politicians who saw only that the initial appropriation and a subsequent sum of $250,000 was used up in study and mapping without diverting water to a single acre of land. Senator Stewart became a vindictive opponent as did a number of other western congressmen. Powell found increasing opposition to his irrigation survey so that it was abolished in 1892. Powell did certify several sites, including Bear Lake, Utah, and Clear Lake, California, for reservation as future reservoir locations, but for all practical purposes the irrigation survey was dead. No further progress in the surveying of the arid region with respect to its water potential was undertaken for many years. Unofficially, however, the various geological surveying parties were instructed to accumulate hydrological data which became useful in 1902 when the Bureau of Reclamation was established.

Major Powell, though thwarted, continued to command an influential position as an advocate of extensive irrigation in the United States. In 1889 when addressing the North Dakota Constitutional Convention, he warned the convention delegates that they must develop water policies and a settlement pattern which would fit the environment:

> The state of North Dakota has a curious position geographically in relation to agriculture. The eastern portion of the state has sufficient rainfall for agricultural purposes. The western part has insufficient rainfall and the western portion is practically wholly dependent on irrigation. In the western portion all dependence on rains will ultimately bring disaster to the people.



PHOTOS, BUREAU OF RECLAMATION

In great measure through the vision of Powell, thousands of arid but reclaimable acres such as the above will be turned into fruitful life-sustaining areas when the great irrigation projects of the Colorado River Basin now in the planning and construction stages are completed.

Powell was sought by many organizations to speak on behalf of irrigation. His public record was well known. Few doubted his sincerity or the soundness of his experience. Nevertheless, it became increasingly clear that a popular irrigation movement based on wishful thinking rather than on information was gaining recognition in the United States.

The Great Plains had been subject to severe drought from 1889 to 1891. The very region, said by Powell to be held by nature in perpetual bondage, was devastated by the catastrophe. Disheartened farmers abandoned their farms and returned eastward to more humid land. By now a number of new techniques with local application were looked upon with special favor, artesian wells, windmills, and many others. It was widely believed that even the disastrous drought of 1890 might have been succored if artesian wells had been available.

The drought years put momentum into the irrigation movement, and it mushroomed with the optimism of its most zealous proponents. Organizations, local and regional, sprang up under the leadership of William E. Smythe, of Nebraska, and R. J. Hinton, of New Mexico. In 1893 the First International Irrigation Congress gathered in Los Angeles with several hundred delegates from more than twenty states and territories and a dozen foreign countries. One of the slogans was "a million forty acre farms" to be developed by irrigating lands in the public domain. Major Powell had prepared an address "The Water Supply of the Arid Region" for this meeting, but was so horrified by the misleading propaganda, that he put it aside. Rising to the rostrum Powell acknowledged the chairman, turned to the audience and began:

I have decided on the spur of the moment not to present the paper I have prepared, instead I shall tell you a few facts about the arid region.

I wish to make clear to you, there is not enough water to irrigate all the lands; there is not sufficient water to irrigate all the lands which could be irrigated, only a small portion can be irrigated. It is not right to speak about the area of the public domain in terms of acres that extend over the land but in terms of acres that can be supplied with water. Gentlemen it may be unpleasant for me to give you these facts. I hesitated a good deal but finally concluded to do so. I tell you gentlemen, you are piling up a heritage of conflict and litigation of water rights, for there is not sufficient water to supply the land.

Mr. Smythe cried out addressing the Major, "Why do you admire our platform? We have said we have homes for a million more people, you say we have not." Powell was interrupted from the floor and the

disappointment of the delegates was evident to even the casual observers in the back of the hall.

These circumstances induced Powell to continue his own campaign for a more accurate understanding of the public domain and its water problems. He wrote three articles for the *Century Illustrated Monthly* and a number of shorter pieces for various other magazines. In all of them there is a common argument: There must be equitable division of water among the states, but there are no laws to implement such a division; the role of the federal government must by necessity increase in scope and authority as these projects become bigger and bigger.

> Millions of money must be used. Who shall furnish it? Great and many industries are to be established. Who shall control them? Millions of men are to labor. Who shall employ them? This is a great nation; the government is powerful. Shall it engage in this work? This then, is the proposition I make, that the entire arid region be organized into natural hydrographic districts each one to be commonwealth within itself. The plan is to establish local self-government by hydrographic basins.

Powell, more than any other one person, was responsible for bringing about reforms in federal land policies. He did this, not by pointing to the frauds and dishonest practices — of which there were many — in securing title to valuable lands, but rather by informing and cajoling those in positions of power and responsibility about the natural and scientific problems of land use.

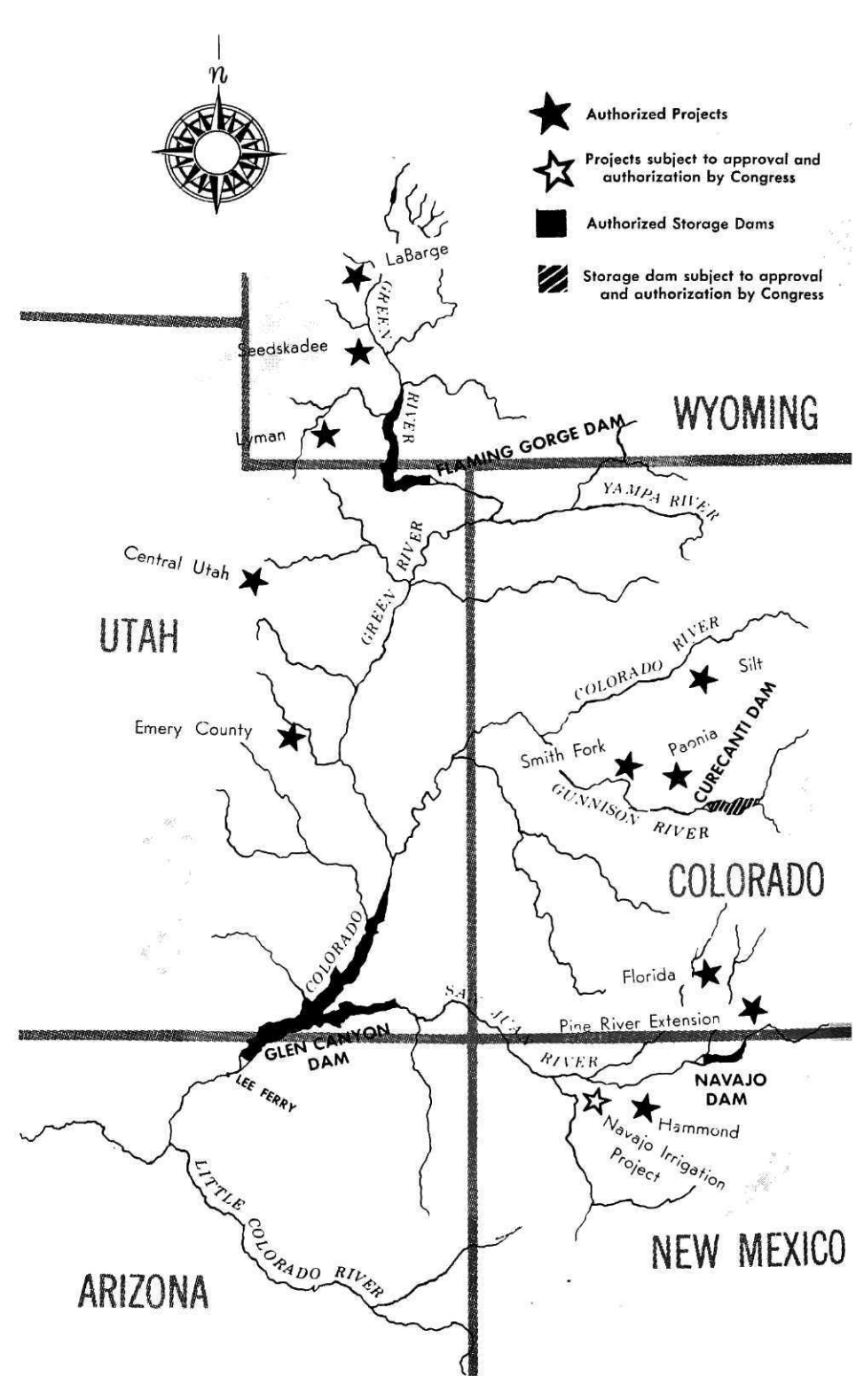
Although Powell's own geological investigations were concerned chiefly with the arid regions, and hence irrigation potentials, on a broader scale he realized that the *national* problem was land classification, an inventory of land resources such as the world had never known before — wet lands as well as dry, forest as well as desert, mining lands as well as grasslands or agricultural.

President Theodore Roosevelt in 1902 signed the bill creating the Bureau of Reclamation, giving the American people an agency to administer and develop wise conservation practices and to engineer and construct large irrigation works. Its first director, Frank H. Newell, the chief engineer, Arthur Powell Davis, and most of the staff were recruited from the Major's "boys" of the old irrigation survey. Powell, now crippled by a stroke and angina, near the end of his fruitful life, took keen interest in this tangible success after so long a struggle. Newell and Davis visited their old chief to pay their respects and receive his well wishes.

In the years that have elapsed since Major Powell's death in September, 1902, many of the problems he foresaw grew in proportion until

they have become national issues. The accuracy of his judgment has been proven in many ways. On one side he envisioned massive engineering works, multipurpose projects, democratic co-operation to achieve them. On another even greater side was his belief in this three-fold relation: capability of the land, the needs of people, the equitable distribution of opportunity — or to say it another way, the limitations of nature, the physical and spiritual wants of man with humanitarian or Christian ethics to bring them in balance. In this sense Major Powell is the real father of the American conservation movement. He chose the federal government as his place to work and the public domain as the object of his study and stewardship. He had a prominent part in shaping federal policies which subsequently developed the pattern of irrigation and conservation in the American West. This is not to say that Powell was aways right or seldom wrong; rather it is to remind the present generation that the massive works such as Hoover Dam and Glen Canyon Dam represent grand scale efforts for the greatest good for the greatest number, efforts which began with small people with big ideas, implemented at public expense by the only social institutions capable of undertaking the work.

We shall not soon forget Major Powell's self-appointed role in the irrigation movement in the United States.


N
Authorized Projects
Projects subject to approval and authorization by Congress
Authorized Storage Dams
Storage dam subject to approval and authorization by Congress
LaBarge
GREEN
Seedskadee
RIVER
Lyman
FLAMING GORGE DAM
WYOMING
YAMPA RIVER
Central Utah
GREEN RIVER
UTAH
COLORADO RIVER
Silt
CURECANTI DAM
Emery County
Smith Fork
Paonia
GUNNISON RIVER
COLORADO
COLORADO
Florida
SAN JUAN RIVER
Pine River Extension
GLEN CANYON DAM
LEE FERRY
NAVAJO DAM
Hammond
Navajo Irrigation Project
LITTLE COLORADO RIVER
NEW MEXICO
ARIZONA

"he Colorado River, the last undeveloped Water Hole," is the key to the industrial nd agricultural development of the West. "he Colorado River Storage Project will rovide the water needed to conquer this ast great frontier.

RECLAMATION AND THE COLORADO

*By Jay R. Bingham**

The House of Representatives on March 1, 1956, took decisive action on one of the great resource development projects of our time. This project so vital and significant to the progress of the Upper Basin States was, at the same time, one of the most comprehensive and controversial pieces of legislation to come before the national Congress. House approval, by a vote of 256 to 186, will long be remembered as the turning point in Reclamation on the Colorado. It is true that this action was preceded by Senate approval and that later authorization was given by the President of the United States, but the crucial decision was made by the Representatives. Their action climaxed the efforts of many in the long struggle to subjugate the Colorado River.

The publisher of *Time* magazine recognized, on March 12, 1956, the future implications of the House vote when he wrote:

> Last week a branch of our Government took an action so very good for the country, that the editors of *Time* and I like to think that we, along with much of the Daily Press, can associate ourselves with this progressive step.
>
> After last week's decisive vote in the Congress, we are sure we share with many other editors and publishers across the Nation a sense of gratification that an informed public opinion helped to bring the Upper Colorado River Basin development to the verge of reality.

The same informed public opinion that helped bring the Upper Colorado River Basin development to the verge of reality was instru-

* Mr. Bingham is executive director of the Utah Water and Power Board.

mental in passing the Reclamation Act of 1902 to assist in reclaiming the arid west. On that occasion Senator Hoar of Massachusetts took a long look into the future when he said:

A reclamation of these arid lands will be almost like adding a new continent to our domain — a vast expanse opened for the employment of the energies and the activities of our people.

As our nation grew west in the years that followed, federal participation in reclamation helped the people to cope with the task of watering the arid lands.

Throughout the years that man has attempted to tame, control, develop, and equitably apportion the waters of the Colorado, the problems have been numerous, complex and profound. Even the early explorers reacted to this formidable barrier. Lieutenant J. V. Ives in his report to the War Department in 1857, after a steamboat expedition 400 miles up the Colorado River, wrote:

Ours was the first, and doubtless will be the last, party of whites to visit this profitless locality. It seems intended by nature that the Colorado River, along the greater portion of its lone and majestic way, shall be forever unvisited and unmolested.

The Colorado River is many things to many people. It has proved to be a challenge to missionaries, gold seekers, an allurement to trappers and traders, explorers, a means of sustenance to immigrants, pioneers and settlers. Trappers' tales and Indian legends told of a mysterious, unknown land, of the river with great falls and whirlpools, a stream that ran underground for hundreds of miles. Precipitous canyon walls and barren wastes added to the awe and obstacle.

The Colorado River is a river of many contrasts. It rises high in the snow-capped mountains of the Continental Divide, flows over 1,400 miles southwesterly, finally disgorging in the Gulf of California at sea level in a foreign country. In its turbulent course to the sea, the Colorado River drains 242,000 square miles of the Continental United States. The drainage basin is 900 miles long, and in the upper reaches, 300 miles wide. Its tributaries extend into seven large western states. It is the longest river, and has the largest watershed, of any major river system except the Mississippi. The upper basin is high and generally mountainous with grassy valleys, but the lower basin is mostly desert-like, with an altitude usually only a little above, sometimes below, sea level.

The Colorado River has gouged in the crust of the earth one of the most spectacular incisions in the world — the Grand Canyon. This

chasm, extending 200 miles in length and 12 miles in width, is a mile deep. In 1540 Cardenas discovered the Grand Canyon, but was unable to descend its treacherous slopes. It is significant that over two centuries elapsed before a crossing was made in the canyon section.

Navigation never extended very far inland, nor was traffic very heavy, yet it was probably the first use made by white man of the main Colorado River. In 1830, a stern-wheeler boat reached Fort Yuma; and in 1851 similar trips were made by a boat named *Uncle Sam*.

In 1843 Jim Bridger had established a trading post on a branch of the Green River. In the twenty years prior to the establishment of Fort Bridger, traders, trappers, Mountain Men and explorers had rendezvoused on the upper Green River. By 1840 the beaver had been depleted so that this was no longer a profitable operation.

The Mormon Battalion, on its famous march from Santa Fé to San Diego, marked a wagon road across the lower Colorado in 1846. The original band of Mormon pioneers crossed the upper Green River near Fort Bridger in 1847 and established a settlement at Salt Lake City.

The gold seekers of 1849 crossed the Green River in Wyoming, and the Colorado near Yuma and Needles in the lower basin. By 1854 the Mormon pioneers had established themselves at old Fort Supply in Wyoming on Black's Fork. They soon were diverting water for agricultural purposes. In that same year the first agricultural endeavor in the Colorado River Basin in Utah was established on two tributaries of the Virgin River which is a part of the Colorado System — Fort Harmony on Ash Creek, and Santa Clara on the Santa Clara River near the present town of the same name. Development of the Uinta Basin was slowed by the establishment of an Indian reservation in 1861, and lands unoccupied by the Indians were not open to settlement until 1905.

In 1880 one of the epic stories of Western colonization was enacted when early settlers from Parowan and Cedar City made their courageous journey through the Hole-in-the-Rock to reach the bed of the Colorado River, crossed the river and proceeded eastward to establish the town of Bluff, near the Four Corners area.

Settlement in the Colorado River Basin proved to be slow and arduous, and on a small scale. Most developments were scattered along the tributaries. For many years mining in the entire Colorado River Basin was the leading industry, but declined in relative importance as development of irrigation proceeded. By an odd coincidence the settlement in Colorado extended from the Continental Divide down into the valleys. Many who came seeking fortune failed in their quest and turned to farming to supply food to the mining camps.

Cattlemen were attracted to the expansive grazing in many sections. Colonization was attended by a constant search for a satisfactory irrigation water supply. Early settlers migrated to areas more readily irrigable. Even the high tributaries fed from lakes with eternal snow failed to provide an ample supply during the summer season. In all reaches of the Colorado, particularly on the Virgin, settlers had a continual struggle with floods. Many established towns were abandoned. Dams were washed out. Crops withered as the floods ravaged the farms and homes.

Settlement continued in spite of hardship. Price, Utah, succeeded in putting a large area under cultivation only to find that a cut back was necessary because of an undependable water supply. Established communities at Green River depended for the most part on pumping, with some early upstream diversions established on a small scale. Elsewhere, in Emery County, on the tributaries to the Colorado, hardy settlers carved out canals and husbanded the meager water supply. In the San Juan country the original colonizers of Bluff established the town of Blanding, and on the Colorado main stem Moab became an important outpost.

Even though the Colorado River system drains nearly 49 per cent of the area of the state of Utah, the 1940 census showed that only 12 per cent of the state's population resided in the basin. Estimates of the 1960 population indicate that 8.9 per cent of Utah's population will reside in the Colorado River Basin, even with allowance for uranium and oil activity in the region. The sparse settlement of Utah's portion of the Colorado Basin can be contrasted to the national average of 44.2 people per square mile, 6.5 for the state of Utah as a whole, and 1.6 for that part of Utah in the Colorado Basin.

Large scale development of the waters of the Colorado River System in Utah awaited the passage of the Reclamation Act of 1902. One of the first projects to be undertaken under this program was the Strawberry Valley Project. This granddaddy of Utah reclamation projects, constructed in 1913, has been highly successful. For a cost of 3.3 million dollars, a three and three-quarter mile tunnel diverts water from the 270,000 acre-foot Strawberry Reservoir into southern Utah County. This water which formerly wasted into the Colorado and out to the Gulf of California now waters 45,000 fertile acres. In another five years, every cent that the United States government invested in the project will have been returned to the federal treasury.

A dramatic effect of the Strawberry Project is reflected by the assessed valuation of the southern part of Utah County which jumped

from $6,271,000 in 1911, to $30,558,000 in 1920, with most of the increase being attributable to the project.

Elsewhere in the Colorado River Basin early reclamation projects were the Uncompahgre and Grand Valley projects in Colorado, and the Yuma and Salt River projects in Arizona.

Later, reclamation projects consisting of tunnels at Spring City and Ephraim were added to bring precious Colorado River water into the heavier populated areas of the west slope of the Wasatch Range. The Duchesne Tunnel, bringing waters from the North Fork of the Duchesne to the Provo, was constructed as a part of the Provo River Project. Reservoirs were built at Moon Lake and Midview in the Uinta Basin, and Scofield Reservoir on the Price River was enlarged.

In the entire Upper Basin, improvements in transportation, the opening of scenic areas, the accessibility of markets, and a general westerly migration were putting more pressure on the limited and erratic water supplies. Smaller reservoirs and diversions were added by private effort, but in the main the development of the Upper Colorado in Utah, as in her sister states of Wyoming and Colorado, was lagging behind the development of the Lower Basin.

In 1905 the Colorado River at flood stage picked up the swollen Gila River, the flood crest broke through the cut of the Alamo Canal four miles below the international boundary, and the swirling, angry waters gushed unchecked for sixteen months into the below sea level Imperial Valley and the Salton Sink. Homes were wrecked, farmland, highways and railroads were flooded. The flood helped form the Salton Sea, a huge lake nearly 300 square miles in area. Only after great difficulty and expense was the breach repaired.

The Colorado River in its lower reaches in carrying its heavy silt load raised the heights of its bed at the rate of ten feet of silt per year. The river at flood stage overtopped the levees, left its old channel and caused havoc.

Lower Basin interests clamored for flood control, as well as storage to regulate the low season supply. At the same time, Lower Basin users realized that it was risky to develop large-scale diversions from the river, when over 90 per cent of the flow of the river originated in the upper reaches. In the Upper Basin, Utah and her sister states were looking with apprehension on further development in the Lower Colorado, fearing that these uses would establish a priority which would adversely affect future Upper Basin projects.

All states tributary to the system had a strong desire to maintain their interests in this great western resource without federal domination.

Yet the federal government could not be ignored in this case because this was not only a stream common to seven states, affecting many federal properties, but had international aspects as well.

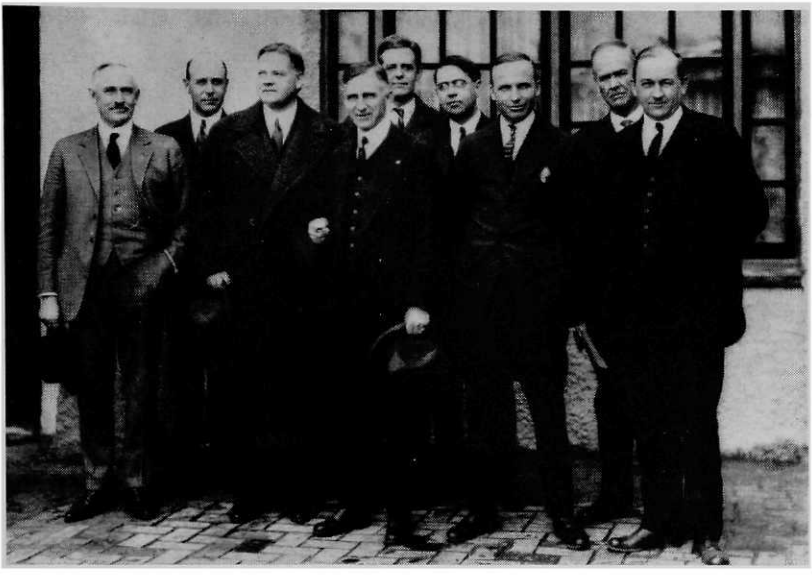
These conditions set the stage for the historic compact of 1922. At the suggestion of Delph E. Carpenter, of Colorado, the governors adopted a plan of proceeding under the treaty-making powers of the states to negotiate with the federal government and state representatives for an equitable apportionment of the waters of the Colorado River System. In addition to the precedent setting exercise of the treaty powers of the states, it is perhaps the first time in the history of man that the complete and total utilization of a river system has been decided upon in advance of actual use.

With the procedures approved by the governors and legislatures of the various states, the federal Congress added its consent to the proposal on August 19, 1921. On January 26, 1922, the Colorado River Commission was organized with Herbert Hoover, Secretary of Commerce, as federal representative and chairman. Following organizational meetings in Washington, public hearings were held in Phoenix, Los Angeles, Salt Lake City, Grand Junction, Denver, and Cheyenne. A final session at Santa Fé, New Mexico, November 24, 1922, resulted in the signing of the Colorado River Compact.

The negotiators had failed in their attempt to allocate the waters of the river among the seven states. In view of the difficulties, they crystallized on a plan to divide the waters between the Upper and Lower Basin.

The principal importance of the compact was its definition of the purposes for which water could be used beneficially — in order of priority — and provision for an equitable distribution of water supply. The water resources were to be developed for the total basin rather than by states or subdivisions. The water was to be divided between the Upper and Lower basins. Lee Ferry, Arizona, was the point of division. The compact apportioned 7,500,000 acre-feet of water annually to each of the basins, in perpetuity, for beneficial consumptive use. To the Lower Basin it granted the further right to increase its beneficial consumptive use by 1,000,000 acre-feet. The water apportioned was only that which was considered to be the "dependable" flow, and apportionment of the excess was to be made after October 1, 1963. The Upper Basin could not deplete the stream flow at Lee Ferry below a total of 75,000,000 acre-feet for any period of ten consecutive years.

In 1923 the compact was submitted to the several state legislatures, and was promptly ratified by all the states except Arizona. Several



COLORADO RIVER COMMISSION

Front row (left to right), W. S. Norviel, Arizona; Herbert Hoover, chairman; R. E. Caldwell, Utah; Frank C. Emerson, Wyoming; James G. Scrugham, Nevada; Back row (left to right), Delph E. Carpenter, Colorado; Clarence C. Stetson, executive secretary; Stephen B. Davis, Jr., New Mexico; W. F. McClure, California; framers of the historic 1922 Compact.

actions were taken by some states, particularly California and Utah, concerning whether or not the compact had to be ratified on a six- or seven-state basis. In 1928 Congress enacted the Boulder Canyon Project Act (the Swing-Johnson bill), which was signed by President Coolidge on December 21, 1928. The act became binding if ratified by six of the seven states within six months' time. In 1929 Utah and California ratified the six-state compact.

Utah thus gave its sanction to the Colorado River Compact and the Boulder Canyon Project Act, both of which were prerequisites to construction of Hoover (Boulder) Dam, the All-American Canal, and Coachella Canal and other lesser projects.

Lower Basin development moved into high gear. Hoover Dam, 726 feet high with a reservoir capacity of 29,827,000 acre-feet, was completed in 1935. This dam represents development of one of man's mightiest structures, controlling for the first time the errant Colorado. The threat of floods was removed, large diversions into Imperial Valley in southern California resulted. Power — a by-product of the development — was produced economically and in abundance.

Before Upper Basin development could begin, the states faced the necessity of dividing the block of water granted them by the 1922 compact. Many years of study and negotiation were required to reach agreement. Finally, on October 11, 1948, at Santa Fé, New Mexico, the Upper Colorado River Basin Compact was signed.

The consumptive use of the water allocated to the Upper Basin States by the Colorado River Compact of 1922 was apportioned by the Upper Colorado River Basin Compact of 1948 as follows: Colorado, 51.75 per cent; New Mexico, 11.25 per cent; Utah, 23 per cent; Wyoming, 14 per cent; and Arizona, an amount not to exceed 50,000 acre-feet per year.

With this distribution finally effected in the Upper Basin, planning began in earnest to bring the waters from the deep chasms of the river to the farms and cities in the Upper Basin. A master Basin-wide plan, following the concepts of the early planners, was detailed and reported by the engineers of the Bureau of Reclamation on December 4, 1952.

The plan officially designated the Colorado River Storage Project and Participating Projects was favorably commented upon by the seven states of the Colorado River Basin during December of 1953 and January of 1954. Comments by eighteen federal agencies followed.

Authorizing legislation was introduced by Upper Basin congressmen, and hearings before committees of the House and Senate began. Testimony and national propaganda generated by conservation groups waged a bitter and emotional campaign against the project, primarily because of the proposed Echo Park Dam on the Green River in northwestern Colorado. Conservationists, aided by Lower Basin interests in California, contended that construction of the Echo Park Dam would, because of its location in the Dinosaur National Monument, constitute an invasion of the National Park System. Proponents of the bill cited the long list of power and reclamation withdrawals dating from 1904 which contemplated water development in the area, and the provisions in the executive order enlarging the monuments making reservations for construction of Echo Park Dam. The bill, with Echo Park included, was passed by the Senate on April 20, 1955, by a vote of 58 to 23.

Strategists in the House advised deferring Echo Park and substituting Flaming Gorge in order to get development started. The combination of opposition from conservationists, antireclamationists, and conservation-minded congressmen, was thought to be too formidable to risk defeat or further delay.

The Colorado River Storage Project, consisting of four dams and eleven participating projects in the Upper Basin, passed the House that

PHOTO, BUREAU OF RECLAMATION

The technical skill, the adventurous spirit and daring of the men engaged in building the mammoth dams of the great Colorado River Project is typified by these workers on the walls at the Glen Canyon damsite.

memorable day, March 1, 1956. President Eisenhower, a staunch supporter of the project, signed Public Law 485 on April 11, 1956, and on October 15 triggered an explosion at both Glen Canyon and Flaming Gorge setting the project in motion.

The storage features of the project consist of the Glen Canyon Dam on the Colorado River near the Utah-Arizona border. This 700-foot high concrete dam will store 28,040,000 acre-feet of water, and the power plant will have 900,000 kilowatts of installed generating capacity.

Flaming Gorge Dam, located in northeastern Utah on the Green River, cuts into the north flank of the Uinta Mountains. The 490-foot high concrete arch dam will store about 3,800,000 acre-feet of water in a reservoir reaching ninety-one miles upstream to Green River, Wyoming. Three generating units of 36,000 kilowatts capacity each will be installed in the power plant.

Navajo Dam on the San Juan River in northeastern New Mexico will be a large earth and rockfill structure. It will stand 400 feet high and create a thirty-five-mile-long reservoir with a capacity of 1,709,000 acre-feet.

The Curecanti unit in western Colorado will consist of two or three dams, with a combined storage capacity of 1,000,000 acre-feet, and power plants on a short reach of the Black Canyon of the Gunnison. Final engineering details are being developed.

Of the participating projects, Utah has the large Central Utah which includes the enlargement of the Strawberry Reservoir to 1,663,000 acre-feet. The project will serve 28,600 acres in new farms, 131,800 acres receiving a supplemental supply, and 48,800 acre-feet annually for city and industrial water supply. Four power plants will produce 61,000 kilowatts.

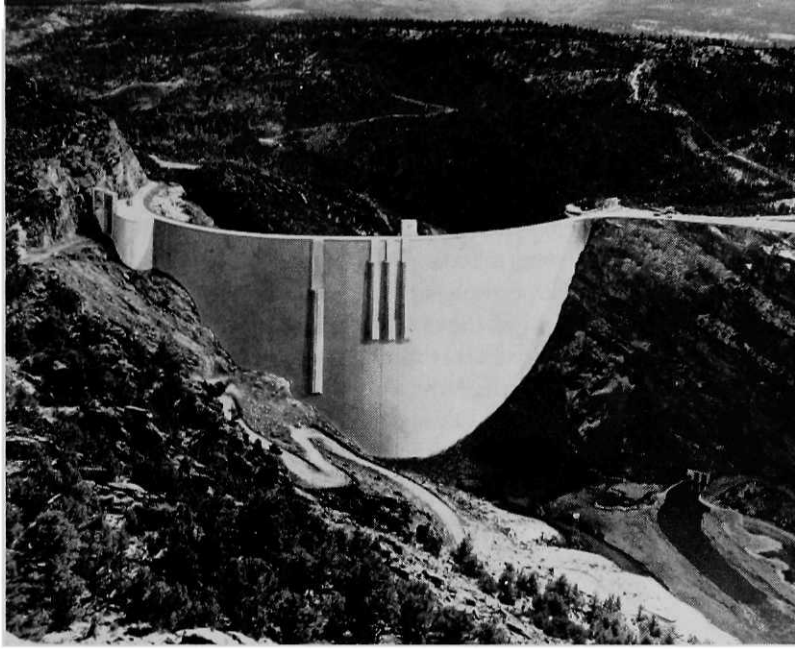
The Emery County Project in Utah will serve 3,600 acres in new farms, and 20,500 acres needing a supplemental supply. The main feature will be the 50,000 acre-foot Joes Valley Reservoir.

The Wyoming participating projects are the Seedskadee, La Barge, and Lyman.

Colorado will have the Paonia, Silt, Smith Fork, and Florida projects.

New Mexico has the Hammond Project authorized.

It is realized, however, that construction is dependent upon federal appropriations to transform the blueprints and plans into dams, tunnels, pipelines, and canals to serve our needs. The entire Congress must be resold each year in order to keep construction on schedule.



PHOTOS, BUREAU OF RECLAMATION

Artist's conception of the Flaming Gorge Dam as it will appear when completed, looking downstream from visitor's viewpoint. Dam will be a concrete, thin-arch type, 490 feet above bedrock.

Operations at the Flaming Gorge damsite. Heavy equipment excavates river channel for the foundation of the dam between upper and lower cofferdam. Intake structure of diversion tunnel is on extreme right.

The federal government has an interest in the states of the Upper Colorado River Basin that well justifies the investment they are making to develop the resources of the area. In Colorado, 38 per cent of the area of the state is federally owned. In New Mexico, 45 per cent, in Wyoming, 52 per cent, and in Utah the total federal ownership amounts to 72 per cent of the area of the state. The combined federally owned area of the four states is in excess of 408,000 square miles. This represents an area larger than the combined total area of the states of New York, Pennsylvania, Ohio, Indiana, New Hampshire, Massachusetts, New Jersey, Connecticut, and Rhode Island. This large federal ownership limits the tax revenues which would normally be available to the states, and on the other hand considerable income from the federal lands within the borders of the states of Utah, Wyoming, Colorado, and New Mexico accrues to the federal treasury. The Congress has wisely provided that part of the revenues from public lands are to be credited to the Reclamation Fund. These accretions to the reclamation fund from the sale of public lands and the proceeds from the Oil Leasing Act amounted to a total of 31.6 million dollars for fiscal year 1959.

The harnessing of the Colorado River for the benefit of the people of the state of Utah and the other Upper Basin states is proceeding on schedule. Work is now under way on three major storage dams — the Glen Canyon, near the Utah-Arizona border, the Flaming Gorge in northeastern Utah, and the Navajo in New Mexico. Work is likewise under way on the Vernal unit of the Central Utah Project. Completion of this irrigation feature will be realized in 1961. Final reports on the comprehensive Central Utah Project, which might more aptly be described as an enlargement of the original Strawberry Valley Project, is in the final planning stages. The Emery County Project, which would provide a 50,000 acre-foot reservoir at Joes Valley on Cottonwood Creek, will be under construction within two years.

These projects represent a great accomplishment by the leaders and the citizens of Utah. They will help harness our greatest remaining resource, and yet Utah will still, after the completion of these projects, be a long way from a solution to its water problems. A feasible way still will have to be found to utilize an additional one million acre-feet of Utah's entitlement in the Colorado River.

Not only is the Colorado one of the greatest sources of water for future development, it has also been the subject of one of the most complex and expensive litigations in water history.

In response to Arizona's complaint, dated August 13, 1952, against the state of California and seven public agencies of the state, the Su-

preme Court of the United States appointed a Special Master and directed him to find the facts, and state his conclusions of law, and submit to the court a draft of a recommended decree. In essence, the state of Arizona claimed the right to use 2.8 million acre-feet of 7.5 million acre-feet of water in the Colorado River, plus half of any surplus. California claimed that existing projects exhausted the safe annual yield of water in the Colorado River and that there was no supply available for new projects in Arizona. California contended that the 7.5 million acre-feet, plus any surplus, were provided not from the main stream of the Colorado River itself, but from all waters, including the tributaries in the Lower Basin.

After pretrial conferences, the trial, presided over by the Special Master, began in San Francisco, California, on June 14, 1956.

In the course of the trial, 106 witnesses were heard. The transcript of their testimony occupies about 22,000 pages. Several thousand exhibits were received in evidence, and it is estimated the total cost of the trial will be in excess of seven million dollars.

After two years, two months and two weeks, the trial was concluded August 28, 1958. The Special Master, after studying the testimony of expert witnesses, and the volumes of exhibit material, rendered his draft report on the case on May 5, 1960. In his recommended decree the Special Master generally apportioned 2.8 million acre-feet to Arizona, 4.4 million acre-feet to California, and 0.3 million acre-feet to Nevada, with the further provision that any surpluses above 7.5 million acre-feet were to be divided equally between the states of Arizona and California, and that in the event the river yields less than 7.5 million

PHOTO, BUREAU OF RECLAMATION

In early phase of the construction of the dam at Glen Canyon with the bridge arching across the chasm.

acre-feet, each party was to have a prorated decrease in its basic apportionment. The master held that with the exception of the Upper Gila no controversy existed, and that the tributary water uses could be made in an orderly manner and without commitment to supply main stream demands. The findings of the master are yet to be submitted to the Supreme Court itself, before they become binding.

It is generally concluded that the master's findings uphold the sanctity of compacts, water contracts, and the legislative acts of the states involved, and permit use on the tributaries to continue without restraint. Development of Utah's Dixie Project is brought nearer to the verge of reality by this action.

Over the years Utah has benefited from the dedicated efforts of many outstanding men. No enumeration would be complete or accurate, but in any listing the following would be deserving:

A. F. Doremus was one of the early planners who visualized much of the present-day development and made a significant contribution. Mr. Doremus served as state engineer for Utah from 1901 to 1905, and later worked with the Utah Storage Commission.

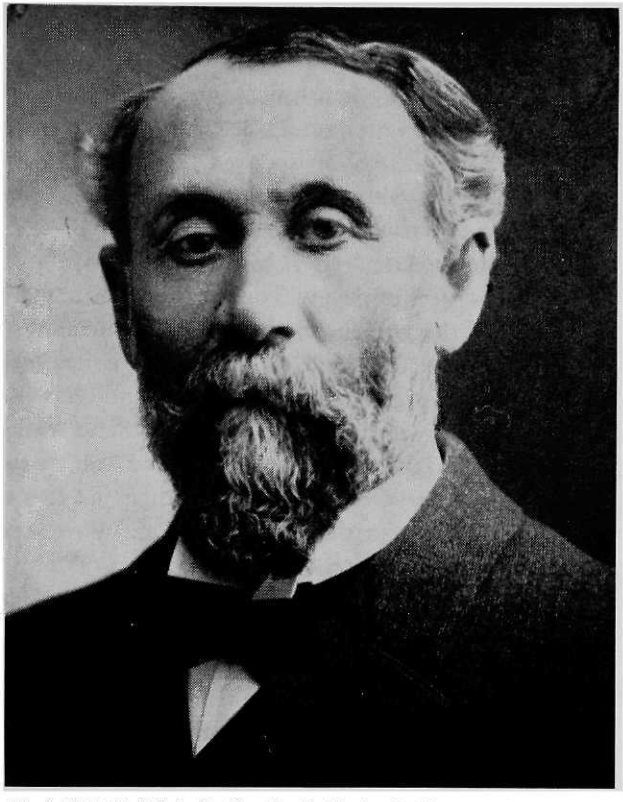
R. E. Caldwell was Utah's representative appointed by Governor Charles R. Mabey to negotiate the Colorado River Compact of 1922. Mr. Caldwell, state engineer from 1921 to 1924, was a strong proponent of making irrigation and domestic uses of water paramount to power and navigation. He was assisted by Dr. John A. Widtsoe who provided valuable counsel to the compact commission and gave considerable of his time to state affairs.

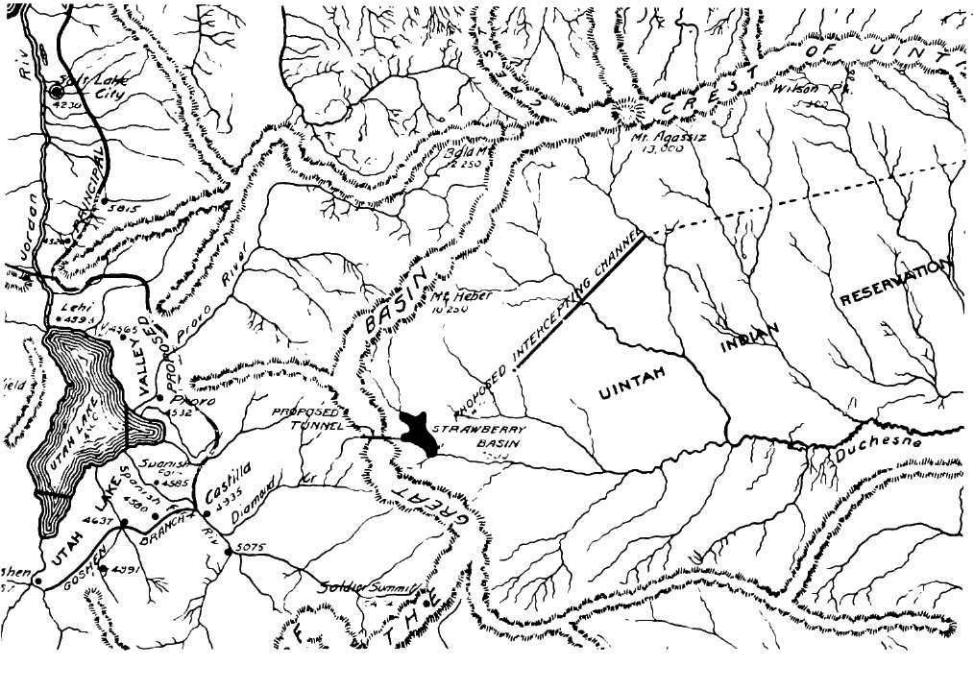
William R. Wallace bridged the time interval between the 1922 and 1948 compacts. Mr. Wallace gave unselfishly of his time, and on many occasions pledged his personal assets to keep investigative work moving. He was chairman of the Utah Water and Power Board from its inception in 1947 to the time of his retirement in 1953 and was an active leader of the Utah Water Users Association. He was intimately familiar with the details of the early proceedings and made high level contacts which kept the states together. Associated with Mr. Wallace was Thomas W. Jensen, who was secretary-manager of the Water User's Association.

Edward H. Watson, state engineer, and Grover Giles, attorney general, together with Judge J. A. Howell and Edward W. Clyde represented Utah in the negotiations that led to the 1948 Compact, and they deserve special credit for their accomplishments.

Behind the early Colorado reclamation projects there were local men of influence and leadership. Jonathan S. Page, Hyrum Lemon, and James McBeth, of Payson, together with Henry Gardner and Sere-

A. F. Doremus, state engineer for Utah, 1901–5, later with the Utah Storage Commission, visualized much of the present-day development of the Colorado River Basin. As early as 1903 he prepared a plan for the enlargement and utilization of the water supply in Utah. The section reproduced below is of the Strawberry Basin with the proposed intercepting channel to gather water from the Uinta Mountains and make it available to the Salt Lake Valley. The plan which is now nearing fruition is estimated to cost about $230,000,000 and will be completed in the not too distant future.





nus Gardner, of Spanish Fork, are credited with doing the early exploratory work and promoting the Strawberry Project at the local level.

Horace Allred, of Roosevelt, was closely associated with the Moon Lake Project, and was given special recognition for his accomplishments by the Secretary of the Interior.

The successful effort to secure authorization of the giant Colorado River Storage Project was one of the outstanding examples of organized effort of the citizens of the state and surrounding states. Civic clubs, chambers of commerce, cities, counties, irrigation companies, businesses, and groups organized as Aqualantes and Grass Roots supporters waged nationwide information campaigns. State leaders capitalized on this support and the preparatory work done over the years.

Governor George D. Clyde, then director and interstate streams commissioner for the Utah Water and Power Board, prepared Utah's case for presentation to the committees of the Congress, and oriented the supporting forces. At the congressional level, Utah's delegation worked diligently for passage. Senator Arthur V. Watkins and Congressman William A. Dawson held committee posts which gave them special opportunity to advance the state's interests. Senator Watkins was very effective in securing the Republican administration's support for the project.

Calvin W. Rawlings, Democratic national committeeman, and Milton L. Weilenmann, state Democratic chairman, like many others, worked with their party leadership and congressmen in the interest of development.

Gus Backman, veteran executive secretary of the Salt Lake Chamber of Commerce, took the cause before national organizations which traditionally were unfavorable to federal expenditures for Western development.

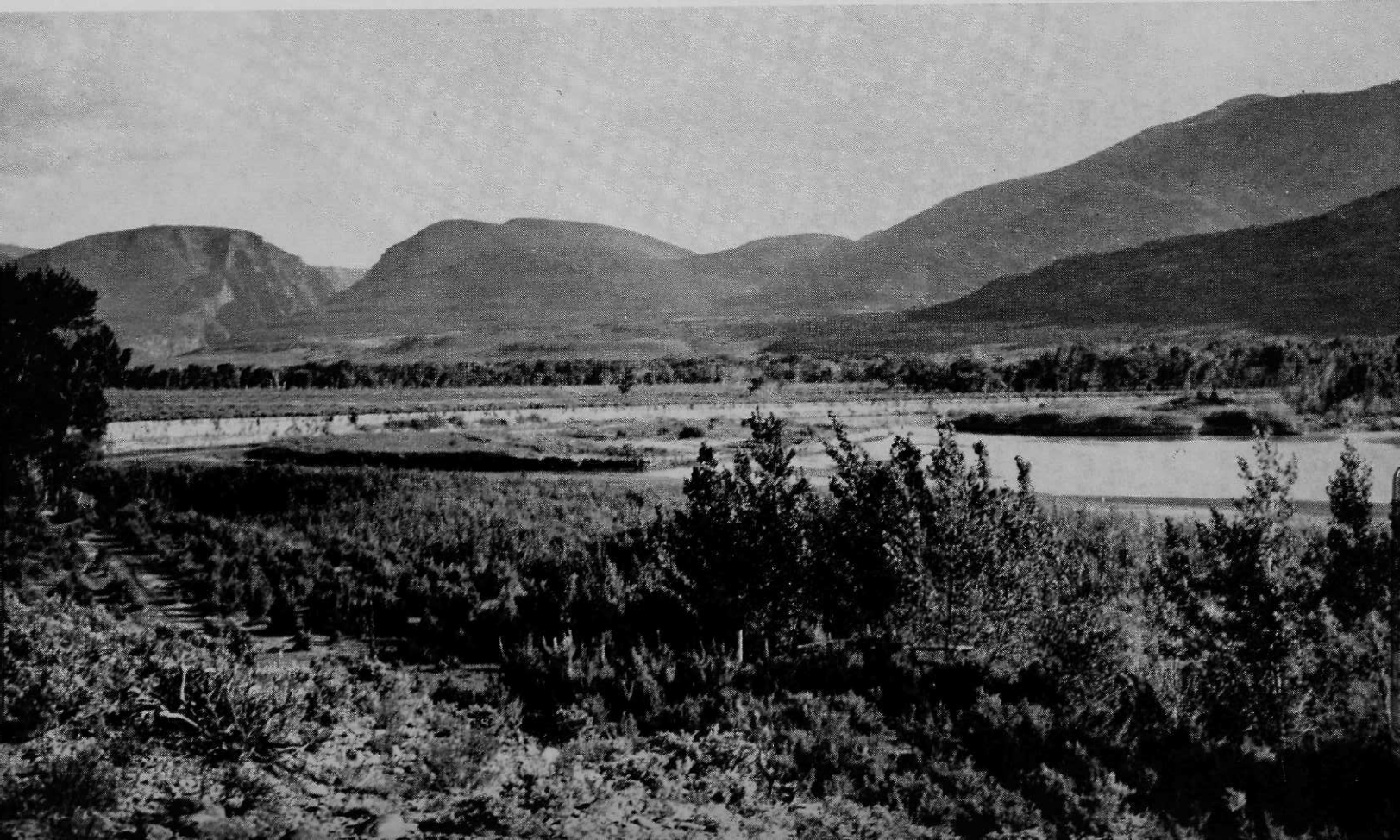
David W. Evans, through his firm, co-ordinated a national public information program which was extremely effective in the final passage of the bill.

State Senator B. H. Stringham from Vernal will long be remembered as a vigorous proponent of the Echo Park Dam and an activator and organizer. He helped organize and served as leader of the Colorado River Development Association of Twenty-One Counties.

E. O. Larson, a veteran reclamation planner, led the engineers who developed and detailed the Colorado River Storage Project. To Mr. Larson and his associates and predecessors the state owes much.

The Colorado River, challenging, unique, and defiant, has been forced since that eventful day on March 1, 1956, to relinquish its treasure for the good of the state of Utah.

Dr. John A. Widtsoe, who made a boat exploration of the Colorado River from Hall's Crossing to Navajo Bridge, September 3–19, 1922, preliminary to the Santa Fé Conference, wrote: ". . . to man is given the power to compel nature to serve, if only human powers are applied intelligently and diligently."



Beautiful Brown's Hole, looking toward the opening of Lodore Canyon. Diamond Mountain is to the right, Douglas Mountain to the left. Because of the mild winters, the "Hole" was popular as a winter retreat in the days of the fur trappers.

GREEN RIVER: MAIN STEM OF THE COLORADO

*By William M. Purdy**

Beneath the glacial snows in the lofty Wind River Mountains of western Wyoming, sparkling water droplets converge into streamlets that tumble down into emerald-colored lakes. Here is born the mighty Colorado, truly one of the world's great rivers. Fourteen hundred miles later the river has drained an area of 244,000 square miles, one-twelfth the area of the United States, as it dumps its cargo into the Gulf of California. There will be those who will charge geographic license to the statement above. The water has been measured and the origin of the Colorado River is Grand Lake in Rocky Mountain National Park, Colorado, about six miles west of Long's Peak. This is academic.

Historically the Green River is the upper trunk of the Colorado River. It is an important stream in both the annals of exploration and reclamation, and in a given year it will flow more water than the Colorado above the confluence of the two streams, although on an average it may flow somewhat less.

In earlier times that part of the river heading in the state of Colorado was known as the Grand River, but was changed to the Colorado River. The Green River has been officially designated as the main tributary to that stream.

The Green River, from its source to its junction with the Colorado

* Mr. Purdy is an instructor in the history department of St. Mark's College Preparatory School for Boys in Salt Lake City.

River, meanders 720 miles. It drains 45,000 square miles, which is about 70 per cent more area than is drained by the Colorado above the junction of the two streams. This indicates the vast area of arid land within the Green River division. The wooded hills and green valleys of the upper river soon give way to arid badlands and desert, and very early the river assumes its major role as a carver of canyons.

The earliest known white men to gaze upon the waters of the Green River approached its banks in the immediate vicinity of Jensen, Utah, in the year 1776. This was the celebrated Spanish expedition sent out from Santa Fé to explore a new inland route from that city to Monterey, California. The party of ten was led by friars Francisco Atanasio Domínguez and Silvestre Vélez de Escalante. Father Escalante[1] named the stream the *Rio de S. Buenaventura.* The river was thought by Escalante to be unrelated to the Colorado system, an error that was to confound the cartography of the Green River for nearly half a century.

How the stream came to be known as the Green is still somewhat confusing. John Charles Frémont, on the banks of the Green in 1844, refers to the stream as the Spanish *Rio Verde,* but the native Americans, the Crows, on the upper river called it the *Seedskadee.* He suggests that the Spanish *Rio Verde* was so named because the green vegetation along the river banks contrasted so dramatically with the drab desert country that it traversed. It is logical to reason so but it is not conclusive. Bernardo de Miera y Pacheco, the famous cartographer of the Domínguez-Escalante expedition, gave the name *Plateau Sierra Verde* to the Yampa Plateau country east of the expedition's river crossing. C. Gregory Crampton suggests that although there is still a doubt, the origin of the name Green River may well be related somehow to Miera's *Sierra Verde.*[2] Or, is it not possible that some unchronicled Spanish adventurer had penetrated the upper reaches of the river and having gazed on the brilliant green water, gave it the inevitable name Green?

While the Indian inhabitants of the West were listening spellbound in 1776 to Father Escalante's Christian message on the banks of Lake Timpanogos in central Utah, the English Colonies on the eastern shores of the continent were proclaiming to the world the birth of a new nation — a nation where men could truly be free. A few decades later the very ultimate of that freedom concept was to be realized with the advent of

[1] See Herbert E. Bolton's *Pageant in the Wilderness, Utah Historical Quarterly,* XVIII (1950).

[2] See C. Gregory Crampton, "Humboldt's Utah, 1811," *Utah Historical Quarterly,* XXVI (July, 1958), 273.

the free trapper in the Rocky Mountains. The conception of Rousseau's noble savage, man enjoying perfect liberty and unrestraint, became a remarkable reality during the brief fur trapping era in the Rocky Mountains, for probably never before and surely never again will men live a life so unfettered by society's restraints as did the Mountain Man!

The American fur trade was ushered in by the Lewis and Clark exploration in 1803 of the land encompassed in the Louisiana Purchase. Reports of streams teeming with beaver excited the imagination, and enterprising men, usually young men, sought the wilderness streams.

In the beginning the trade followed the navigable streams east of the mountains, the Upper Missouri and its tributaries. But as the trade increased new areas were explored, and in the early 1820's the central Rocky Mountains were penetrated. The Green River Basin became an important center of the mountain trade.

Of the "one hundred enterprising young men" who answered William Henry Ashley's famous advertisement in the *Missouri Republican* of March 20, 1822, more than a score lived to become masters of their trade — collectors of furs by design, but more important, pathfinders and empire builders by accident. It is doubtful that there existed a single stream in the entire reaches of the Rocky Mountains that was not explored by the Mountain Man. He was in his element and he learned it well. When the fur trade came to an end the Mountain Man found his geographical knowledge, gained incidentally while trapping the beaver stream, to be in great demand. The westward movement had entered the trans-Missouri stage, and pioneers were coming by the thousands in the 1840's. No better guide ever led a westering party than the Mountain Man, and he lived out his life fulfilling the "Manifest Destiny" of the American people — extending the boundaries of America to the Pacific.

Men of William Ashley's fur company penetrated the central mountain region in the fall of 1823 or spring of 1824 and discovered or rediscovered the famous South Pass in Wyoming. General Ashley came the following year with a mule caravan laden with goods for the trade he hoped to establish.

Until this time the company trade had been carried on from established posts on the streams east of the mountains. Individuals in the business would gather their furs by personally trapping for them or by making trades with the Indians; then they would deliver their furs to St. Louis for sale. Ashley conceived a plan that would be beneficial for trader and trapper alike — the rendezvous system of collecting furs. Under this system a site in the mountains was designated, and on a pre-

arranged date all who had furs to trade would gather there. It saved the trader the valuable time it would have taken to visit the various tribes and trappers, and it saved the trapper the necessity of going to St. Louis each year — thus leaving him free to remain in the familiar haunts of his beloved mountains which he became more and more loath to leave.

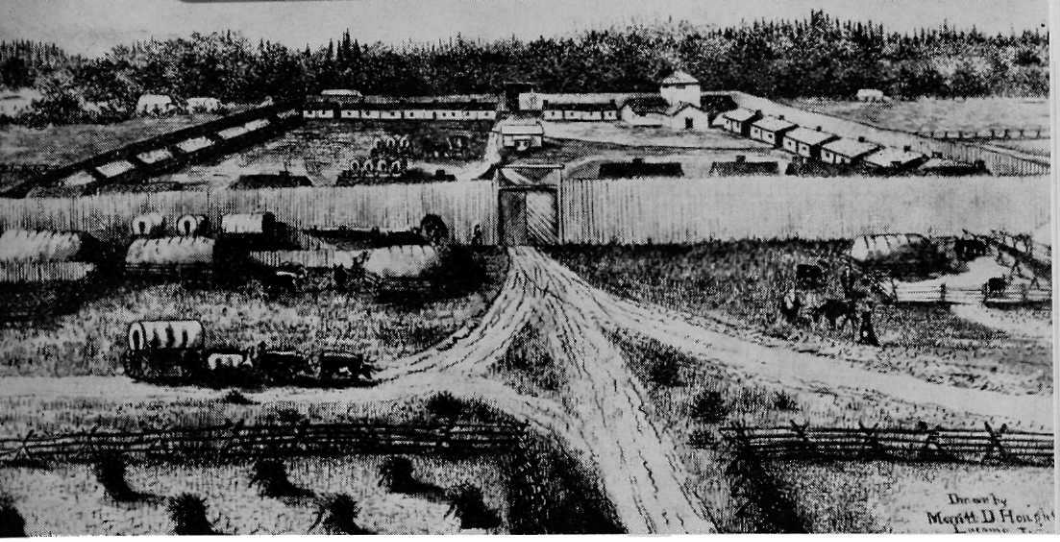
The first rendezvous in the Rocky Mountains was held on Henry's Fork of the Green River in southwestern Wyoming during the first part of July, 1825. Subsequent rendezvous were held in other localities as far west as Ogden's Hole. But the favorite sites were on the upper Green River in Wyoming.

William Ashley led the first expedition to undertake an exploration of the Green River. In the spring of 1825, in boats made from green buffalo hides stretched over willow frames, he commenced his journey near present-day Green River, Wyoming. His exploration was almost entirely within the treacherous canyon country that is characteristic of the river in the Uinta Mountain region. It is possible he went as far as Green River, Utah, and then, satisfied that the country below would produce few beaver, he turned to the northwest, crossed the Uinta Range and returned to Henry's Fork in time for rendezvous.

During the brief fur trapping era in the Rocky Mountains, the Green River was as popular with the trader and trapper as any stream in the West. Through the 1830's four trading posts, or forts as they were called, sprang up along the Green River. Their owners calculated to take advantage of the brisk mountain trade and to do business with both St. Louis and Santa Fé.

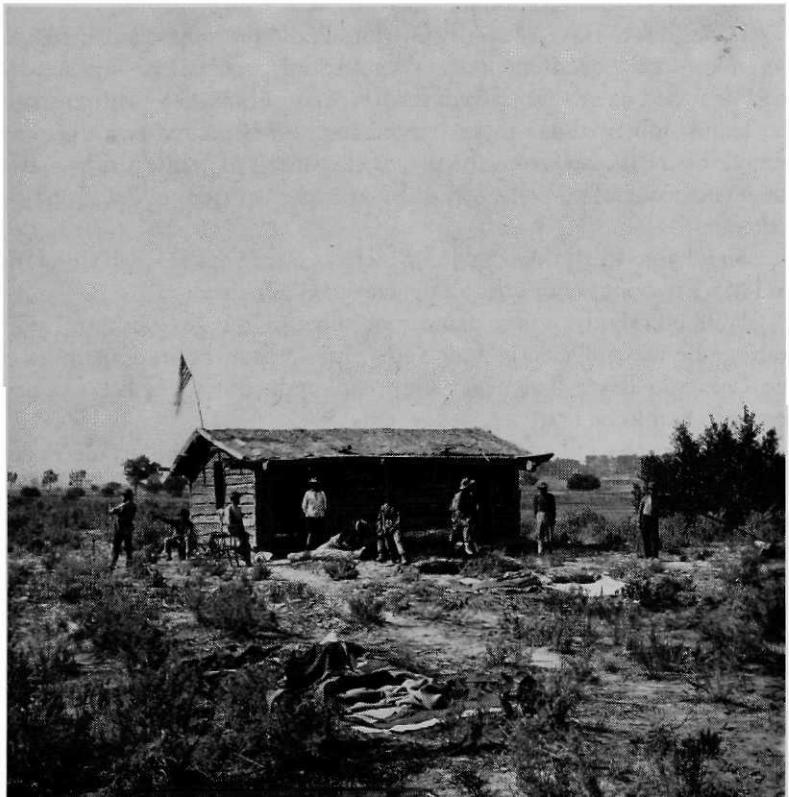
Fort Bonneville, or Fort "Nonsense" as it was sometimes called, was built by its illustrious namesake, Benjamin Louis Eulalie de Bonneville, in the year 1832 on the upper river near the present site of Daniel, Wyoming. Although Bonneville did not succeed in the fur business, chiefly because of the lateness of his entry and other reasons too involved to discuss here, he was located in the very nerve center of the mountain trade. There was nothing nonsensical about the location of his post.

At about the time Bonneville was building his fort, Antoine Robidoux was building a trading post near the junction of the Uinta and Whiterocks rivers, tributaries of the Green in the Uinta Basin. Fort Robidoux, or Fort Wintey, as it was sometimes called, lasted some dozen years before it was destroyed by Ute Indians. In 1833 or 1834 another trading post called Fort Robidoux, but more accurately, Fort Kit Carson, was built near the confluence of the Duchesne, White, and Green rivers across the river from present-day Ouray, Utah. These last two mentioned posts were in an excellent position because of their prox-



Artist's sketch of Fort Supply, site of Mormon settlement located a few miles from Fort Bridger. Water was diverted from Black's Fork of the Green by Mormon pioneers in early irrigation efforts here.

This cabin was built on the approximate site of old Fort Robidoux opposite the Uinta River. Shown are members of the second Powell expedition as they visit the historic site once so important to the fur trade.



imity to the Old Spanish Trail over which considerable trade was carried from the mountains to Santa Fé.

Another post, of little real value but of considerable historic interest, was Fort David Crockett, constructed by fur traders Craig, Thompson, and Sinclair in Brown's Hole, Colorado, probably in 1837. Brown's Hole was extremely popular as a winter retreat because of its mild winters. The wild game on the north slope of the Uinta Mountains also wintered in this same area, making it an even more attractive winter rendezvous. In later years Brown's Hole became a popular hide-out for the famous western bad men who rode the "Outlaw Trail."

The most famous of the trading posts in the Green River division was Fort Bridger. The four previously named trading posts were designed to accommodate the fur trade, but the owners of Fort Bridger had larger horizons. The fur trade, by the early 1840's, had run its course, and the most innocent mountain child could see his world crumbling around him. James Bridger saw the trend and had the foresight to capitalize on it.

American visionaries with eyes on the West even from the earliest beginnings were aware of Oregon and California. The great and terrifying distances across plains and deserts and mountains only served to magnify the virtues of the coastal region, and nothing could stop the flood of westward migration once it really started.

It was a rare traveler on the Oregon Trail who stopped at Bridger's Fort for just an overnight rest. Wagons and harnesses always needed mending, and oxen's shoes were forever wearing out. Not infrequently the teams, too tired-out to be trusted in the mountains beyond, were traded for fresh stock from the plentiful pastures of James Bridger, two for one of course! "Well now, did you expect to ride to California on a dream?"

So why go to all the trouble? "Here at our feet is the Rio Colorado and Mr. Fremont says it goes all the way to California. . . ."

William Manly was a pioneer of superior imagination, and with courage he was sufficiently endowed. Hundreds of mysterious miles of the Colorado River had never been explored. But then, he reasoned, someone had to be first.

Thus in the fall of 1849 William Manly and company of Forty-Niners on the way to the California gold fields embarked on the second known navigation of the Green River. They devised the incredible plan of floating down the river to the Pacific Ocean. A discarded ferryboat was renovated from the sands at the old Green River crossing, and the party of seven began the great experiment — an experiment that became

an unforgettable experience almost as soon as it began. The ferryboat stuck fast in a rapid in Red Canyon and was abandoned. The crew then fastened together makeshift canoes and continued, managing to survive the rapids in the Canyon of Lodore and Split Mountain. In the Uinta Basin they chanced to meet the Ute Indian chief, Walker, who convinced them that the downstream river was a poor risk that invited certain disaster. The party, convinced, traveled overland to Salt Lake City where they spent the winter. The following year Manly and his party again made history when they joined the California-bound party whose tragic end gave the name to Death Valley.

By 1869 the Colorado River still remained unconquered, but in the spring of that year ten men in four boats left Green River Station in Wyoming, and the Colorado River met her master.

Major John Wesley Powell became absorbed with the study of the West shortly after the Civil War while he was associated, as a professor of geology, with Wesleyan College and Illinois State Normal University. He began his study of the Colorado region in 1867 and 1868 and became convinced that the tremendous plateau country could be accurately surveyed only from the river itself. It was a frightening challenge, but one that Powell could accept. On May 24, 1869, the epic-making voyage began.

The scope of this, one of the outstanding adventures in the annals of American exploration, precludes a detailed account here. His accurate interpretation of the river and the country it traverses is only now receiving the recognition that it deserves. Probably no one, at least in Powell's time, developed such a keen insight into the problems of the West, problems inexorably tied to water or lack of water. The great reclamation projects now taking form are but manifestations of his observations.

The first reclamation project in the Green River division of the Upper Colorado River system was developed by Mormon pioneers at Fort Supply, south of Fort Bridger in southwestern Wyoming. As early as 1854 water was diverted from Black's Fork to irrigate the adjacent lands. Because of the unpredictable weather and the short growing season in that area, Fort Supply was not the most suitable location for the growing of crops. When the Mormons were recalled to Salt Lake City just before the outbreak of the Utah War a few years later, they did not sacrifice an area of very great agricultural potential. From that time to the present land has been irrigated on a small scale all along the Green River and its tributaries. The area's main industry being stock

raising, the irrigated lands were chiefly devoted to the raising of hay for winter feeding.

In 1902 President Theodore Roosevelt signed the Reclamation Act that created the Reclamation Service, since 1923 known as the Bureau of Reclamation. At that time investigation of potential irrigation projects in the West began. It is interesting to note that since that time the West has grown by some 23,000,000 people, and 25,000,000 acres of land have been reclaimed by the farmer.

The Green River division is divided into four distinct parts or basins: the Upper Green River Basin, for the most part in Wyoming; the Yampa and White river basins, for the most part in Colorado; the Uinta Basin; and the Price and San Rafael river basins in eastern Utah.

Reclamation projects have been about evenly distributed among the four areas and have been on a relatively small scale, consisting mainly of small storage units along the tributaries.

Agriculture has developed on an accelerated scale in the Uinta Basin since the beginning of the century. The Ute Indian Reservation, which took in the greater part of the Uinta Basin, was established in 1861, but the lands not occupied by Indians were not opened to settlement until 1905. A shortage of water in late summer has plagued this area in the past several years.

By 1920 each of the Colorado River Basin states was acutely aware of its potential water needs and the importance of the Colorado River in satisfying those needs. The demands of the various states greatly exceeded the available water, and the need for controlling legislation became apparent.

The long struggle for a fair and equitable division of the Colorado River water was partially solved with the signing of the Colorado River Compact in 1922. The compact provides for a fair and equitable division of Colorado River water between the Upper and Lower Basin states.

The utilization of every drop of water in the Colorado River system has long been the goal of the Bureau of Reclamation. They have surveyed the entire length of the river, mapping possible damsites, and setting up a development program for the consideration of the people and Congress. By 1946 thirty-three potential projects were outlined for use of water in the Green River division alone. Eleven other projects were outlined which would transfer about 1,137,700 acre-feet of water annually from the Green River Basin to other basins for irrigation and incidental power production. This will indicate the tremendous scope of the plans for developing the waters of the Colorado River.

The Colorado River Storage Project, as authorized by Public Law 485, Eighty-Fourth Congress, provides for four large main-stream dams known as "storage units" and eleven irrigation projects known as "participating projects." In the over-all plans for reclaiming the Colorado River, Public Law 485 is but an humble beginning.

There are five "participating projects" in the Green River division: LaBarge; Seedskadee; Lyman; Emery County; and central Utah. Upon completion of the projects 100,860 acres of new land will be under cultivation, and 192,890 acres of land already under cultivation will receive supplemental water.

The Colorado River Storage Project provides for the construction of four main-stream dams. One of these, the Flaming Gorge Dam, is located in the Green River division, in Red Canyon of the Green River in Daggett County, Utah.

The Flaming Gorge Dam will be a thin-arch type concrete structure having a height of 490 feet, a crest length of 1,180 feet, and a maximum base width of 150 feet. The dam will have a 27-foot roadway on its crest. Three 10-foot diameter penstocks will supply water under high

Flaming Gorge Dam, looking downstream at dam at night. Lights on right and left side outline keyways which are being excavated. Upper cofferdam is in lower right with intake structure of diversion tunnel at lower corner. In center of the picture the lower cofferdam is shown under construction.

pressure to three 52,000 h.p. turbines. The reservoir created by the Flaming Gorge Dam will have a storage capacity of 3,789,000 acre-feet and will extend upstream to within nine miles of Green River, Wyoming. The total cost of the project will be approximately $70,000,000; over $3,000,000 of the total will be expended for fish and wildlife development and other recreational projects.

The Echo Park Dam, although not yet authorized, is probably the best known of the projects proposed for the Green River division. The dam would impound water in the Yampa River Canyon and the Canyon of Lodore within the Dinosaur National Monument. The controversy over the project became so heated that it was removed from the original bill so as not to jeopardize the entire program. It deserves a little attention.

The Dinosaur National Monument was established by proclamation of President Wilson on October 4, 1915, for the purpose of preserving a rich deposit of fossilized dinosaur bones. The monument was enlarged to a total of 209,744 acres on July 14, 1938, by proclamation of President Franklin D. Roosevelt. The extension of the monument was expressly to preserve the geological, archeological, and wilderness values of that unique area. Included in the monument were the Yampa River Canyon, Canyon of Lodore, Whirlpool Canyon, and Split Mountain Canyon. Seventy per cent of the addition is in the state of Colorado and thirty per cent in the state of Utah.

The purpose of the National Park Service, as stated in the act of 1916, is to assume responsibility of the natural and historic objects and the wildlife that exists within the areas in the National Park System, and to provide for its use and enjoyment in such a way as to leave them unimpaired for future generations.

Charged with this responsibility the National Park Service took a long and critical look at the recommended reclamation proposals within Dinosaur National Monument.

In the Park Service report, completed in 1946 and published in 1950, entitled, *A Survey of the Recreation Resources of the Colorado River Basin,* it is asserted that "the effects of the proposed Echo Park and Split Mountain units upon irreplaceable geological, wilderness, and related values of national significance would be deplorable."

The Park Service felt that a thorough investigation by authority higher than the National Park Service or the Bureau of Reclamation was necessary to determine where the public interest would best be served — in the proposed water development or in the preservation of the natural setting, as was the original intent.

Subsequently, a public hearing was called by Secretary of the Interior Oscar Chapman in Washington, D.C., on April 3, 1950. The question was openly debated, and Secretary Chapman, after carefully weighing the arguments, decided that the public interest could best be served if the proposed water development were completed according to the recommendations of the Bureau of Reclamation. He then charged the various departments under his supervision to work harmoniously toward that end.

President Eisenhower also gave the project his blessing in a press release of March 20, 1954: "Construction of the Echo Park and Glen Canyon dams, two of the large projects in the basin plan, is recommended. These dams are key units strategically located to provide the necessary storage of water to make the plan work at its maximum efficiency."

Officially, at least, the Echo Park project was in. But, in America, officially does not necessarily mean in fact. A group of Americans, dedicated to their cause of preserving what is left of the American wilderness, began an organized campaign against Echo Park that was so effective that the project was dropped for fear of damaging the entire project.

This affront has made the Bureau of Reclamation and Western politicians, by and large, more determined than ever to make Echo Park a reality. The conservationists are just as determined that they will not succeed. The Green River division of the Colorado River, with all the reclamation projects, both real and proposed, is almost entirely wilderness area. Perhaps we should appreciate that fact more than we do. In search for new values or for values lost, the wilderness may have more to offer than we think.

Stanton survey crew eating Christmas dinner in front of the Lee's Ferry fort.

The survey members at their destination, Needles, California. Left to right, Reginald Travers, H. G. Ballard, W. H. Edwards, George Melick, John Hislop, Langdon Gibson, Elmer Kane, Robert B. Stanton.

PHOTO, R. W. HILDRE

Starting with three sturdy boats of oak but ending with only two, Stanton and seven members of his party successfully completed the survey to tidewater on the Gulf of California in Mexico, April 26, 1890.

THE ENGINEER AND THE CANYON

*By Dwight L. Smith**

It was staggering to the imagination of an average person in 1889–90; seventy years later it is still fantastic. In the heroic annals of the unfolding Southwest in the latter part of the past century is a too little-known chapter of railroad history. In light of the present considerable interest in the Colorado River, the Stanton engineering survey to determine the feasibility and worth of a railroad along the river from Grand Junction, Colorado, to the Gulf of California is of historical importance.

The much publicized Powell expedition which navigated the Colorado River in 1869 led even engineers to conjecture the possibility of a low grade railroad line by way of the river from the western base of the Rockies to the Pacific.[1] The Powell report certainly removed some of the misconceptions and ignorance concerning the river, but there was still much more that was unknown about it.

The Powell report fired the imagination of a college junior, Robert Brewster Stanton, enrolled in Miami University. He envisioned "a vast

* Mr. Smith is professor of history at Miami University, Oxford, Ohio. Acknowledgment is due Mrs. Anne Stanton Burchard, of New York City, and Mr. Robert W. Hill, keeper of manuscripts of the New York Public Library, for access to the Robert Brewster Stanton papers, and to Mr. Ralph H. Phelps, director of Engineering Societies Library, New York, for the use of other Stanton materials. A grant from Miami University defrayed the cost of research. Mr. Leland S. Dutton, director of Miami University Libraries, extended many special courtesies to facilitate the research.

[1] Robert B. Stanton, "The River and the Canyon," 2 vols., unpublished manuscript, II, 507. This 1039 page typescript manuscript was prepared for publication. It contains considerable on the geology and history of the Colorado River besides the narrative of his own exploration and engineering survey in 1889–90. Pagination for the second volume is continuous from the first. Hereafter cited as TRTC.

plateau . . . through it a winding river that by corrasion had cut its way down into the solid rock, to a depth of a mile and a quarter, *forming a canyon with practically vertical walls from the water's edge to the level of the plateau.*" At the surface the chasm was perhaps a half mile wide. He dreamed of someday throwing "a single span railway bridge across that chasm!" After graduation he went into civil and railroad engineering and established a quite respectable reputation. One of his ventures took him into the Southwest on an instrumental reconnaissance with the Atlantic and Pacific Railroad then projected from Pierce City, Missouri, to San Diego, California; but because of financial stringency of the company, Stanton's party never reached as far as the Colorado.[2]

S. S. Harper, a lone prospector in north central Arizona, had followed the line of the Atlantic and Pacific survey across the high passes and up and down the mountains of what he called the "saw-tooth route." With a very limited knowledge of the Colorado, not including the Powell report, he conceived the notion of a line from the western slope of the Rockies to the coast with a water grade by way of the Colorado. Harper with his vaguely defined idea and Frank M. Brown, a successful Denver real estate businessman who was looking for a scheme for investment, came together.[3] The Denver, Colorado Canyon, and Pacific Railroad Company was organized March 25, 1889, to fulfill the Harper-Brown scheme and to try to interest a syndicate in financing it.[4]

The actual survey began on March 28, 1889, and continued down the Grand (Colorado) River from Grand Junction to the mouth of the Green River in southeastern Utah, under the supervision of Frank C. Kendrick, the assistant engineer. From this point the main survey party was to take over.[5] Arriving by rail from Denver, this party of sixteen embarked, May 25, 1889, on Green River where the Denver and Rio Grande Railway crossed it at Green River Station (present Green River), Utah. It was under the leadership of Brown, president of the company,

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[2] TRTC, II, 500–3.

[3] Stanton, "Exploration and Survey of the Canyons of the Colorado River of the West, 1889 and 1890," 22n. This is Stanton's report to the railroad company. Hereafter cited as Exploration and Survey. See also, TRTC, II, 504–8.

[4] Stanton, Field Notes, 4 manuscript vols., Book A, 4; Exploration and Survey, 22–23; and TRTC, II, 482, 508–9, and Appendix C, "History of the Origin of the Denver Colorado Canyon and Pacific Railroad Survey," 828. Field Notes are records made by Stanton on the spot during the expedition, recording miscellaneous matters. They are labeled as A, B, C, and D. Harper was a member of the board of the company. Exploration and Survey, 22n. Brown expected the line to be open by May, 1895. Ethan A. Reynolds, "In the Whirlpools of the Grand Canyon of the Colorado," *Cosmopolitan Magazine,* VIII (1889), 25.

[5] Field Notes, Book A, 18, 38; and TRTC, II, 511–14, and Appendix C, 829.

and Stanton, chief engineer of the expedition.[6] This way was chosen because of the relative ease of navigation down river to the terminal point of the Kendrick survey.[7]

Outfitted with five clinker-built thin red cedar keel-bottomed hunting and pleasure boats and an ordinary flat-bottomed dory from the Kendrick party, medicine, instruments, and provisions for seventy-five days, the party doggedly pursued its mission. It was planned to replenish their provisions at Lee's Ferry, Arizona (at the end of Glen Canyon), and Peach Springs, Arizona (down river near the end of the Grand Canyon division).[8]

The expedition was plagued with disaster, and there was serious doubt as to whether the river could be mastered and the survey completed. Most of the cooking utensils and some of the supplies were lost when the cook boat was jammed between two rocks. Other accidents resulted in the loss of nearly all of the provisions. Bedding and clothing were frequently soaked. Two of the boats were totally destroyed and the others badly damaged. After obtaining some relief supplies, they reached Dandy Crossing, Hite, Utah (at the end of the Cataract and Narrow canyons division at the mouth of the Dirty Devil [Frémont] River), June 24.[9]

Here the party split into two groups with one under W. H. Bush to continue the survey. Brown and Stanton led the other on what was to be a rapid examination by making notes, sketches, and photographs of the lower canyons and as far on down the river as Needles, California. President Brown was anxious to have an "eye survey" to that point where the Atlantic and Pacific Railroad crossed the Colorado because he had an appointment with a group of eastern capitalists who had expressed interest in the project.[10] This advance party moved on to Lee's Ferry, and after a delay for supplies plunged into Marble Canyon on July 9.[11]

[6] Letter of application for the position as chief engineer, Stanton to Brown, April 15, 1889, Stanton Papers, Box 5, Folder 2.

[7] Exploration and Survey, 23–24; and Field Notes, Book A, 20.

[8] Exploration and Survey, 24, 26–27; Field Notes, Book A, 17, 57; and TRTC, II, 511, 513–14, 516, 524–26.

[9] These incidents and others are reported in Field Notes, Book A, 41, 48, 54, 56, 62, 82–84, 86–87, 94–96, 111–14, *passim*. They are also reported in TRTC, but usually by quotation from the Field Notes. See also TRTC, II, 548–49, 551, 561; and Exploration and Survey, 46–48, 56.

[10] *Ibid.*, 56–57. Brown said a fifty-million-dollar syndicate was interested if the engineer's report was favorable. Field Notes, Book A, 33, 94–95, 128; and TRTC, II, 563–65. After the drowning of Brown no further mention is made of this group. A reorganization of the company took place, Stanton was elected to the board, retained as engineer, and instructed to raise the necessary money to continue the survey. Field Notes, Book B, 112–15; and TRTC, II, 592n, 592–93, and Appendix C, 829.

[11] Exploration and Survey, 86; and TRTC, II, 568–69.

The next morning one of the boats was upset and Brown drowned. A few days later another disaster resulted in the drowning of two more of the party. These accidents probably could have been averted with the safety precaution of a life preserver. The expedition carried none.[12] Under the circumstances it was decided to quit the river and to return more adequately prepared. The instruments and supplies were cached in a cave about forty miles south of Lee's Ferry; the party climbed out of the gorge and returned to Denver.[13]

Three more sturdy boats of oak, with more spacious water-tight storage compartments, capable of carrying heavy loads, difficult to upset, and equipped with other safety features were specially built. Other equipment, which included rubber bags and floatable kegs for storage of such things as rice and coffee, and life preservers were expressly designed for the undertaking.[14]

The Stanton party of twelve included only three of the previous expedition. Since it was not necessary to go through difficult Cataract Canyon again, the boats were wagoned from Green River Station, Utah, to the mouth of Crescent Creek at Crescent City, a short distance above Dandy Crossing. Here the Stanton expedition embarked on December 10.[15]

The photographer (F. A. Nims) broke his leg and was carried out at Lee's Ferry. Another man (Harry McDonald) left when the party was in the Grand Canyon. One of the boats was broken into splinters in a rapid in Grand Canyon and so it was necessary to reduce the party by three more (A. B. Twining, L. G. Brown, and James Hogue) at Peach Springs.[16] Stanton and the other six and a new cook successfully completed the survey to tidewater on the Gulf of California in Mexico on April 26, 1890.[17] After this Stanton made "field examinations" for a route from Yuma to San Diego.[18]

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[12] Field Notes, Book B, 16–21, 52–54; Exploration and Survey, 88–93, 96–98; and TRTC, II, 570–75, 582–83.

[13] Field Notes, Book B, 62, 79, 111; Exploration and Survey, 98–100; and TRTC, II, 583, 585–89.

[14] Field Notes, Book A, 235, Book B, 113–15, and Book C, 2–10; and Exploration and Survey, 100–2.

[15] *Ibid.*, 102–4, 213–14; Field Notes, Book A, 223–38; and TRTC, II, 593–94, 595–98.

[16] Field Notes, Book B, 156–72, Book C, 111–12, 116–19, 138–44, and Book D, 6; Exploration and Survey, 104–5, 123; and TRTC, II, 612–17, 620–23, 664–67, 714.

[17] Exploration and Survey, 216; Field Notes, Book D, 224–26; and TRTC, II, 732.

[18] Field Notes, Book D, 236. The contract under which Stanton had worked was canceled by mutual consent at a board of directors meeting in Denver, April 13, 1891. MS, Stanton Papers, Box 4, Folder 1. See also TRTC, II, Appendix C, 830.

The details of the descent of the Stanton expedition down the Colorado River are a thrilling adventure story of exploration that will be told elsewhere. The matter at hand is a consideration of his findings and their possible application.

As this was a railroad survey detailed information of the lower canyon walls, the composition of the river banks, and the alignment and fall of the river was required.[19] To this end, a continuous transit line was run for the first 355 miles, levels were taken, contour topography sketched, and photographs made. The shortage of sufficient funds did not permit this detailed a survey below Glen Canyon. During the Stanton led phase of the project only an "instrumental reconnaissance" was made except where excessive fall, sharper grades, or other circumstances made greater detail a necessity.[20]

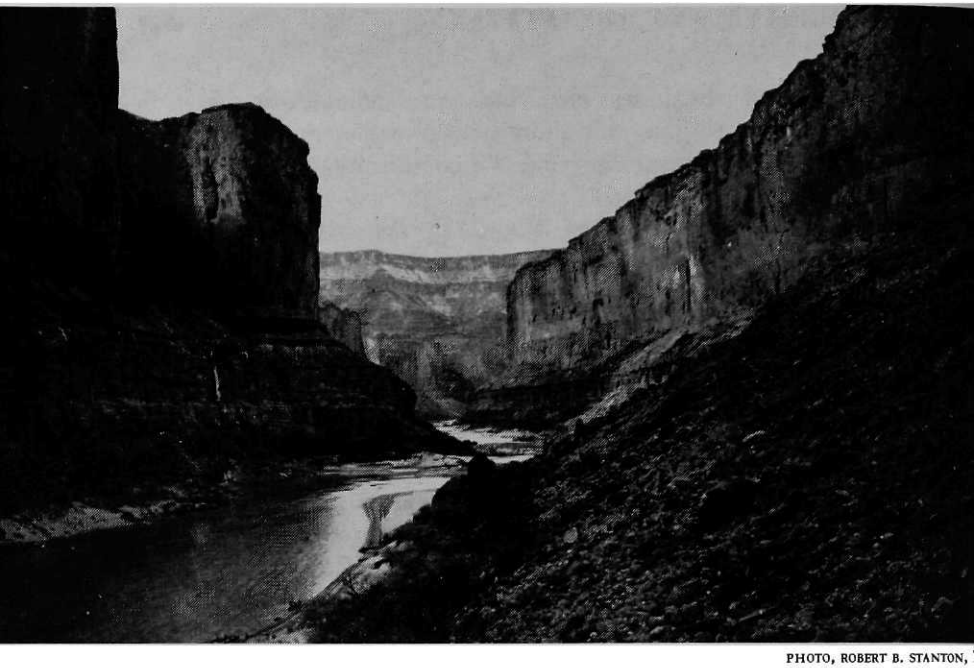
A visual record was made by photography, because of the "inaccessibility of the country," and as indisputable evidence to convince skeptics that the statistical and other data was all that it appeared to be. Altogether, over two thousand pictures were taken, most in duplicate and some even in triplicate. Not a single negative was lost, or damaged, or wet, a remarkable record, even with all the precautions that were taken. The eleven hundred views are a valuable part of the records of the expedition.[21]

The survey revealed that the preparation of a roadbed in the about 650 miles of the upper or canyon division, that is, from Grand Junction, Colorado, to the Grand Wash near the Nevada border, meant: (1) 62½ per cent of "comparatively light work" in earth, loose rock, and talus slopes of loose and solid rock; (2) 35½ per cent of "heavy" work in solid rock, cliff benches, and sloping granite walls; (3) 2 per cent of tunnel-

[19] Since the widths at the tops of the canyon areas are so great, the depths involved have little relevance to the consideration of a water level railroad survey. As was suggested, if the upper mile or so of the depths of some of the canyons were sheared off the problem would seem so much less impressive or mysterious to the layman. And the magnitude of the problems involved here would be no greater than of those encountered on other western lines. Exploration and Survey, 114–15; and TRTC, II, 493–97, 650. See also Arthur M. Wellington, "Canyons and Railway Lines," an editorial in *Engineering News and American Railway Journal,* XXII (September 21, 1889), 278–79. It is a discussion on Stanton's article which appeared in the same issue. While applying to this specific project, it is also an excellent general discussion on the subject. Wellington, "The Colorado Canyon Survey," an editorial in *ibid.,* XXIV (October 18, 1890), 349–50, discusses a subsequent Stanton article which appears in this issue. There are other comments in this editorial of interest to the conclusions in this study.

[20] TRTC, II, 489–90, 610, 610n, 732.

[21] Exploration and Survey, 24–26, 28–29; and TRTC, II, 615–16, 680. A convenient summary and discussion of this phase of record taking is made in Stanton's article, "Engineering with a Camera in the Canyons of the Colorado," *Cosmopolitan Magazine,* XV (August, 1893), 292–303.



PHOTO, ROBERT B. STANTON,

Up river from Mile 50 in Marble Canyon. Both the "heavy talus slopes" and the "Cliff bench work" are shown in the right of the picture.

ing and half tunneling.[22] The average fall per mile was smaller in the Glen Canyon portion (from Dandy Crossing to Lee's Ferry) than in any other part of the division. On the other hand the course of the river was so extremely crooked here that, in order to locate a good line, some seventeen to nineteen tunnels from 200 to 6,600 feet would be required.[23] In Marble Canyon (from Lee's Ferry to the Little Colorado) was the most difficult ten mile stretch to locate on the entire river, and it would undoubtedly be the most expensive to construct.[24]

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[22] TRTC, II, 735, and Appendix B, "Results of the Railroad Survey," 824; Exploration and Survey, 3, 134, 141. See also Stanton, "The Denver, Colorado Canyon and Pacific Railroad Project," *Engineering News and American Railway Journal,* XXII (September 21, 1889), 269–72. While reorganizing in preparation for a resumption of the survey, Stanton wrote this article in reply to what he regarded as misleading statements in a New York newspaper. His article contains data on the proposed railroad apropos to this study even though it is just a preliminary report.

[23] Field Notes, Book A, 128–208, 216; Exploration and Survey, 65, 67, 84; TRTC, II, Appendix B, 822; and Stanton, "The Denver, Colorado Canyon and Pacific Railroad Project," 270.

[24] Field Notes, Book B, 22, *et seq.*; Exploration and Survey, 108; and TRTC, II, 634, 640. Even though "the canyon makes two almost complete right angle turns, a good line can be located by crossing the river — the only time in the whole survey — with a single span bridge, from marble cliff to marble cliff, at an elevation of some 200 or more

The lower or valley division of the river extends some 400 miles from the Grand Wash to the Gulf of California. Generally it is composed of broad fertile valleys and sloping hillsides, but in places on either side are a number of short canyons. On this part of the project, was involved: (1) 75 per cent of earth and gravel work; (2) 24½ per cent of solid rock work; (3) ½ per cent of tunneling.[25]

Looking at it from the standpoint of the entire river, the same 400 miles of level bottoms with earth and gravel slopes could be handled by light plows and scrapers like similar work outside the canyon country. The high water line does not ordinarily reach these bottoms, and the roadbed here could be adequately and cheaply protected by a riprap slope wall construction. The nearly 280 miles of hillside and rough talus slopes were mostly side hill cut which involved no waste to be hauled. These hillside slopes are generally not of loose rock slides and the talus slopes are usually horizontal stratifications with but a thin top layer of debris. The tremendous width of the canyon area on top lessens the damage potential of loose rock to a railway constructed in the lower gorge area. The same 320 miles of principally solid rock work in the sloping hills or solid rock benches of sandstone, marble, and granite would entail the least expensive kind of rock work. Excavation itself would almost entirely prepare the roadbed while the waste could be pushed into the river. Tunneling costs would only be increased above the ordinary because of the inaccessibility of the area. But the twenty miles of tunnels were to save about forty-two miles in distance and other difficulties so that the extra cost would thus be partially offset. New innovations, such as electrical drills which could use the river to generate power, would further cut construction expense.

The entrance of side streams and canyons into the river present no unusual problem. At their mouths, most of them enter the Colorado through deep and narrow channels of solid marble or granite that would be crossed usually at elevations of fifty to a hundred feet above their beds. Although some of these side canyons are from three to six miles across on top, a hundred foot single span bridge would suffice at the railroad level. In those cases where the mouths of the side streams have washed out into wide flats, ordinary bridge construction could be employed.[26]

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feet above low water, and with a tunnel at either end." TRTC, II, 640–41. See also Stanton, "The Denver, Colorado Canyon and Pacific Railroad Project," 270–71; and Exploration and Survey, 107.

[25] TRTC, II, 730–31, 735, and Appendix B, 824; Exploration and Survey, 3.

[26] *Ibid.* 168, 181–83, 185, 189–90; TRTC, II, 736; and Stanton, "The Denver, Colorado Canyon and Pacific Railroad Project," 271.

Adverse winter weather of hard freezing and snow that frequently handicapped the transcontinental lines through the Rockies, especially as demonstrated in the winter of 1889–90 when the Stanton survey was under way, would have little or no effect in the canyon area of the Colorado.[27]

Stanton calculated that, except for unusual situations, a railway line could be constructed with a grade not in excess of 26.4 feet per mile (one-half of one per cent); and that, except for tunnels to take care of the sharper bends, the curves required in the line would not be more than ten degrees (with about 573.7 foot radius). Where the average fall of the river was no more than twelve feet per mile, the roadbed could nearly parallel the high water mark.[28]

If construction of a Colorado River line was possible only from both ends, time and costs would be unnecessarily increased. Stanton figured, however, that in the upper or canyon division, simultaneous construction could be carried on in perhaps as many as forty different locations. By employing railroads (the Denver and Rio Grande, the Colorado Midland, and the Rio Grande Western on the north, and the Atlantic and Pacific on the south), existing and easily constructed wagon roads, jack trails, horse trails, ferries, flatboats, and steam launches, it would be readily accessible. In the lower or valley division, that is from about the Nevada line down, there was no real problem because steamboats were then running on the river and could haul the necessary supplies and equipment needed for construction.[29]

Stanton was satisfied that the proposed line was "neither impossible or impracticable" and that cost of construction and maintenance would be "reasonable" especially when compared with other transcontinental railways.[30]

An added possibility making the whole scheme appear even more

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[27] Stanton documents this with detailed statistics and tables. See Exploration and Survey, 185–89.

[28] *Ibid.*, 175–76, 178; and Stanton, "The Denver, Colorado Canyon and Pacific Railroad Project," 270–71. The Field Notes and TRTC frequently have notations about where and how the line could be constructed. See Books A, B, C, and D, *passim*. Field notes, Book A, 216–18, for example, contains a summary view for the Cataract Canyon portion. TRTC, II, 640–41, summarizes the Marble Canyon situation.

[29] *Ibid.*, II, 542; and Exploration and Survey, 163–67.

[30] TRTC, II, 735–36; and Stanton, "The Denver, Colorado Canyon and Pacific Railroad Project," 270–71. Stanton gives a detailed analysis of construction costs, section by section, in Exploration and Survey, 169–72. He estimated that the roadbed "complete with all superstructures, ready for the rolling stock, of single track standard gauge," with stations, sidings, and terminals, to San Diego via Yuma, and with a branch line up the Rio Virgin would cost about $60,000,000. *Ibid.*, 190.

attractive was of operating the whole line from electricity generated by the power of the river itself.[31]

In themselves, however, these factors probably were not sufficient to convince investment capital in a venture, such as a Denver, Colorado Canyon, and Pacific Railroad which still sounded unrealistic and fanciful no matter what the cold calculations of an engineer revealed. Assuredly from an engineering standpoint it was possible. But what of the possibilities of traffic and profit? Stanton was convinced that this railroad scheme would be a profitable venture.

In the first place the principal object of this Colorado River line was to haul coal from Colorado to the Pacific.[32] Coal was expensive in California and most of it was imported from other countries. The projected railway seemed to be the answer. Because of navigation difficulties at the head of the Gulf of California, it was decided the road should go as far as Yuma and thence over the mountains to San Diego harbor.[33]

Assuredly there was much else for which the railway would be used. Counting on this sublime spectacle of nature as a drawing card for tourists, this traffic itself should defray extraordinary construction costs. None of the other western lines had a drawing card of such magnitude. Its passenger traffic, therefore, would be "in excess of all other lines across the continent." [34]

Potential freight traffic certainly was an important consideration. Competition in transcontinental transportation was becoming keener; and Stanton was confident that a thousand mile low grade year round line over the mountain area would successfully meet this competition, as well as that of the then much talked about Nicaraguan canal. It would capture more than its proportionate share of the through freight traffic.[35]

As in other parts of the West where railroads were a boon to exploitation of natural resources and settlement, Stanton fully expected his line to have similar effects on the area through which it would run. The starting point, Grand Junction, was not only a western terminus of railroads that came into Denver from the East, and with connections to the

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[31] TRTC, II, 736.

[32] The title page to Field Notes, Book A, is "Notes of an Instrumental Examination of the Canyons of the *Colorado River* of *the West*, for a Railway Line from the Coal Fields of *Colorado* to the *Pacific Coast*." See also Exploration and Survey, 21–22.

[33] *Ibid.*, 31. Stanton analyzes this idea and urges board consideration of it in *ibid.*, 159–61. He also suggests possibilities for another line from Las Vegas Wash, across the mountains, to San Francisco. *Ibid.*, 101. See also *ibid.*, 30–31.

[34] *Ibid.*, 191–93; and Wellington, "Canyons and Railway Lines," 279.

[35] TRTC, II, 735–36.

West, but it was situated in a prosperous agricultural region and cattle-raising territory and within easy reach of large "inexhaustible" coal fields.[36]

Although the Cataract Canyon area further downstream seemed to have little to offer except scenery and thrills, at the heads of the side canyons were large tracts of grazing land. Below that into the Glen Canyon, according to Stanton, there were almost continuous gold placer deposits, enough to develop a quite respectable mining industry and to last at least a century. Up some of the side canyons were other deposits of mineral wealth and coal and even petroleum.[37]

Existing wagon roads connected Lee's Ferry with agricultural and grazing lands in southern Utah and northern Arizona whose vast possibilities through irrigation were not yet dreamed of. In Marble Canyon, in fact in most of the canyons, a great variety of building stone awaited a railway to make possible the development of a considerable industry.[38]

The Grand Canyon portion of the line was rich in deposits of silver, lead, copper and iron ores, and even roofing slate. Here as elsewhere, besides taking out the ores, the railroad would bring in provisions, machinery, and other supplies for the mining camps. And why not exploit the Kaibab Plateau timber for railroad ties, fuel, lumber, and other related products.

The lower or valley division had much to offer. Flanking the Colorado were rich mineral areas of principally rock salt, gold, and silver. Many already established mines were inoperative because of the high cost of the coal which was needed to develop them. Others were waiting for favorable circumstances for establishment. The railroad would correct this situation. Prosperity to the mining industry would be accompanied by the development of agricultural areas with such products as grains and semitropical fruits, especially citrus.[39]

Coal was by no means limited to that obtainable in the Colorado fields. Probably even greater quantities were available from nearer points. To this end branch lines should be constructed to the various fields, especially one to the "practically unlimited" fields of the southwestern Utah area up the Rio Virgin.[40]

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[36] Exploration and Survey, 163–64, 194–95.

[37] *Ibid.*, 195–99.

[38] *Ibid.*, 199–200.

[39] "I am led to believe that this whole section through the Grand Canyon . . . will some day be developed into one of the most extensive and valuable mining districts of the Western States." *Ibid.*, 201–7.

[40] There were also iron fields that might be developed. Stanton urged survey for such a line to the board. *Ibid.*, 157–59, 208–9. Stanton prepared a paper on a railroad down

The market possibilities for coal were good. Mining and milling operations along the Colorado River would consume their share; the Atlantic and Pacific Railroad which crossed the proposed route at Needles and the Southern Pacific which crossed it at Yuma needed it for their own use and for shipping over their own lines; and their markets would welcome this new source of supply.[41]

In 1889, Australia and British Columbia accounted for about nine-tenths of the coal received at San Diego; and British Columbia, Australia, and England accounted for nearly two-thirds of the import at San Francisco. Stanton believed his own railroad could deliver coal and coke to southern California at from a half to a third of its market price. A cheap and unlimited supply would tend to make San Diego, with its connections with other roads to the north, the coal depot for the rest of California.[42] Ocean steamers using the proposed Nicaraguan canal would create further demand. San Diego would soon become the principal exporting coal station on the Pacific, and ocean traffic would increase considerably. Undoubtedly industry would be attracted to the area to take advantage of cheap ores, coal, coke, and ocean and land transportation facilities. The city would have tremendous advantages over other Pacific ports.[43]

With the attractive features of not too difficult or unusual or expensive construction, better than usual year-round weather conditions, a constant water supply, the possibilities of use of on the spot generated electricity for both construction and operation, cheaper rates, faster service, low grade line, a permanent roadbed, the potential exploitation of mining, agriculture, and natural resources with plentiful markets, certainly the Denver, Colorado Canyon and Pacific Railroad could successfully meet the competition of already established lines and indeed become a most prosperous venture. But the line was never constructed, so beyond the data and records of the Stanton survey, a not inconsiderable achievement, all else about the projected line is mere conjecture.

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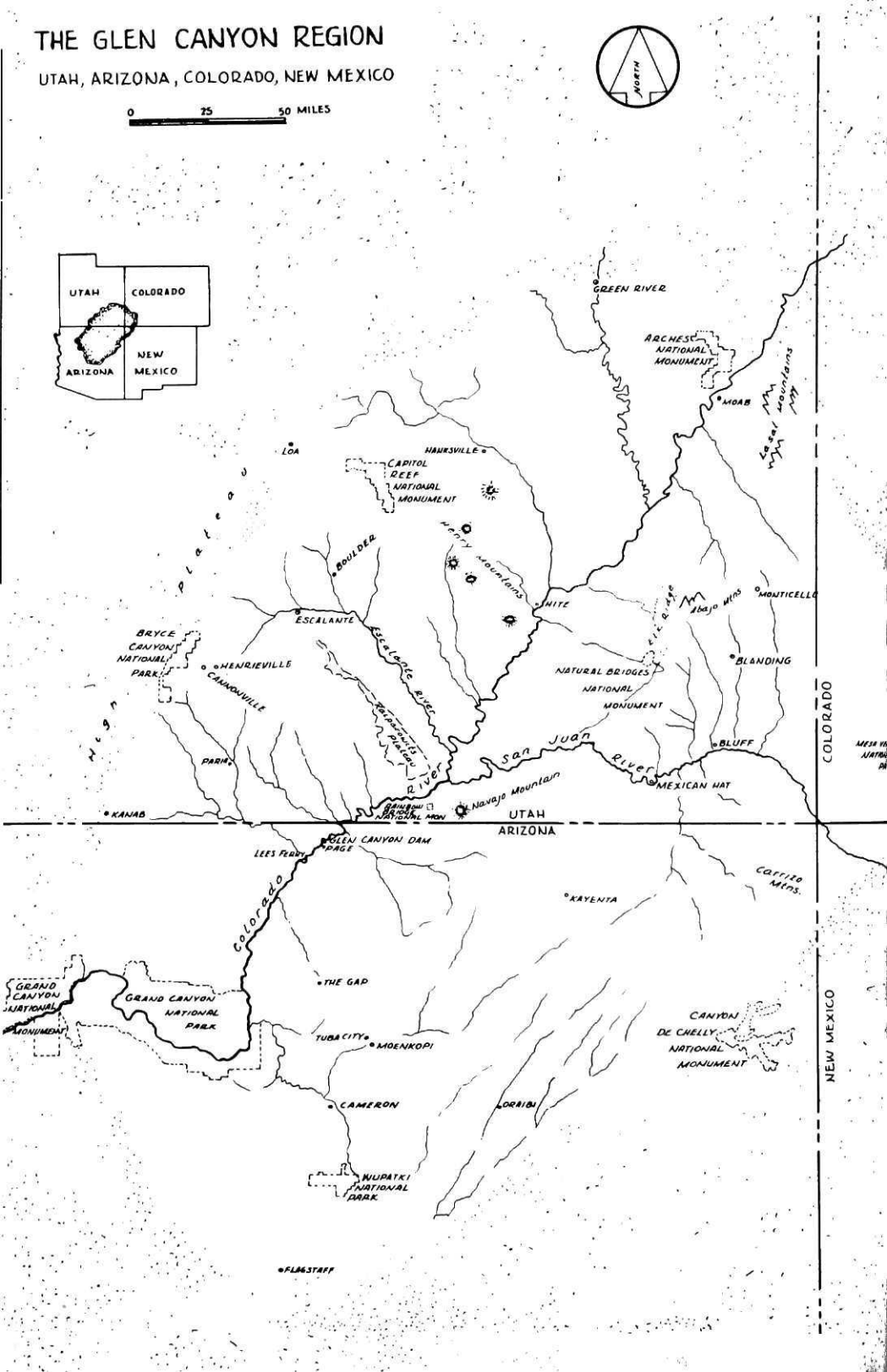
the Rio Virgin, the Colorado, and to San Diego, in which he treats of the area and its value to the proposed line. "The Far Southwest. Its Possible Development," typescript manuscript, 18 pp., Stanton Papers, Box 4, Folder 4.

[41] Exploration and Survey, 209.

[42] *Ibid.*, 209–12. Stanton figured that his line would be from 166 to 713 miles shorter from Denver to San Diego than any of the then operating lines. With existing connections, it would be shorter from 150 to 1,347 miles than all other lines, except one, from Chicago to San Diego. Generally not as much distance would be lost in the windings of the Colorado as was lost by other railways in crossing various mountain ranges. *Ibid.*, 179–80.

[43] *Ibid.*, 211–12. For a detailed analysis of "the railroad connections and prospects" of San Diego, see the lengthy newspaper article by a civil engineer, Charles J. Fox, "San Diego's Railways," in the *Union* (San Diego), March 15, 1891.


THE GLEN CANYON REGION
UTAH, ARIZONA, COLORADO, NEW MEXICO
0 25 50 MILES
NORTH
UTAH
COLORADO
ARIZONA
NEW MEXICO
GREEN RIVER
ARCHES NATIONAL MONUMENT
MOAB
La Sal Mountains
LOA
HANKSVILLE
CAPITOL REEF NATIONAL MONUMENT
Henry Mountains
Kaiparowits Plateau
BOULDER
ESCALANTE
Escalante River
WHITE
Abajo Mts
MONTICELLO
BLANDING
NATURAL BRIDGES NATIONAL MONUMENT
BRYCE CANYON NATIONAL PARK
HENRIEVILLE
CANNONVILLE
PARIA
San Juan River
BLUFF
MEXICAN HAT
KANAB
RAINBOW BRIDGE NATIONAL MON
Navajo Mountain
GLEN CANYON DAM
PAGE
LEES FERRY
Colorado River
KAYENTA
Carrizo Mts.
THE GAP
GRAND CANYON NATIONAL MONUMENT
GRAND CANYON NATIONAL PARK
TUBA CITY
MOENKOPI
CAMERON
LORAIBI
CANYON DE CHELLY NATIONAL MONUMENT
NAVAJO NATIONAL PARK
FLAGSTAFF

The Spanish explorers, Fathers Domínguez and Escalante, were the first Europeans to reach Glen Canyon. Their recorded experiences are the earliest we have of much of all the Upper Basin of the Colorado.

HISTORIC GLEN CANYON

*By C. Gregory Crampton**

The siren charms of the Grand Canyon are so powerful as to have left neglected the other great gorges of the Colorado stretching out in a line through Arizona and Utah into Colorado, and those of the Green River, into Wyoming. Few writers have appeared to describe them, and they remain obscure in the popular image. This includes Glen Canyon extending from the mouth of the Dirty Devil River in Utah to the historic crossing of the Colorado at Lee's Ferry in Arizona 169 miles downstream. Yet much more is known of Glen Canyon than the rest, for it has the richest historical heritage and more people have seen this canyon from the river than the others.

The first white men to see and describe the upper basin of the Colorado River were Spaniards from New Mexico. From Santa Fé exploring parties ranged north and west and touched the upper tributaries of the Colorado. They probably did not penetrate into the canyon country before 1776, although the Abajo (Blue) and La Sal mountains overlooking the canyons in Utah were known to them by that time. The first comprehensive traverse of the upper basin was undertaken by two Franciscan friars, Francisco Atanasio Domínguez and Francisco Silvestre Vélez de Escalante. The two Franciscos hoped to open a road between

* Dr. Crampton, professor of history at the University of Utah, is supervising the University of Utah-National Park Service program of historical studies in Glen Canyon, the purpose of which is to salvage historical values subject to loss through inundation by the waters of Lake Powell. His *Outline History of the Glen Canyon Region, 1776–1922*, published by the University of Utah Press in 1959, and which has been drawn upon for this article, is an outgrowth of the program, and is the first broad reconstruction of the history of an area touching four states.

New Mexico and Monterey in California and to locate sites for missions and Spanish settlements en route. They did not get through; a late start forced them to return, and the exploration ended where it began at Santa Fé.

Domínguez and Escalante and their companions had traveled in a great circle through the four modern states of New Mexico, Colorado, Utah, and Arizona, most of the way through wilderness unknown to white men. Many discoveries they made along the way. They were the first whites to see the Green River and the first to reach the Colorado River where nearly a hundred years later Lee's Ferry was established. Unable to ford there, the Spanish explorers turned upstream and became the first Europeans to reach Glen Canyon. After some hardship they found a way across the river at a place since known as the Crossing of the Fathers, thirty-nine river miles above Lee's Ferry and fourteen miles above Glen Canyon Dam. Safely across the river on November 7, 1776, the Spaniards celebrated "by praising God our Lord," Escalante wrote in his diary, "and firing off a few muskets as a sign of great joy which we felt at having overcome so great a difficulty."

Thus began the recorded history of Glen Canyon. Not only were Domínguez and Escalante the discoverers of Glen Canyon, but the records they made are the earliest we have of much of the Upper Basin of the Colorado. The diary kept by Escalante, full as it is of geographical, ethnological, and biological information, and the beautiful charts made by Bernardo de Miera y Pacheco, expedition topographer, literally put Utah and the upper Colorado River on the map.[1]

After the Spanish discovery there was little activity in Glen Canyon for a number of years. During the time when the region was under the control of Mexico, 1821–48, an overland caravan trade was opened between New Mexico and California. In the opening stages of this commerce the Colorado was forded at the Crossing of the Fathers, but an easier route was soon discovered — called the Spanish Trail — which crossed the Colorado at Moab and the Green at Green River, Utah, thus heading the Glen Canyon barrier. Traders dealing in Indian slaves were active in Utah west of the Colorado. Ute Indians and unscrupulous Mexicans preyed upon the Southern Paiutes for victims, women and children, selling them in New Mexico. This shadowy business which began during the Mexican period was outlawed in Utah in 1852, although it continued for some time after that.

[1] See Herbert E. Bolton, *Pageant in the Wilderness.* The Story of the Escalante Expedition to the Interior Basin, 1776, *Utah Historical Quarterly,* XVIII (Salt Lake City, 1950).

Glen Canyon during the Mexican period was probably visited by American trappers, men who would go anywhere after beaver (still commonly seen in Glen Canyon today) but who kept meager records of their journeys. James O. Pattie, for example, traveled up the basin of the Colorado on a trapping expedition in 1826, but his account offers only a few clues as to his route. A date 1837 with some letters in French in Glen Canyon may have been left by a party of French trappers headed by one Denis Julien who left his name and the date 1836 upstream on the walls of Cataract Canyon. But the slavers and the fur men were itinerants. They briefly traveled the canyon or they crossed it, and their presence had little bearing upon subsequent events.

The continuous history of Glen Canyon began on November 6, 1858, when Jacob Hamblin — eighty-two years almost to the day after Domínguez and Escalante — forded the Colorado River at the Crossing of the Fathers. Hamblin and his ten companions at the time were bent upon visiting the Hopi Indians to initiate missionary work among them on behalf of the Church of Jesus Christ of Latter-day Saints. A pioneer in the settlement of Utah's "Dixie," Hamblin was a central figure in the Glen Canyon region for thirty years as missionary, Indian agent, explorer, peacemaker, and colonizer. After 1858 he made a number of missionary journeys to the Hopi villages and to the Navajos in the interests of peace, crossing the Colorado River at the ford found by Domínguez and Escalante or at what later became known as Lee's Ferry, where he built the first crude ferryboat in 1869.

On his third trip across the Colorado, Hamblin, near Moenkopi Wash, ran into some hostile Navajos who killed George Albert Smith, Jr., of his party. This was the first clash between two expanding frontiers, that of the Mormons west of the Colorado and of the Navajo Indians east of it. The Mormons in advancing their settlements southward along the eastern side of the Great Basin and over into the Virgin River Valley and the Arizona Strip had displaced the Indians. The Walker War, in 1853–54, was followed in 1865 by a general outbreak of the Utes in central Utah and of the Southern Paiutes in southern Utah and northern Arizona. This, the Black Hawk War, was brought to an end in 1868 by the Utah territorial militia, but it had cost the lives of seventy persons and a million dollars. The war was made the more serious when the Navajos joined it in 1865.

The approach of the Navajos to Glen Canyon may be explained as a result of frequent conflicts in which these Indians found themselves involved with the United States after 1846. These increased to a warlike pitch in 1858 and only ceased early in 1864 when most of the Navajos

capitulated to Colonel Kit Carson. Most, but not all. Many of the Navajos during these hostilities left the tribal territory about Canyon de Chelly and moved northward into the canyon of the San Juan and west toward Glen Canyon and escaped the captivity at Fort Sumner, or Bosque Redondo, 1864–68. With no particular love for the whites as a result of these difficulties, the Navajos crossed the Colorado to prey with the Southern Paiutes on the Mormon frontier. Their strategy was to raid the settlements for stock, and then quickly return to the east side of the river before they could be apprehended. More than once the Utah militia chased marauding Navajo bands to the Crossing of the Fathers without catching them.

Not the least of these troubles was the killing by the Shivwits, a Southern Paiute band, of O. H. Howland, Seneca Howland, and William Dunn, three who left John Wesley Powell's first expedition on the Colorado at Separation Rapids in the lower end of Grand Canyon. The men left the river August 28, 1869, and shortly afterward were killed as they climbed out of the canyon.

At length the Indian troubles ended. In November, 1870, Jacob Hamblin persuaded the Navajos assembled at Fort Defiance to make promises of peace. As far as the Mormon frontier was concerned they were kept. There were indeed some later hostilities but no general outbreak. Trade between the Indians and the Mormons followed. The first peaceful party of Navajos en route to the Mormon settlements to trade forded the Colorado at the Crossing of the Fathers in October, 1871, while the second Powell expedition was encamped a mile upstream.

The two voyages of discovery on the Colorado River directed by John Wesley Powell, who examined the long line of canyons from Green River, Wyoming, to the foot of the Grand Canyon, together with much of the adjacent country, 1869–73, is much the best known chapter in the history of the Colorado River.[2] Powell's survey provided the first accurate and comprehensive description of the canyons; he demonstrated that they were passable, if not easily navigable, and he named the three canyons in a row — Cataract, Narrow, and Glen — soon to be filled by the reservoir waters behind Glen Canyon Dam. It is appropriate that the reservoir is to be called Lake Powell. Powell's report on the Colorado River of the West (1875) is less impressive than other related works which incorporated the results of his survey. The reports

[2] See "The Exploration of the Colorado River in 1869, hitherto unknown and unpublished journals of the first and second Powell expeditions down the Green and Colorado rivers . . ." *Utah Historical Quarterly,* XV (1947), and "The Exploration of the Colorado River and the High Plateaus of Utah in 1871–72," *ibid.,* XVI–XVII (1948–49).

BISHOP MAP OF THE POWELL EXPEDITION, 1871

Manuscript maps drawn by Francis M. Bishop, member of the second Powell expedition through the canyons of the Colorado in 1871, show the river from Green River, Wyoming, to Lee's Ferry, Arizona. The portion of one here reproduced shows the area of the Crossing of the Fathers. Camp No. 79 where the Powell expedition spent the days of October 6–13, 1871, is just upstream a few yards from a small stream now called Kane Creek which is the present foot of navigation for pleasure boats in Glen Canyon. This point is connected by a trail shown in the dotted line, which enters another stream about a mile below. This is Navajo Canyon, or Padre Creek, and the entrance to the ford crossed by the Spanish padres in 1776. The trail out of the ford leads to Fort Defiance. The Mormon scout and explorer, Jacob Hamblin, crossed here and so did the Navajo Indians who preyed on the Mormon settlements in southern Utah. Top of the map faces east, the left border north.

by Powell on the Uinta Mountains (1876) and on the arid region of the United States (1879), by G. K. Gilbert on the Henry Mountains (1877), by C. E. Dutton on the High Plateaus of Utah (1880), and on the Grand Canyon (1882) are classic studies in geological and reclamation literature.

The Indian troubles before 1870 and the investigations made by the Powell survey (officially the United States Geographical and Geological Survey of the Rocky Mountain Region), together with some of those made by the Wheeler survey (officially the United States Geographical Surveys West of the One Hundredth Meridian) and by the Hayden survey (officially the United States Geological and Geographical Survey of the Territories), made known the Glen Canyon region, blanketed it with its first satisfactory maps, and opened the way for settlement. Francis M. Bishop, a member of Powell's river expedition in 1871, made a remarkable detailed map of the Colorado and Green rivers from Green River, Wyoming, to Lee's Ferry, Arizona, now in the possession of the Utah State Historical Society. A portion of the map showing the area of the Crossing of the Fathers is published here for the first time.

The first permanent settlements by whites in the Glen Canyon region reflected the advance of the Mormon agricultural-pastoral frontier from the older adjacent communities in Utah, and a similar advance of miners and cattlemen from southwestern Colorado. From 1869 to 1882 a string of little Mormon communities was planted along the eastern base of the High Plateaus from Kanab to Hanksville; others were founded across the river in Arizona in the drainage of the Little Colorado; a connecting link between the two groups was Lee's Ferry. Settled by John D. Lee in 1871, a ferry service was opened two years later which was maintained until the highway bridge across Marble Canyon six miles downstream was opened in 1929. When, in 1882, the Santa Fé Railroad (then the Atlantic and Pacific) reached Flagstaff, Arizona, and the Denver and Rio Grande Western reached Green River, Utah, the Glen Canyon country was put into closer touch with the rest of the world.

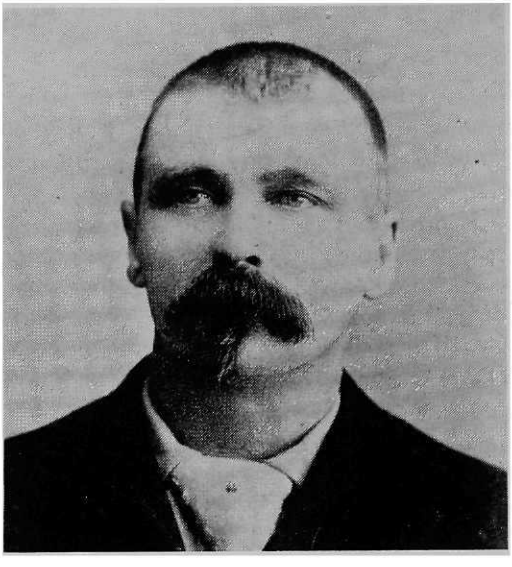
To the vast eastern half of the region extending from the Little Colorado on the south to the D. & R. G. W. on the north the earliest settlers came from different directions. The pioneer settlements of La Sal and Moab and some scattered ranches located about the bases of the Abajo (Blue) and La Sal mountains were founded by cattlemen from Colorado and Texas and from the older communities in Utah before 1879. By that time, the Navajos, those having fled the captivity at Bosque Redondo and those having become acquainted with the canyon country

during the raids on the Mormon frontier, had moved into the region already occupied in part by bands of Southern Paiutes, south of the San Juan River, an area soon to be granted them through an extension of their reservation.

In 1879 the heroic Hole-in-the-Rock trek began. In order to have a stronger hold in southeastern Utah and a base closer to the Navajo and Ute Indians, the Mormon Church organized a formal mission to colonize the San Juan country. A scouting party in 1879 crossed the Colorado at Lee's Ferry and traveled north through the Navajo country to the San Juan River. The scouts found a suitable place to settle at the mouth of Montezuma Creek and then returned by an easy route which took them north to Moab and the Spanish Trail which they followed back to Paragonah, near Cedar City, the place of beginning. A large colonizing expedition of about 250 persons — men, women, and children — was recruited in south-central Utah. But rather than journey to the San Juan by either the easy Spanish Trail or the somewhat more difficult route through the Navajo country, the leaders of the expedition decided to cut directly "across lots." The trek across Glen Canyon at the Hole-in-the Rock and through the "impassable" region beyond is one of the remarkable pioneering achievements of the West.

With some eighty wagons and over 1,000 head of cattle, the Mormon colonists left the town of Escalante late in 1879 planning to reach their destination in six weeks. It took them six months instead. They traveled two hundred miles where wheeled vehicles had never been before, and they built a road most of the way, much of it in solid rock. The expedition crossed Glen Canyon just below the Escalante River where a natural fault in the canyon's rim was enlarged to accommodate wagons which were then driven down to the river more than a thousand feet almost directly below. After crossing the Colorado on a ferryboat made for the purpose, it was necessary to get out of the canyon on the east side, to cross Grey (Wilson) Mesa, to get over the Clay Hills, to head Grand Gulch, and to surmount Comb Ridge. When in April, 1880, the colonists reached a place on the San Juan River which they called Bluff, some distance downstream from Montezuma Creek, they stopped from sheer exhaustion. As a farming community the Mormon outpost at Bluff did not prosper. In 1887 a good many of the settlers moved to Verdure and to Monticello the next year, and others left to settle the town of Blanding in 1905 when irrigation water was brought from the Abajo (Blue) Mountains.

By about 1882 the upper reaches of the Glen Canyon watershed had been occupied by farmers, cattlemen, and Indians, and connecting roads



Cass Hite, who discovered gold on the river at the s known as Hite.

and trails and two railroads put them in touch with the older settlements on every side and with the rest of the country. But as for the canyon very little development had taken place by then. This followed upon the discovery of gold.

The mining history of Glen Canyon opened in March, 1880, when Navajo Indians killed two prospectors, James Merrick and Ernest Mitchell, in Monument Valley. The two were in search of a hidden mine believed to be the source of the silver used by the Indians in their jewelry. When a searching party found some samples of silver ore with the bodies it was thought the prospectors had located the mine. Although no one after them ever found out where the samples of silver ore came from, the Merrick-Mitchell mine was a lodestone for prospectors who searched for it in the Monument Valley–Navajo Mountain region for at least twenty-five years. Among them was Cass Hite, a miner from Montana and Colorado. Hite was befriended by the Navajo Chief Hoskininni (usual spelling of the Indian's name as opposed to name of the mining company), who told him gold could be found in Glen Canyon. Following the chief's directions, he went to the place later called Hite in September, 1883, and soon discovered placer gold on both sides of the river.

A gold rush to Glen Canyon occurred when Cass Hite's discoveries became known. Several hundred miners appeared to prospect in what was quite likely the most difficult gold region any of them had ever encountered. But they found gold, first in the upper part of the canyon,

Hite as it appeared in about 1898. The Hite cabin is the one with the chimney. Cass Hite settled here in September, 1883, when prospecting for gold.

where the White Canyon Mining District was organized in 1885, and then they worked their way downstream to find gold all the way from the mouth of the Dirty Devil to Lee's Ferry. Extremely fine gold it was; most of it was found in lateral gravel terraces above the high water level. With the exception of the San Juan River, practically no gold was found in the tributary canyons though they, together with the plateaus and the adjacent laccolithic mountains (especially Navajo Mountain, the Abajo and La Sal mountains, and the Henry Mountains), were explored in search of the source of the gold in the canyon.

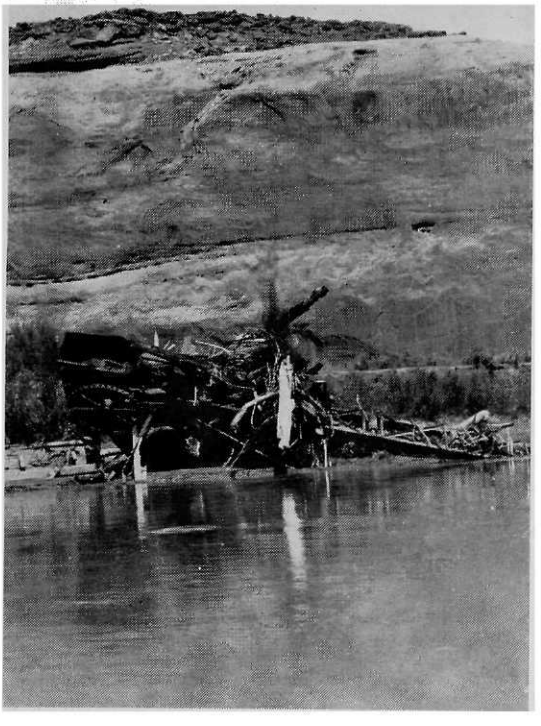
The gold rush had some bearing on the ambitious enterprise of the Denver, Colorado Canyon, and Pacific Railway, a corporation organized in Denver by Frank M. Brown. The firm planned to build a railroad from Grand Junction to seaboard through the canyons of the Colorado River. Brown engaged Robert Brewster Stanton, a prominent mining engineer, to superintend the project, and with a large party they began the railroad survey in May, 1889, at Green River, Utah. Three boats were lost in Cataract Canyon, and after passing through Glen Canyon the expedition met disaster when Brown and two others were drowned in the rapids of Marble Canyon. Before the year was out Stanton returned and carried the survey successfully through Marble and Grand canyons and to the Gulf of California by April, 1890. The rail-

road was not built. Stanton argued the feasibility of it from an engineering viewpoint, but capital was more timid than the doughty engineer. Robert B. Stanton, however, had seen enough of Glen Canyon to convince him that a fortune was to be made there in gold mining; within a few years he was back to test his conviction.

Hoskininni-begay, only son of old Navajo Chief Hoskininni, who with his father led Cass Hite to the site where gold was found on the river.

In 1892 gold was discovered in the canyon of the San Juan River, the Colorado's main tributary in Glen Canyon, and a rush bent itself in that direction. The Island, Gabel, Monumental, and Williams mining districts covering the area were all organized by 1895. Placer gold mining on the San Juan centered in the middle portion of the canyon between the mouth of Grand Gulch and the Big Bend, all of which region will be covered by the waters of Glen Canyon reservoir. The best mining areas were found near Clay Hill Crossing, Paiute Farms, the mouth of Clay Gulch, and mouth of Copper Canyon, the mouth of Nokai Canyon, and at the foot of Paiute Mesa between Zahn's Camp and Spencer Camp. The most extensive operations were set up at the latter two places where heavy machinery was installed to capture the elusive, powdery gold.

The largest enterprise in the entire Glen Canyon gold field was that of the Hoskaninni Company, founded in 1897, in which the imaginative engineer, Robert B. Stanton, had an interest and was in charge of field operations. His plan was to install a dredge designed to handle large quantities of sand and gravel. If the first were successful other dredges would be built to be operated by electric



Remains of the Hoskaninni, or Stanton, gold dredge located in the bed of the Colorado River in Glen Canyon 121 miles above Lee's Ferry.

power generated by dams built in the canyons; the impounded water would be used for mining operations as well. Stanton was the first to propose a multipurpose hydroelectric project in Glen Canyon. Crews were put to work: one staked out the unclaimed portion of the full 170-mile length of the canyon in such a way that all the mining claims adjoined; another tested for values on the river bars, terraces, and beds; still another started work on the huge dredge.

The assembling and building of the Hoskaninni 82-bucket, 180-ton dredge was a colossal job. All the machinery was hauled by sixteen and twenty horse teams from the railhead at Green River by way of Hanksville and over a specially built road through the Henry Mountains to the river's edge just above Bullfrog Creek. The first trial run was made in March, 1901. The dredge operated a few months before it shut down, never to operate again. Not enough metal had been saved to pay costs. The huge machine stands in the river today, covered at high water but visible most of the year, a monument to the power of gold.

The failure of the Hoskaninni Company climaxed the Glen Canyon gold rush. The excessively fine gold in the canyon had simply eluded recovery by every process except in a few places such as Hite, Castle Butte Bar, Ticaboo Bar, Good Hope, California Bar, Moqui Bar, Gretchen Bar, and Klondike Bar. The only places approaching towns in the canyon were Hite and Lee's Ferry, where there were post offices.

The little farming communities of Bluff, Kanab, Escalante, and Hanksville were the nearest supply points to the canyon diggings.

When Emery and Ellsworth Kolb passed through Glen Canyon in 1911 they saw only a few people where there had been hundreds a decade earlier. The only mining activity noted by the Kolbs was at Lee's Ferry where the American Placer Corporation had set up elaborate equipment to placer the extensive clay, sand, and gravel beds there and at the mouth of the Paria River nearby. But this, too, was a failure. Not the least interesting phase of the firm's operation was the construction of a large steamboat, the *Charles H. Spencer,* with which it was expected to haul barges of coal, brought down from the country above, from the mouth of Warm Creek, twenty-seven miles upstream. The largest craft ever operated in Glen Canyon, it was ninety-two feet long, twenty-five feet wide and propelled by a steam driven twelve-foot rear paddle wheel. There was scarcely enough power to push the boat upstream empty. It made five trips before it was tied up never to move again. The remains at Lee's Ferry may still be seen at low water.

The gold fever in Glen Canyon and San Juan Canyon, 1883–1911, is a unique chapter in the mining history of the United States made so by the canyon locale: the greater part of the mining region is enclosed by high cliffs making it difficult of access and hard to traverse once reached. and the gold itself, extremely fine as it is, together with the peculiar conditions of canyon mining, resisted most attempts to recover it with profit. With the exception of Lee's Ferry, the entire mining field in Glen Canyon will be inundated as the waters of Lake Powell back up behind Glen Canyon Dam.

There were some later mining activities in the Glen Canyon country — copper, petroleum, and in recent times, uranium — but these touched the canyon itself but slightly except during the prospecting stages. There was a revival of gold mining during the Great Depression, but it did not compare with the boom days at the turn of the century.

After the first world war, reclamation developments in the Upper Basin of the Colorado, discussed in another paper in this issue of the *Quarterly,* led to the formation of the Colorado River Compact in 1922, which opened the way for the federal development of the river. The Colorado River Storage Act of 1956 is the basic authorization for the comprehensive utilization of the waters of the Colorado River allotted by the compact to the states of the Upper Basin.

By 1922, the scenic and recreational aspects of the Glen Canyon region had been recognized. It is difficult to say when this began. The earliest visitors to the region said little about it. Government reporters,

C. E. Dutton of the Powell survey (*Geology of the High Plateaus,* 1880, and *The Tertiary History of the Grand Canyon District,* 1882) excepted, seldom departed from scientific objectivity in their descriptions, and those who were trying to wring a living from a land of bare rocks and little water could find small comfort in the aesthetics of their environment. Yet it was the pioneer farmers, cattlemen, and particularly the miners, who first became thoroughly familiar with the region. For example, the sandstone arches, bridges, and windows, so common to a region where meandering streams are deeply entrenched in straight-walled canyons, were nearly all first seen by them before they were "discovered" by later comers. But the first finders seldom wrote of what they saw. To illustrate, the natural bridges in White Canyon were known to miners and stockmen, but they did not attract wide attention until Horace J. Long came out from the East to settle the affairs of the bankrupt Hoskaninni Company. He visited the bridges in 1903 and articles about them by W. W. Dyar of his party appeared in *Century Magazine* and elsewhere the next year. This attracted more visitors and more articles were published, and in April, 1908, Natural Bridges National Monument, the first national park or monument in Utah, was proclaimed by President Theodore Roosevelt.

In 1909, Dean Byron Cummings, archeologist of the University of Utah, and W. B. Douglass, of the General Land Office, discovered the greatest arch of them all, Rainbow Bridge, on the western slopes of Navajo Mountain. Made a national monument in 1910, it too had probably been seen before by miners working along the Colorado River only five easy miles below the bridge. But it was the later discoveries, together with those of archeologists working in the Four Corners area at the same time, that popularized the eastern slopes of the Glen Canyon region as a recreational and scenic area. Tourists appeared shortly after the formation of the two national monuments to visit the bridges and to see the ancient ruins in Mesa Verde National Park (created in 1906) and in the Navajo National Monument (created in 1909) and other places. John Wetherill from his trading post at Kayenta guided many parties, including such articulate visitors as Theodore Roosevelt, Charles L. Bernheimer, and Zane Grey. Others guided a steady stream of tourists into Natural Bridges National Monument and the country north of the San Juan River.

Somewhat slower was the growth of river running on the Colorado in Glen Canyon and the recreational growth of the western slope. Although Zion National Park dates from 1909 (as Mukuntuweap National Monument to 1919), Bryce Canyon National Park was not cre-

ated until 1928, and Capitol Reef National Monument not until 1937. By then Glen Canyon was literally ringed around by parks and monuments. In addition to those mentioned there were: Grand Canyon National Park, and Pipe Spring, Wupatki, Sunset Crater, Petrified Forest, Canyon de Chelly, and Arches national monuments. Now in 1960 reclamation focuses national attention on the Glen Canyon region, separating these parks and monuments. Visitors in the future will find it to be rich in historical values and one of matchless scenic beauty.

In ever present danger familiar to all river unners, upsetting in the rapids. This photo f the Best expedition of 1891 shows the pset in Cataract Canyon. The sunken oat is against the rock. The man on the ock is Harry McDonald, the one in the wer is Elmer Kane.

RIVER RUNNERS: FAST WATER NAVIGATION

*By Otis Marston**

The following piece constitutes a near encyclopedic listing of river-running navigation of the Colorado River. In volumes XV, XVI and XVII of the Quarterly *the Society printed most of the journals that could be located of both Powell expeditions. In order to complete the record, this article has been compiled to show many of the known expeditions since.*

In the years after Powell many of the river-runners were involved in serious business — trapping, mining, geological surveying — but as one observer aptly put it, most of the river men risked their lives on the turbulent waters of the Colorado and its tributaries simply for adventure and the "hell of it." Whatever the motive that led men to the river, the result has been a considerable amount of accumulated knowledge about the river and the land through which it twists its way.

The Ashley and Manley jaunts on the Green River sent glimmerings of light into the dark legends of the horrors lurking in the fast water of the Colorado River system. The wide circulation of florid fabrications arising from the Powell ventures again dropped the curtain of fable and discouraged use of the river for transport.

* "Dock" Marston, an authority on the river-running of the Colorado and its tributaries, has spent years not only running the river but researching the history of such river navigation.

THE UPPER CANYONS

But by 1891 a man by the name of Snyder and his son of Vernal are reported to have upset in the Canyon of Lodore. They borrowed a horse from the Chew family and rode over the mountains.

Able water-man George F. Flavell was little impressed with the danger legends. With a half-breed, whom he called Ramon Montos, Flavell built a flat-bottomed skiff and started from Green River, Wyoming, August 27, 1896. On October 30 they cleared the Grand Wash Cliffs, having lined rapids four times in the Canyon of Lodore and once in Cataract Canyon.

In the simple pursuit of a living, Nathaniel Galloway accepted the watery risks, trapping and prospecting the river course from 1891 to 1913. From the beginning he faced the danger with his stern-first technique. His knowledge of effective hull form produced a maneuverable boat designed to avoid the hazards. But lack of a written record has prevented possible questioning of the legality of his trapping and added barriers to ascertaining the complete accuracy in listings such as this. It is known that in the fall of 1895 he and a partner went down the upper canyons and to the mouth of Green River and to Moab. The next spring, he and a partner ended a trip in the upper canyons at Nine-Mile-Creek, where he cached his boats.

In September, 1896, Galloway dropped his boat into the Green River at Henry's Fork and packed in a thirteen-year-old son to start him on a river career. At Little Hole they camped with Frank Leland and William Chesley Richmond, the latter agreeing to a cruise down the Green and through the Cataract and Grand canyons. Leland left by land, and the boy stopped at home in Vernal. In February, 1897, Richmond and Galloway completed the run to Needles, California.

In 1897 trapping took Galloway from Vernal to Lee's Ferry, where he arrived in October. He remained in Glen Canyon most of 1898. In 1901 he trapped from Meeker down the White River and on down the Green to Green River, Utah. The year 1903 introduced Parley Galloway to the river when he boated with his father from Vernal to the mouth of the Green and back to Moab, following with a trip down the White River. The same team went through Desolation, Gray, and Cataract canyons and on through to Lee's Ferry in November, 1904. In September-October, 1905, Nathaniel again ran the upper canyons of the Green. By January, 1908, Galloway had tallied five trips through the upper canyons of the Green — one remains obscure; six were through Desolation and Gray canyons; three through Cataract Canyon; and one was

through the Grand Canyon. In that year, he tested a steel boat on the river, made a run from Green River, Wyoming, to Green River, Utah, and another through Desolation and Gray canyons. Parley was with his father again in the spring of 1909 for a cruise of the Yampa River, Whirlpool, and Split Mountain canyons.

Talk around the camp fires during a Glen Canyon traverse with Julius Frederick Stone and F. Stewart Knox as early as November, 1898, resulted in Galloway's piloting of a run with four boats starting from Green River, Wyoming, September 12, 1909. Charles Sharp and one boat dropped from the party at Hite. Seymour S. Dubendorff and Raymond A. Cogswell finished the run to Needles, California, with Stone and Galloway.

In December, 1910, Galloway ended an experimental run in a canvas boat through Desolation and Gray canyons. He continued the canvas boat testing, and started from Green River, Wyoming, shortly after the departure of the Kolb brothers in September and reached Green River, Utah, October 27. His son John was with him, and the young man went on for a solo run through Cataract Canyon to North Wash. In May, 1912, the father boated from Green River Lakes to Green River, Wyoming.

In November, 1912, Galloway trapped down the Green and passed Charles Smith at Green River, Utah. This was the man whom the Kolb brothers had met in Cataract Canyon in October of the year before. Smith and Galloway joined forces through Cataract Canyon. Near Dark Canyon they sighted the body of Edward Elder who had left Green River, Utah, in a crude boat. Galloway ended this trip and, incidentally, his river career at Lee's Ferry. Smith started through Cataract Canyon again in the fall of 1913 and was unreported. Parts of his boat were found near Tickaboo in Glen Canyon.

June, 1909, witnessed the departure from Green River, Wyoming, of two St. Louis athletes, Tom Martin and Jules Woodward. The river in Red Canyon took their boat and clothes. While walking out they found a pair of pants and used them to wrap their feet.

Ellsworth Kolb and his brother Emery followed the Galloway-Stone design of boat and their course on the river, departing from Green River, Wyoming, in September, 1911. James Fagin left their company at Echo Park, and Hubert Lauzon joined them at Bright Angel Creek before they completed their run.

In 1914 Eugene Clyde LaRue ventured through Flaming Gorge and Horseshoe canyons. In 1919 the Utah Power and Light Company sent a survey party down the Green River. They found favorable dam

sites at Flaming Gorge, the Canyon of Lodore, Split Mountain, Moon Bottom, Desolation Canyon, and near Dead Horse Point.

July 13, 1922, witnessed the mapping of the upper canyons begun by the United States Geological Survey crew which worked from Green River, Wyoming, to Green River, Utah. Twenty-four years later, in 1946, the survey returned to this section with two skiffs and outboard motors. From two miles upstream from the Wyoming-Utah line, they started on September 21 and ran to Green River, Utah. One boat went on to the mouth of the Green, while the other was carried to the mouth of Bitter Creek on the Colorado, three and one-half miles downstream from the Colorado-Utah line. Cruising down to the junction, the two boats united in the run to Lee's Ferry where they arrived October 17. The spring of 1947 saw another run, which started on June 12 at the same place and continued to Green River, Utah. The boats were portaged to Moab and ran down river to Lee's Ferry. September 10 another start was made at the same point, and the boats were run to Green River, Utah, arriving September 20. At Ashley Falls one boat was lost but recovered. This run was supplemented by a trip from Hite to Lee's Ferry which ended on September 26. In the spring of 1948 a short trip was made from Wyoming to Little Brown's Hole. Starting September 14, 1948, from Henry's Fork, two seven-man inflated boats were run down to Jensen. Portaging to Ouray, the trip was continued to the dam eight and one-half miles above Green River, Utah.

Drew Stubbs and Ray Rose left Green River, Wyoming, in the fall of 1924 and walked back from Cataract to Moab after losing their boat.

John Galloway and a brother left Green River, Utah, in 1924 and traversed Cataract and Glen canyons. March, 1925, John and Parley Galloway started from Nine-Mile-Wash and ran to the junction and up to the oil well below Moab. John Galloway trapped from Green River, Wyoming, to Ouray in 1926 and was followed by the Todd-Page party in two of the USGS boats. The latter party lost one boat in the Canyon of Lodore, but the other finished the run to Green River, Utah. Parley Galloway trapped down the river with Frank Gerber and salvaged the derelict, then continued trapping to the junction and back to Moab.

In the spring of 1926 or 1927 John Galloway records a trip from the Utah-Colorado line to Moab. In the winter of 1927 he and Dave Fraughten departed from Ouray and ran to Lockhart Canyon on the Colorado River above the mouth of the Green. In February, 1928, the boats were recovered and brought on up to Moab.

A development from the canvas boat of Galloway in 1910 was Fred

Launer's introduction of the modern foldboat in September, 1932, with a run from Green River, Wyoming, to Jensen.

The Galloway experience inspired Bus Hatch, Frank Swain, C. L. Hatch, and Royce Mowrey to try an open skiff in 1931. Using bow-first technique, they struggled through the upper canyons to Jensen. The next year they abandoned one of their two boats during a run from Chokecherry Draw to Jensen. This river experimentation was continued in 1933 between Ouray and Lee's Ferry, and in 1934 was carried on through the Grand Canyon in an extraordinary demonstration of stamina and poor technique. Dr. Russell George Frazier participated in these trials. In 1936 Hatch and Swain were piloting "dudes" in a ten-day adventure from Green River, Wyoming, to Jensen. They lost their plywood *Lota-Ve,* and her metal stern compartment now rests at the foot of Triplet Rapid.

A punt left on the talus below the first rapid in the Canyon of Lodore is testimony to the frustrated efforts of Anton R. Backus in 1936. A 1937 Yampa River expedition, which Frazier registers as leading, ended its run through the upper Green River canyons after reaching Pat's Hole.

On October 4, 1937, Haldane "Buzz" Holmstrom slid into his fine Galloway-Stone type skiff at Green River, Wyoming, and at Hoover Dam scored the first solo run of the canyon series. Amos Burg joined him the following year, and they tried Green River Lakes for a starting point, planning to reach the Gulf of California. Shallow water forced a motortruck portage of many miles into Green River. Philip Lundstrom joined for the stretch to Jensen, and they added Willis Johnson at Green River, Utah, who went on with them to Boulder City. Burg introduced an inflated boat which became the forerunner of the neoprene equipment now used on fast water courses to "bumble bus loads of dudes" down the river in fancied safety.

In November, 1940, Holmstrom left Ouray in a fifteen-foot plywood skiff and carried two engineers to Green River. Profile surveys of eleven dam sites were made en route.

Roy Despain was pilot of a wild life management party which left Hideout Park September 20, 1938, and ran to the Dinosaur Quarry in nine days. Much of the time they cruised in company with the three kayaks operated by the French trio, including the first woman pilot, twenty-two-year-old Genevieve de Colmont. At Lee's Ferry the plans of the French party to run to Lake Mead were cancelled. Close on their sterns through Lodore, Whirlpool, and Split Mountain was Stewart Gardiner in a kayak, who joined with Alexander (Zee) Grant to run a

similar course the next year. Charles Fulton Mann in 1939 smashed and patched his fourteen-foot kayak through the canyons as far down as Lee's Ferry.

Albert Loper and Laphene "Don" Harris at Pat's Hole in 1940 met the first upper Green River run by the "sadiron" skiffs of Norman Davies Nevills. Loper and Harris had run from Green River Lakes. The Nevills party started at Green River, Wyoming, June 20 and continued to Boulder City, Nevada. July, 1941, Loper traversed the Yampa River with Harris, finishing at Green River, Utah. In 1942 Bus Hatch brought an archeological party down this tributary, and Frazier led a party of four from Lily Park to Jensen in 1945.

Dick Griffith walked through Desolation and Gray canyons after losing his raft on White River in 1947. June 14, 1948, recorded the capsizing of an inflated boat in Split Mountain, and the body of Frank Everett Billings remained in the river until the eighteenth.

Easy access and smooth water at Green River, Utah, encouraged the use of this point for starting of cruises.

A Denver capitalist, Frank Mason Brown, promoted the idea of a rail line down the canyons and commenced the survey from Grand Junction, March 28, 1889. En route to the mouth of the Green, Westwater Canyon was portaged and their boat towed up the Green River to the mouth of the San Rafael. Brown led a party from Green River, Utah, and picked up the survey at the junction. Cataract Canyon supplied them with the adventure their lack of preparation invited, but all the crew managed to get to Hite. After reorganization most of the party went on to Lee's Ferry in two units, one led by Brown and the other with William H. Bush in charge. The latter party carried the survey to the mouth of Anasazi Canyon at Mile 73.6 where they carved their names, cached their instruments, and dashed for food at Lee's Ferry. If Bush is to be believed as he is quoted in the news, the terrors of Glen Canyon drove one man raving mad.

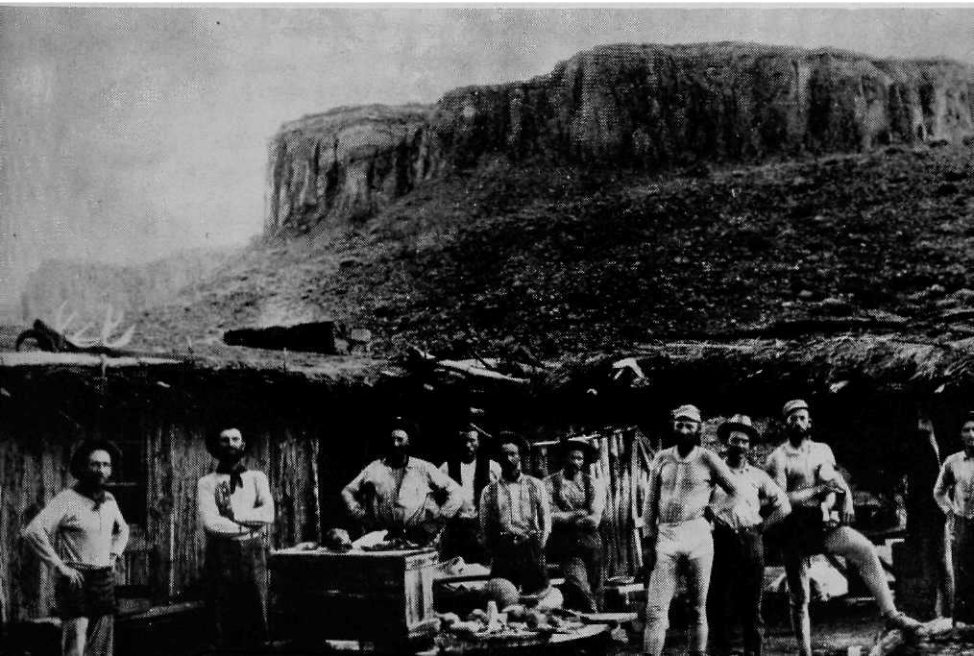
After the loss of three men in Marble Gorge, Robert Brewster Stanton reorganized the party a second time and dropped three boats into the Colorado River at North Wash, from which they departed December 10 and arrived at Lee's Ferry the twenty-third. The survey continued to the Gulf of California.

In 1890 B. S. Ross of Rawlings, Wyoming, and a companion went by skiff from Green River, Utah, to the first rapid in Cataract Canyon before returning to Green River.

James S. Best, intending to prospect down into Grand Canyon, on July 10, 1891, led a party in two boats close to the Stanton design from

The boats of the Best expedition at the ferry at Green River, Utah, July 12–15, 1891, shortly before starting the expedition.

Members of the Best expedition stopped at Hite after losing a boat in Cataract Canyon (see page 290). The man on the left is Harry McDonald, fourth from the left is Cass. The man with his foot on the woodpile holding a dog is Elmer Kane. The others are unidentified.



Green River to the junction which they reached on the twentieth. The next day at Mile 204.5 they pinned one boat on a rock. Protracted efforts to salvage it, including a round trip by John Hislop over the top to Hite, were unavailing. One boat, *Hattie,* took the nine-man party on to Hite where they obtained an ordinary skiff and went on to Lee's Ferry.

POWER BOATS ON THE RIVER

The 1890 trip in a skiff proved to Ross the need of power, and so a thirty-five-foot steam yacht, the *Major Powell,* was launched at Green River, Utah, in August, 1891. The prompt breaking of her two propellers interferred with the proposed trial trip junket of the owners, but they drifted down to the San Rafael in two skiffs. April 15, 1892, four men succeeded in cruising in the steam yacht to the mouth of the San Rafael. In February, 1893, William Hiram Edwards went by skiff from Green River to examine the steamer. He recruited two men and materials from Denver and put the craft into the river. March 24, they painted the name of the steamer, the date, and their own names above the first rapid in Cataract Canyon, then cruised back to the San Rafael. Starting April 27, 1893, the round trip was repeated. In 1896 she was given another whirl by four young men who took her to the junction and up above Moab, then back to forty-two miles below Green River. The news tells of a run from the San Rafael to the foot of Cataract Canyon in January probably of 1897, which could be the first power run of Cataract Canyon.

A documented cruise started from Fruita, Colorado, May 24, 1955, and, ignoring the marked success of outboard operation on the river, Ed. A. Hudson acting as pilot took an inboard motorboat to Lee's Ferry. Hudson sank the boat in Cataract Canyon. Ed Nichols, his companion, wanted to take his boat home and managed to raise her. Hudson started on the river in 1941 with a trip from Hoover Dam to Needles and was builder and wheelman of *Esmeralda II* in its first motor run through Grand Canyon in 1949.

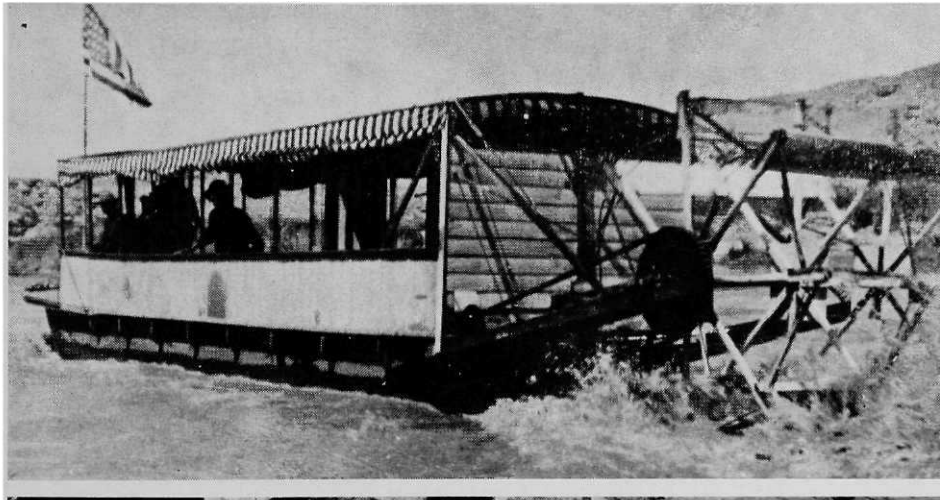
Many other attempts to commercialize power on the stretch from Green River to Moab introduced such craft as the *Undine, Wilmont, Utah, Paddy Ross, Navajo, Marguerite, Ida B, Dispatch, Colorado, Cliff Dweller, City of Moab, Black Eagle, Betsy Ann.* The drilling of the damsite in 1914 near the head of Cataract Canyon provided a subsidy to a few of these craft.

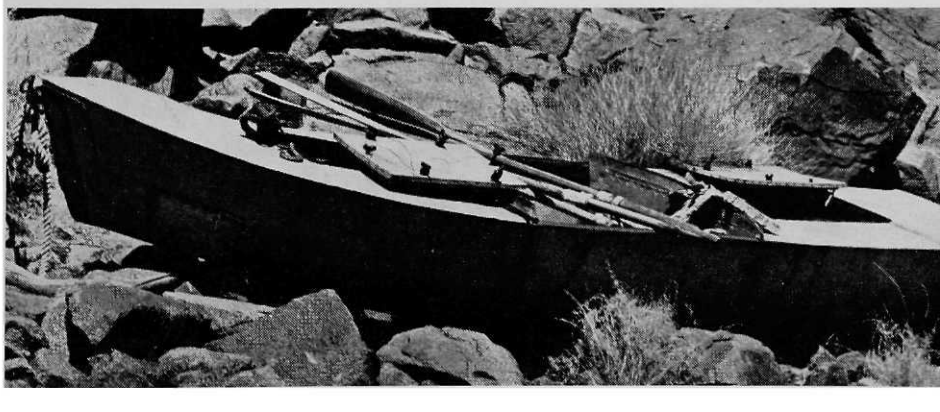
The oil gusher which blew in early in December of 1925 about twenty miles below Moab put the Moab Garage Company in the river transportation business with the *Big Boat,* the *Punkinseed,* and the

The steamer Major Powell *on the Green River, 1893. Lute Johnson sits on the bow.*

The Oppenheimer boat Paddy Ross *on the Green River in about 1909.*

The galvanized iron skiff left by the Russell party near Bass Cable in Grand Canyon was built in 1914. She was taken to 107 miles below Lee's Ferry before the party abandoned the making of a motion picture.





Black Boat. During the oil surveys a seventeen-foot boat with a Grey inboard motor and tunnel stern was named the *Riff Climber.*

A trip down the Grand River in 1909 by United States surveyors received news attention because of the failure of the gas boat operated by M. Oppenheimer and a rescue by Tom Wimmer's boat. The trip resulted in a recommendation that no navigational improvements in that section be made by the government.

THE MIDDLE REACHES AND BEYOND

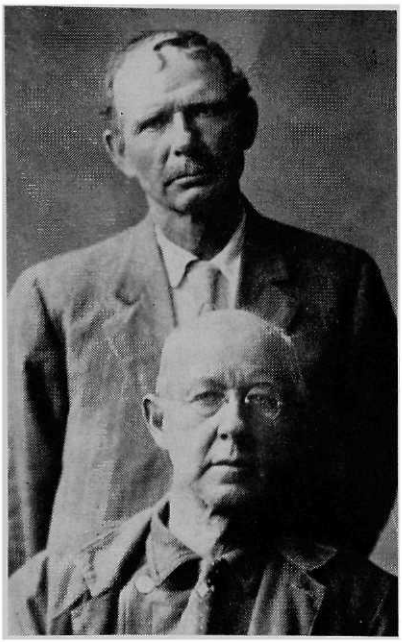
A USGS survey under Raymond C. Seitz with four other men in October, 1911, started with two skiffs from Grand Junction and worked ninety-four miles down to Castle Creek above Moab. Westwater Canyon was by-passed with wagons. The boats were hauled into Moab, and in October to December, 1912, the survey was continued to the mouth of the Green River. The party rigged a sweep scow found at Moab and hoped to use it as a houseboat, but they soon lost it. They brought in a third boat. One boat was left at the junction, and they dragged the other two back to Indian Creek where they left the river. Three men went down from Moab in December and salvaged the boats. The body of Edward Elder seen by Charles Smith in 1912 was, for a time, thought to be one of the Seitz party.

In mid-Cataract Canyon, W. E. Mendenhall reported a message on a rock "F. W. Wright passed here in 1876 Lost one boat in this rapid." [Could this be the first through Cataract Canyon after Powell?]

Sixteen years later, a series of dates from September 18, 1892, to November 13, 1892, with the name C. M. Wright suggests a trip through Cataract and Glen Canyons, but nothing has come to light to tell who either of these voyagers might be. F. G. Faatz registered his name and the date August 27, 1892, in Cataract Canyon and November 16 in lower Glen Canyon. He lived in Sanpete and Sevier counties, but the point of his departure is not known. He always talked of being with another man. The initials "W. H. E." are with the name of Faatz in Cataract Canyon.

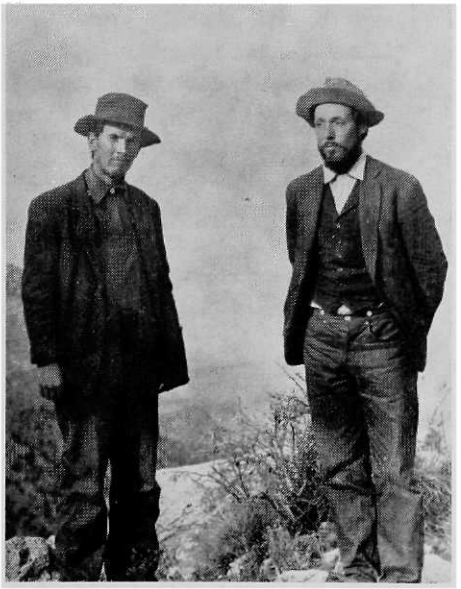
Louis M. Chaffin claims a trip from Green River down to the junction and up to Moab, then down again to some vague point below Cataract Canyon in 1904. His companion was Alonzo G. Turner who went again through Cataract Canyon from Green River in 1907.

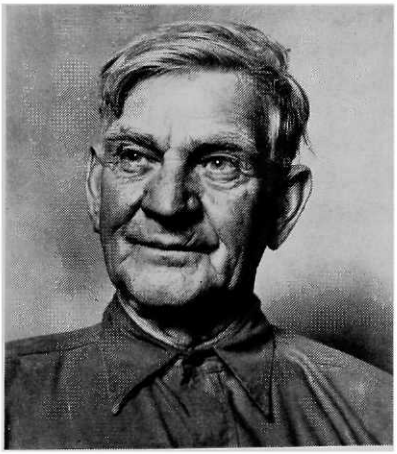
A prospecting trip was promoted by Albert Loper, who was joined by Charles Russell and Edwin Monett. In 1894–95 Loper had gained a limited experience on the San Juan River between Chinle Creek and



Nathaniel Galloway and Julius F. Stone at the time of the 1909 river trip.

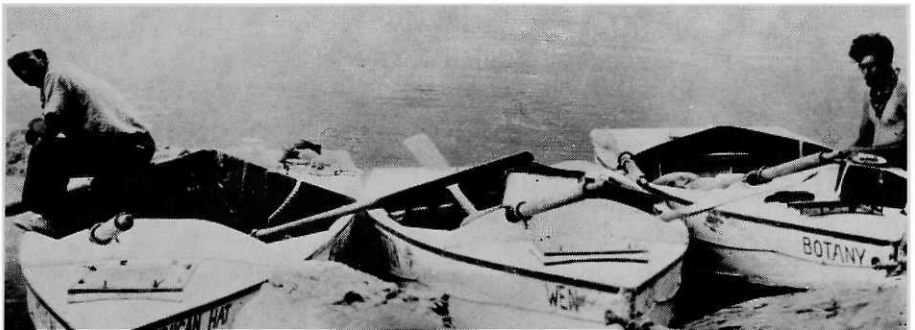
Left, Ed Monett and right, Charles S. Russell, about 1908.





Bert Loper, famous river runner.

The first fleet of three "sadirons" used by Nevills, July, 1938.



Nokai Creek. Leaving Green River September 20, 1907, the three men found poor prospecting in Cataract Canyon and wet their box camera when Loper was hung on a rock. To assure the extra dividends from sale of the pictures, the camera was sent out for repairs from Hite. While waiting, the crew placered near the Hoskaninni (Stanton) dredge at Mile 121. Agreeing to join his companions on the first of December at Lee's Ferry, Loper returned to Hite for the camera which arrived November 20. The other two prospected on down through Glen Canyon. December 13, two weeks behind the appointed time for meeting Loper, the two went on and completed a run to Needles. January 1, 1908, Loper left and eventually reached Lee's Ferry. After more delay, he dragged his boat back up to Hite. In December, 1911 — February, 1912, he made a round trip to Lee's Ferry to study the Spencer mining.

In the spring of 1908, W. E. Mendenhall claims to have gone from Richardson Valley above Moab to the eleventh rapid and then back to Moab. In February, 1919, he tripped from Green River to Moab.

In 1908 a W. J. Law reached Hite. He and another man had started from Green River in one boat and lost it near the head of the canyon. Law climbed out at Clearwater Creek and stumbled into the sheep camp of Chris Jorgensen. On October 25 of the same year, Pat Malone left Green River with a companion in one boat. In the middle of Cataract Canyon the boat was upset. Malone reached the right bank, but his partner sank. The survivor finally staggered into a sheep camp. This type of river operation appears to be typical of that time.

In October, 1909, the Galloway-Stone party found a boat stove-in and a coat marked O. W. Hadley. Footprints suggested there had been two men and a boy.

May 5, 1910, two men left Green River in one boat and planned to go to Hite. Their wrecked boat was found in Glen Canyon.

J. H. Hummel and Dave Miller started from Green River, Utah, planning a run through the Grand Canyon. At the mouth of the Green, Miller left and walked out, but Hummel went in his fourteen-foot boat on to Bright Angel Creek where he concluded he had seen enough of the river.

Photographic exploitation with both motion pictures and stills became the inspiration for a second trip which started Russell and Loper from Green River, Utah, July 19, 1914. Loper was the cameraman. When Russell sank his steel boat in Cataract Canyon, they made a landsman's choice, tied up the remaining boat, and walked out. By the time the new party made its start from Green River on October 8 in a replacement boat, Loper had gone to work at the drilling of the damsite in

Cataract Canyon. William Penn Reeder was the new oarsman. His only experience on the river was on the quiet water which he had first traveled in 1902. They recovered the cached boat, but sank it soon thereafter. Reaching Hite on the twenty-third, Reeder quit, and another boat and oarsman were brought in from Salt Lake City. Leaving Hite in December on an icy river and reaching Lee's Ferry on the twelfth, the oarsman, Goddard Quist, skulled the new boat through Glen Canyon. Quist continued with this crew to Bright Angel Creek where the new boat was lost. The party walked to the Rim via the Bass Trail. The craft lies on the talus in Grand Canyon 107 miles below Lee's Ferry.

In August of 1915, after agreeing to take LaRue and Richardson through Glen Canyon, Loper did not appear, so Tom Wimmer handled the job.

In mid-August, 1916, Ellsworth Kolb and John Shields left Delta, Colorado, in a seventeen-foot freight canoe. They portaged around Westwater Canyon and reached Moab.

Late September saw Kolb and Loper debarking from Grand Junction in a cedar canoe, and they traversed Westwater alternating at the oars. Kolb did not cover the stretch from Moab to the junction. Loper put in at Cisco Pump House and ran to the junction and back to Moab with the help of an outboard motor.

Loper was the boatman for the USGS survey of the San Juan River in 1921 and the upper Green River in 1922. In September, 1929, he handled the oars to take Colonel Elliott J. Dent and Archie D. Ryan between North Wash and Lee's Ferry. In 1930 he was with Dave Rust through Glen Canyon and in 1939 took two USGS geologists through Glen Canyon before making his first traverse of the Grand Canyon. He passed through Cataract Canyon in 1943 and 1944. His river career ended in 1949 when he suffered a heart attack on the river at the head of 24.5 Mile Rapid in the Marble Gorge.

Ellsworth Kolb's last run on the river was as boatman for the USGS party which surveyed the river course from the mouth of the Green River to the mouth of the San Juan under the leadership of Will R. Chenoweth in September and October, 1921. This survey with that of the San Juan was under the general supervision of Alvah T. Fowler. This group discovered and camped under what is now known as the Herbert E. Gregory Bridge on a branch of the Escalante River. In November they met a Frank Barnes with a clumsy battered skiff in Glen Canyon. The stocky pilot claimed to have come down from Grand Junction.

Using Powell's brutal boat design, Clyde Eddy outfitted three boats at Green River, Utah, and signed Parley Galloway as boatman. The crew were college lads and included a professional cinematographer along with a tramp, a dog, and a bear. They departed from Green River and arrived at Needles by the end of August after some changes in personnel at Lee's Ferry.

The Pathe-Bray party of professional motion picture photographers left Green River in six boats November 8, 1927, and landed at Lee's Ferry by the end of the month. The outfit continued ninety-five miles into Grand Canyon where they concluded their cinematography.

Glen R. Hyde constructed a Salmon River type sweep at Green River, Utah, and on October 20, 1928, departed with his wife Bessie, whom he had married April 12. They cruised successfully through Cataract and Glen canyons, but were last seen at Hermit Rapid. Their scow was found at Mile 237 in the Grand Canyon. Bessie Hyde appears to have been the first woman to traverse Cataract Canyon and the Marble Gorge.

Harold H. Leich decided on a new course and started from Grand Lake in 1933. For the run to Grand Junction he used a kayak, but there he built a punt and went through Westwater Canyon with little trouble. When he lost his craft in Cataract, he showed rare presence of mind by walking and swimming down the river. Hite was deserted, and he was forced to walk on to Hanksville.

June of 1938 marked the departure from Green River, Utah, of a party in three "sadiron" skiffs, which included two remarkably capable women, Elzada U. Clover and Lois Jotter. One boat escaped in Cataract and another capsized, but the three craft arrived with their crews at Lee's Ferry. Boatmen Laphene "Don" Harris and W. Eugene Atkinson left at this point. But for the insistence of Miss Clover, the leader, Nevills, would have joined them in defection. Two new men were recruited, and the trip ended at Boulder City with the first women to traverse the Grand Canyon. Nevills' water training involved short trips on the San Juan in 1933, 1934, and 1936, followed by two trips from Mexican Hat to Lee's Ferry in 1936. In 1940 he made the run from Green River, Wyoming, to Boulder City, following with transits of Grand Canyon in 1941 and 1942. Nineteen hundred and forty-five saw him leading a party from Moab to Lee's Ferry, while 1947 included a run of the upper canyons of the Green and the Grand Canyon. Traverses of the Grand Canyon were made in 1948 and 1949 with an upper Green run in the latter year. Numerous San Juan trips were made during

these years, ending when he smashed his plane into a cliff in September, 1949. Harris was with Loper and the Geological Survey on numerous trips and continues his successful piloting of pleasure excursions.

The boats and operations of Nevills were followed by A. K. Reynolds, who joined with Mike Hallacy to establish the capable dude wrangling operation in the upper canyons of the Green River.

About August 13, 1938, Jack Aldridge left Green River, Utah, in a punt he had built there. His wrecked craft was found at Mile 65 in Grand Canyon, but there is no evidence that the pilot passed Lee's Ferry.

In the late fall of 1945, W. Herwig left Moab in a Salmon River scow and carried a load of freight to Hite.

October 23, 1947, Harry Aleson left Green River, Utah, in an inflated neoprene boat and carried his passenger, Mrs. Georgie White, through Cataract Canyon to Hite. Aleson's experience had been on the San Juan River, the lower Grand and Glen Canyons. In July, 1945, this team had swum in life preservers a fourteen-mile section of the Colorado above the head of Lake Mead. In June, 1946, they started from Mile 198 in Grand Canyon and floated down the thirty-seven miles of river in a one-man inflated boat. Thirty miles below the head of Lake Mead they were picked up by a park cruiser. In April, 1946, they cruised through Glen Canyon with two others. They were in Glen Canyon again in June, 1947. In 1948 this duo dragged an inflated boat down the Escalante River. Mrs. White was with Carl Junghans and the Mexican Hat expeditions in Glen Canyon in 1950, and this seems to have marked her graduation from the Aleson operations as, in 1951, she and her husband were wrangling dudes over this stretch, the start of their commercial traffic with neoprene "boloneys."

Between July 25 and August 7 of 1947, Don Harris, who had joined with Jack Brennan, took amateur cinematographer, Al Morton, along with others through Cataract Canyon.

May of 1948 dated a run of the Dolores River from Dolores, Colorado, to Moab with Preston Walker and the writer alternating at the oars of a San Juan punt. Walker led another party on the same course in May of 1949. In May, 1952, Walker lost a boat in this river, and the party walked home. This natural oarsman had initiated his river work with numerous San Juan River trips and a 1942 traverse of Grand Canyon.

In September, 1949, Kenneth Ross ran from Moab to Hite in an inflated boat. His start on the river had been on the San Juan with the Rainbow Bridge-Monument Valley expedition.

August 8 and 9, 1935, Leslie A. Jones claimed a fast run of thirty-six hours from Moab to Hite. His craft was an aluminum canoe rigged with oars which he continued to use in extraordinary river journeys.

THE SAN JUAN AND GLEN CANYON

The year 1882 on the San Juan River lists a trip by E. L. Goodridge down its gorges and to Lee's Ferry. The gold boom of 1892 brought extensive use of the stream, and the next few years include runs of some distance by parties including Walter E. and F. R. Mendenhall, Heber Christensen, Bert Loper, J. H. Woods, and Louis M. Chaffin.

In 1921 W. E. "Billie" Nevills made a run from Mexican Hat to the Honaker Trail.

The Rainbow Bridge-Monument Valley expedition operated trips from Copper Canyon to Lee's Ferry from 1933 to 1938 using ten- and fifteen-foot fold-flat boats. The Nevills' "hydro-herding" commenced in 1936, and his novel selling techniques developed a profitable water taxi business. Jack Frost, who introduced Nevills to the river, conducted a similar but limited operation, concentrating on the geological interest.

Aleson and Larabee provided trips in inflated craft as did Kenneth Ross. The early fifties saw working down this river a foldboat, an eight-foot pram, and an aluminum canoe. In August of 1956 J. Harvey Butchart floated down the river on an air mattress.

Glen Canyon was in much use by prospectors in the days of the gold interest, and skiffs on this slow-water stretch could be numbered in the hundreds. In August, 1897, some twenty to thirty boats were observed at Lee's Ferry. There were some power craft with the most pretentious being the steamer *Charles H. Spencer* built in 1911 and 1912 at the mouth of Warm Creek. The same company brought in the *Violet Louise*, and there is a report of one round trip to Hite in her in 1912. To aid in the building and operation of the Hoskaninni dredge, a launch was brought to Lee's Ferry and dragged up river in 1900.

Mitchell created a steamer out of a hull, boiler, and engine and carried equipment for a placer operation on California Bar where he also used the power units. In 1933 he returned to Glen Canyon and, though handicapped by the loss of an arm and the refusal of his boatman to go along, went alone from Hite to Lee's Ferry.

A trip in crude skiffs powered with outboards was organized in 1922 by E. C. LaRue and included a considerable party which entered the river at Hall's Crossing. Their peering at damsites contributed to the "selling" of Glen Canyon Dam which is now under construction.

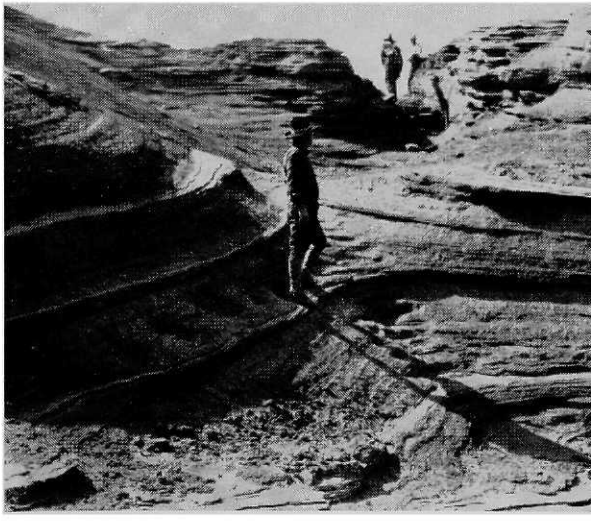
Dave Rust saw the opportunity in the scenery and made his first run for pleasure in the Glen Canyon in July, 1923. He used folding canvas boats.

Moviemaker Jesse L. Lasky cruised through Glen Canyon with an outboard motor in September, 1924. He promised to put the area on the movie map.

In 1925 Rust took as passengers his daughter Emma and Dr. and Mrs. Frank Oastler, which appears to record the first feminine "dudes" through Glen Canyon. The Rust party visited the steps cut by the Domínguez-Escalante expedition and referred to the canyon location as Vado Creek, a change from "Squeeze Canyon" used by Herbert E. Gregory. Rust was through the canyon again the same year, and in 1926 he carried Utah's Governor George H. Dern as one passenger. The governor was photographed standing at the Escalante steps. In August of 1928, Rust took Emery C. Kolb as an assistant boatman. In 1930 Rust used Loper as a helper to take a party to visit these steps.

January, 1931, saw John Wetherill and Patrick Flattum fighting ice up from Lee's Ferry to round a trip to Hole-in-the-Rock. Nineteen hundred and thirty-two provided an archeological study when Julian H. Steward traversed the canyon with Charles Kelly and others.

Rust had a party through Glen Canyon in July of 1938, and they were followed in September by Julius Stone, Kelly, Frazier, and others.



Utah's Governor George H. Dern was a passenger on a river run in 1926. Here he is standing on the steps at Padre Creek cut by Father Escalante at the Crossing of the Fathers.

Harry Aleson claims his April, 1945, round trip from Lee's Ferry to Hite was a first with outboard power.

Nineteen hundred and forty-seven saw two foldboats through Glen Canyon, and that year and 1948 appear to mark the first invasions of the canyon by Boy Scouts.

The decades of the fifties developed extensive running of the various canyons, including numerous solo runs, taxi service in skiffs and motor craft, an airplane propeller sled and bus-riding on the neoprene "boloneys." By 1950 there was almost a need for traffic lights; in season campers numbered close to a hundred at the mouth of Aztec Creek.

The "Mittens" in fabulous Monument Valley, a land of limitless scenic beauty. Though man is altering the countryside, the change is not rapid nor complete. The basin country seems likely to remain a land of space enough, of time enough, for at least another generation.

PHOTO, F. W. TOMPKINS

LAND OF SPACE ENOUGH

*By Jack Goodman**

On that rapidly approaching day when jet planes or rocket capsules take casual sight-seers for a space cruise above the Colorado River, visitors will at last be able to comprehend the lay of the land in this most striking of all western regions. Relief maps, aerial photos, and digging through geological textbooks help considerably. But until one can journey 100 miles or so into the blue-black sky above this canyon-cut sector of earth, an all-encompassing view of the Colorado River Basin is impossible to achieve. For better or worse, recreation seekers coming to the mountain, plateau, and desert provinces ringing the Colorado and its tributaries must seek to grasp the region piecemeal.

To thoroughly sketch, photograph, map, geologize, or otherwise come to grips scientifically with the Colorado River Basin, one would properly expect to be on the river quite a few years. Therefore, to hike, hunt, fish, climb, ski, or boat in every corner of the region, it would be necessary to become at least a semipermanent resident — one limber and lively enough for at least a few decades of outdoor living.

The forested mountains, deep canyons, upland terraces, and deserts drained by the Colorado and its tributaries stretch 1400 miles from the snowy Wind River Mountains of Wyoming and the Rockies of Colo-

* Mr. Goodman is regional correspondent for the New York *Times*. He has made several contributions to this magazine.

rado south and west to the delta country of the Gulf of California. It is fully a quarter of a century since that May of 1935 when Franklin D. Roosevelt dedicated the giant concrete barrier across Boulder Canyon. Since then, with deep blue lakes flooding the desert lands back of Hoover, Parker, and Davis dams, the water-conscious westerner and his guests have been gaining some knowledge of the fishing, boating, swimming, hunting, and even water skiing possible on the lower half of the Colorado's main stem.

Now, a like revolution in recreation is under way upstream from the Utah-Arizona boundary, linked to construction of a carefully engineered, billion-dollar system of multiple purpose dams. Glen Canyon, Navajo, and Flaming Gorge dams, major units in a score of planned river barriers, will be storing water and furnishing recreation by 1963–64. Obviously it is not too early to look at the Upper Colorado River Basin from the recreationist's viewpoint. Obviously too, proper enjoyment of the future and present vacation potential of the region requires a brief look backwards as well. This is, or should be, an essay for visitors who find enjoyment in briefly sampling the history of a region as well as enjoying its lounging, loafing, boating, and fishing facilities.

Historically, it seems pretty certain the aborigines who existed on the scanty food and fodder available hereabout had little time for what we now deem recreation. They were hunting and fishing to sustain life rather than to fill aesthetic needs — a situation which might be worth musing next time you are stalking deer or taking trout in the area. Father Escalante and his padres were the first white men to come this way, and even the most cursory studies of their journeyings indicate an encounter with the Colorado River was anything but relaxing in 1776.

The next white men to roam the Upper Basin were those prodigious fellows of fact and fiction, the Mountain Men. Again, sight-seeing and hunting proved arduous and dangerous. While the Mountain Man was trapping and pelting beaver, an Indian or two might be seeking the visitor's hide. However, there was recreation and plenty of it, in the annual conclaves or rendezvous which attracted Jed Smith, Jim Bridger and their lesser cohorts to bosky dells along the Green and Colorado in the bright years of the fur trade. Their rowdy doings would be too much for even present-day Legion or Shrine conventions, and assuredly would be frowned upon in today's national parks and monuments.

Closing out this précis on the prerecreation era, it seems well to note that the next notables to reach this countryside were scarcely vacationists. Mormons seeking a religious haven, gold seekers skirting the basin en route to the California fields, the railroad builders, the river mappers

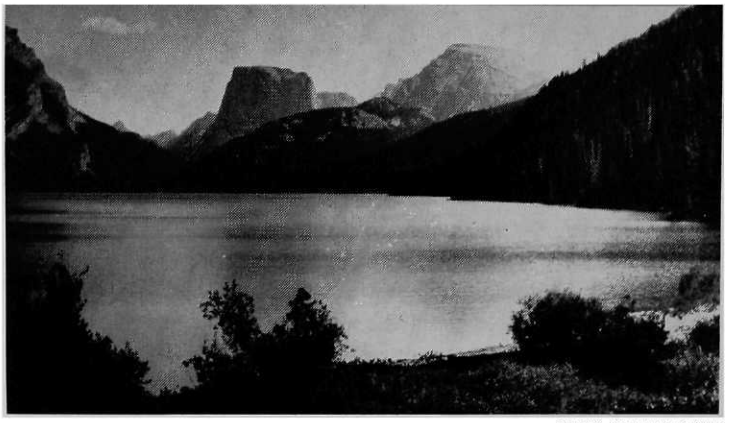
under John Wesley Powell — such folks had little time for recreation.

By the start of our own century, the shape of things in the Colorado River country had pretty well firmed up. Indians had been chased to reservations. The Utes had been pushed to the present Uintah-Ouray lands near Fort Duchesne under a treaty Abraham Lincoln signed in 1865; the Navajos were desiccating on parched lands which would be exploited for scenery, uranium, and oil a half century hence. Cavalrymen had turned to polo playing and similar genteel sport, their western forts and posts to be recalled in the dream world of Hollywood and TV script writers at a later date. The buffalo, never too thick in the Upper Basin, were gone. So too were the first recreation seekers, the English dudes who came to hunt antelope and big horns, stayed to establish ranches, and vanish with the big snows.

The shape of things to come in the basin was buttressed by ranches and irrigated farms; rough, tough silver-lead-zinc mining camps; a few continent-spanning railroads and their narrow-gauge feeders; scattered gentile and Mormon hamlets set amid cottonwoods and poplars; the dugways that were to become the rudiments of a highway system.

Outside the Upper Colorado River Basin and on its fringes, organized recreation began to flourish. Visitors came to view and climb Pike's Peak, and rock upon the porches of Colorado Springs. Yellowstone's geysers and falls attracted Pullman-borne sight-seers. Downstream at the Grand Canyon, vacationists peered into the great gorge, then bounced timidly down trail on muleback. But, aside from a hostelry or two at Glenwood Springs, dude ranches in Wyoming, and a few little-known spas in Utah, recreation seekers bypassed the Colorado River country in the initial years of the twentieth century. According to the mass standards of modern tourism, the region is still being bypassed today.

Just three transcontinental routes cross the river system north of the Arizona line nowadays, namely, U.S. 30, 40, and 6-50. Only two major highways penetrate it from top to bottom on a roughly north-south axis. The Union Pacific and Rio Grande rail systems cross the region; Greyhound and Trailways buses rumble along the aforementioned major roads; United, Western, Frontier, Bonanza, and West Coast airlines leave vapor trails in the basin skies. However, the list is obviously not lengthy. The mountain-ringed basin, with its canyon-cutting rivers, continues to be a barrier to surface travel. Fortunately so, some people think, since the region with which we are concerned thereby remains one of the few uncrowded recreation areas in the nation.



PHOTO, CHARLES KELLY

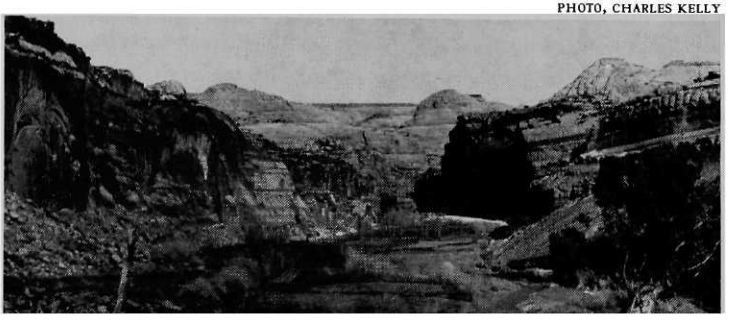
Green River Lake in the Wind River Mountains.

PHOTO, HAL RUMEL

Green River at Split Mountain described by Escalante where "the river enters this meadow between two high cliffs which, after forming a sort of corral, come so close together that one can scarcely see the opening through which the river comes."

Canyon of Frémont River and the settlement of Fruita, heart of Capitol Reef country. Domes suggest the name, Capitol Reef.

PHOTO, CHARLES KELLY



In vacation plans centering around the Colorado River, outlanders quite naturally think first of the ruddy stream, its tributaries, and the giant canyons carved into the desert and plateau country landscape. Before examining this place of recreation, it should be pointed out that mountain snows give birth to the river and that the many and varied mountains feeding the Colorado and its side streams are worth any vacationist's study.

Along the river basin's upper extremities, the spires of the Wind River Mountains are protected as a U.S. Forest Service Wilderness Preserve. They are as scenically satisfying as the more widely publicized Tetons. Flowing from the Wind Rivers, the upper Green River moves through a cool, wide valley once frequented by beaver-trapping Mountain Men, and skirts the upland plateaus where emigrants found fabled South Pass. This is country the history-minded vacationist should explore, a region where wagon train tracks are still visible, a country where markers to DeSmet, Whitman, Bridger, and vanished cavalry troopers recall much of the nation's past.

Next the Green — major arm of the Colorado — cuts through the barrier formed by the Uinta Mountains and Yampa Plateau. The Uintas, too, are a primitive wilderness preserve. Along with history, the visitor who heads into this region by boat, by road south from Green River, Wyoming, or north from Vernal in Utah, will encounter spectacular scenery and the geology lessons available in Dinosaur National Monument and adjacent vacant miles of the still empty West.

Beyond the monument lands, the Green, joined by the Yampa, flows through the Duchesne valley country, a high, fertile irrigated countryside cut by U.S. 40. Again the recreation seeker can find much worth the viewing. This is Ute Indian land, and annual dances, exhibits of handicraft, and the manner in which the Utes are winning a new way of life will have a rich meaning for visitors interested in Indian arts, ethnology, sociology, or "just people."

North of the Duchesne country, north of Dinosaur National Monument, in the region we hastened through as we journeyed down the Green, the Bureau of Reclamation is building Flaming Gorge Dam. As a result, changes will be many in the next dozen years — but more of that anon, when we have finished briefly reviewing the area's geographical features. South of the Duchesne valley and U.S. 40, the Green has cut its way through one of the least-known areas in all the West, the Tavaputs and Roan plateaus. This 9,000-foot high wall extends to the White River Plateau and the Rockies on the east, and seems likely to remain unchanged for decades to come. U.S. 6-50 and the Rio Grande

Railroad's mainline cross the river in this region at Green River, Utah; the stream turns and twists for another half-a-hundred miles to reach its junction with the Colorado. Aside from scenery and hunting, the Tavaputs-Roan plateau region is undeveloped for tourists. However, boatmen in increasing numbers are venturing down the Green from Green River and swinging upstream into the Colorado to Moab. In fact, "Friendship Cruises" led by boatmen headquartering in Moab attract fully 450 outboard craft to the area for two and three days of river running each May. Speedboat regattas on the same section of the two streams are also spotlighting the area for recreation seekers.

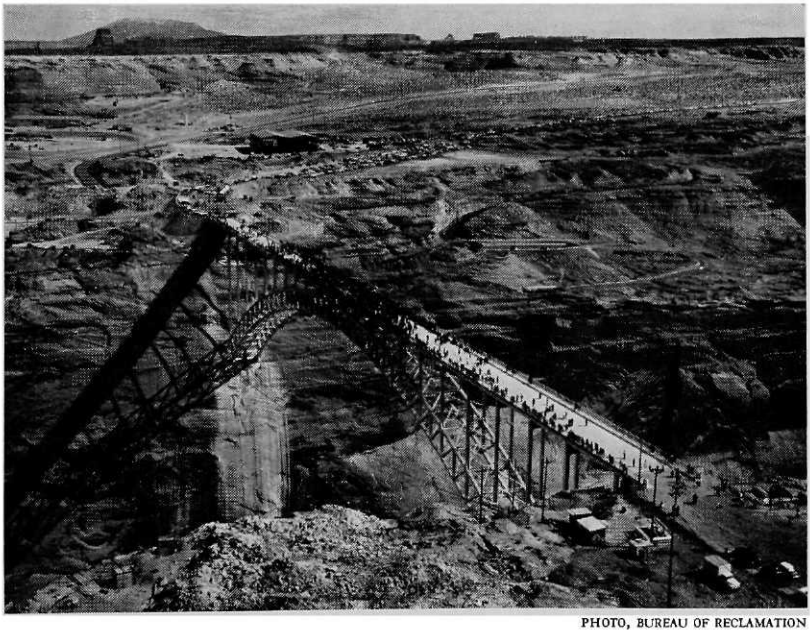
But — back to the junction of the Green and Colorado. The main stream, with its tributary the Gunnison, flows southwest from the central Rockies and through the Colorado orchards near Palisades and Rifle to reach this point. Upstream in the Rockies are skiing, fishing, and vacationing areas which need little attention here, although Colorado National Monument near Grand Junction, with its Grand Mesa, is a recreation area too many easterners — and westerners — ignore.

Just above the junction, both the Green and Colorado cut through fantastic country, and Utah's new Dead Horse Point State Park, Grandview Point, and abutting mesas provide cross-country overlooks for sight-seers and campers. Beyond rise the isolated Henry and Abajo mountains and the rounded summit of Navajo Mountain. In ages past, the San Juan River, now being blockaded upstream by Navajo Dam, has managed to meander through its Goosenecks to join the Colorado. Slicing deeper into the sandstone, the Colorado curves through the Paria Plateau, picks up the Little Colorado, moves past the Kaibab country and on toward the Grand Canyon. Just after crossing the Utah-Arizona line, and before the Little Colorado and Grand Canyon area is reached, the stream flows into the canyon explorer Powell called Glen. It is here at Glen Canyon that men are placing their 700-foot high, 1200-foot wide concrete barrier across the river. Here the lake to be formed, very properly named Lake Powell for the pioneering engineer, will be the prime recreation feature of the entire river system. That being so, it might be well to view the river today — from the recreationist standpoint — and also review a few promised features for post 1964 vacationists.

From Moab's red bluffs, along some 200 miles of canyon country to the buff-colored walls of Glen Canyon, a transformation is already under way. Already the cofferdam, built in 1958, is backing some water upstream toward once isolated Wahweap Creek. The groves of oaks and cottonwoods along the water's edge first glimpsed by Powell in 1870 have vanished. Access tunnels, spillways, and the soaring Glen Canyon

Bridge have already given the area a new look. Undeniably it is an exciting look, both by day when men move concrete into the riverbed at record speed and at night, when twinkling lights turn the desert canyon into a strange new spectacle. The scene is so picturesque that the Bureau of Reclamation has taken time out from dam-planning chores to construct an overlook for tourists and photographers — a spot where a guide explains the earth-moving problems, a spot where you can see a dam nearly as large as Hoover Dam being built.

With a lake fully 186 miles long forming back of the world's third highest dam, recognizable changes are taking place in a narrow band of land along the river's edge and atop the surrounding mesas. Historians are saddened by the fact that steps hacked from the living stone by Father Silvestre Vélez de Escalante in 1776 at the Crossing of the Fathers will be forever covered by several hundred feet of water. Flooding will eradicate another man-made notch in this countryside — the wagon track cut and blasted down to the river edge by pioneering Mormons at Hole-in-the-Rock. The incipient flooding has attracted hundreds of



PHOTO, BUREAU OF RECLAMATION

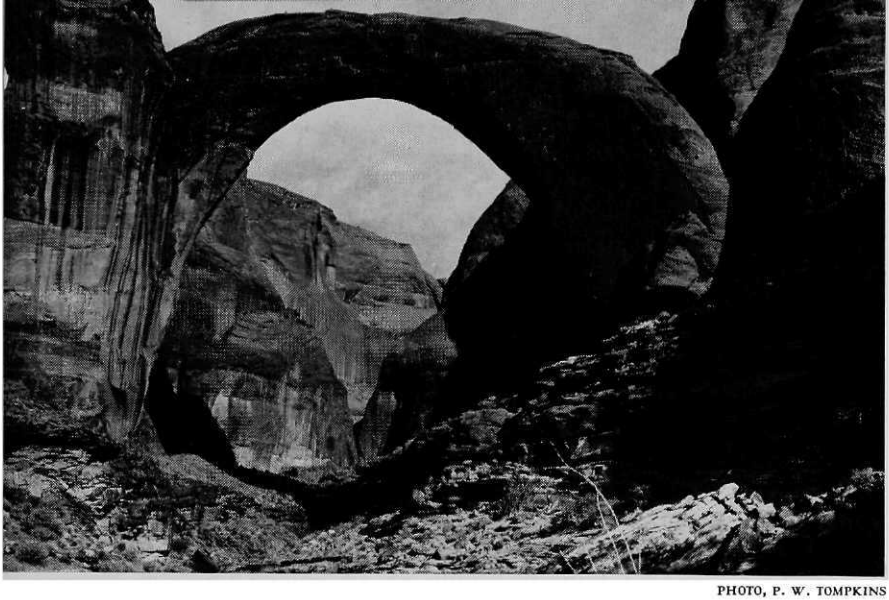
Access tunnels, spillways, and the soaring Glen Canyon bridge have turned the desert canyon into a strange and exciting spectacle. The bridge was dedicated and officially opened to traffic February 20, 1959.

sight-seers by boat and over rough roads to spots once rarely visited.

Another sort of site seeker, anthropologists from western universities, are conducting "digs" at main stream and side canyon locations abandoned by Indian cliff dwellers and basketmakers some 700 years ago. Researchers have already taken thousands of artifacts from the area between Glen Canyon Dam and Hite, mostly bearing on the life and times of a culture existing here from about A.D. 1000 to 1250.

Present-day visitors seeking to glimpse the tremendously scenic countryside before it undergoes its great changes can best do so by planning desert camping expeditions, or joining boating parties on the river itself. Little of the back country can be seen from pavement. Four-wheel-drive vehicles, operated by local guides and lodge operators, are necessary to view such highlights as The Needles (recommended for national monument status), Upheaval Dome, Hole-in-the-Rock, or similar attractions. Piloting boats on the main stream between Moab or Hite and the Wahweap landing should definitely be left to experts, men who can be found at such centers as Moab, Kanab, Richfield, or Salt Lake City through listings maintained by the Utah State Tourist and Publicity Council.

This situation will change for the general public when Lake Powell, with its seventeen hundred miles of shore line, is filled. Planning to accommodate a million visitors by 1966, the National Park Service, cooperating with the Bureau of Reclamation, has carefully blueprinted sizeable smooth-water developments at nine sites. These camp and marine areas will be located at Wahweap Creek, Warm Creek, Padre Point, Hole-in-the-Rock, Oak Island, Cummings Mesa, Shock Bar, Oil Sheep Bar, and Bullfrog Creek. Boating time from Wahweap, closest to Glen Canyon Dam, north over the 115-mile run to Bullfrog Creek, will be six hours in the average powerboat, sailing beneath multicolored cliffs and mesas in a region now impassable. One of the toughest problems dogging park planners is the protection of Rainbow Bridge National Monument from the intrusion of flood waters or an overabundance of civilization. A protective dam of sizeable dimensions is planned on Bridge Creek below the 300-foot high natural bridge, with an upstream diversion tunnel also needed to permit runoff to bypass the graceful rock span. But building such a dam and tunnel in a primitive area without the defacement inherent in heavy construction work is causing considerable debate. Some outdoorsmen — including not a few engineers — feel there would be no threat to the stability of the Rainbow Natural Bridge if the waters of Lake Powell lapped at its abutments. Others say the "draw down" of lake water would leave silt and residue



PHOTO, P. W. TOMPKINS

Rainbow Bridge, one of the great scenic wonders of the canyons of the Colorado River. It was made known to the world in 1909, but was probably seen before that by white miners prospecting for gold in Glen Canyon.

beneath the span, befouling the landscape. Opponents of the plan for a "safety dam" downstream say visitors would have to clamber over the structure on arriving and leaving the national monument, others say such a dam and tunnel would require noisy diesel motors to pump out the residue of water remaining after flash floods.

Until time quiets the controversy, most bridge visitors will continue to drive up from Arizona by dirt road, and then trail in by horse or jeep, while others come down the Colorado from Hite by boat, then hike up the Bridge Creek trails. According to present planning, the major access to Rainbow Bridge will be by lake-cruising powerboats after Lake Powell fills — if the dam controversy is settled.

Today's visitor wishing to explore this changing river country can make his headquarters at any of a dozen motels or lodges in Kanab, Goulding's Trading Post in Monument Valley, or at motels in the Mexican Hat, Blanding, Monticello, or Moab area on the east. Utah State Route 95 from the Blanding-Monticello area passes close to Natural Bridges National Monument, with its three major rock spans arching across the sky. The same road heads into the Colorado River bottoms at White Canyon where an old flat-bottom, cable-guiding ferry operates for ore trucks and travelers. This route connects with Hite and the graded but not hard surfaced road to Hanksville, thence on to Capitol

Reef National Monument. Motel accommodations can be found at Fruita, adjacent to Capitol Reef. A dude ranch, guided tour service from this same orchard-rimmed town will take visitors to the reef, up its blind draws, into Cohab Canyon, down to the Colorado, up onto Boulder and Thousand Lakes Mountain, or to almost any other section of this color-rich country.

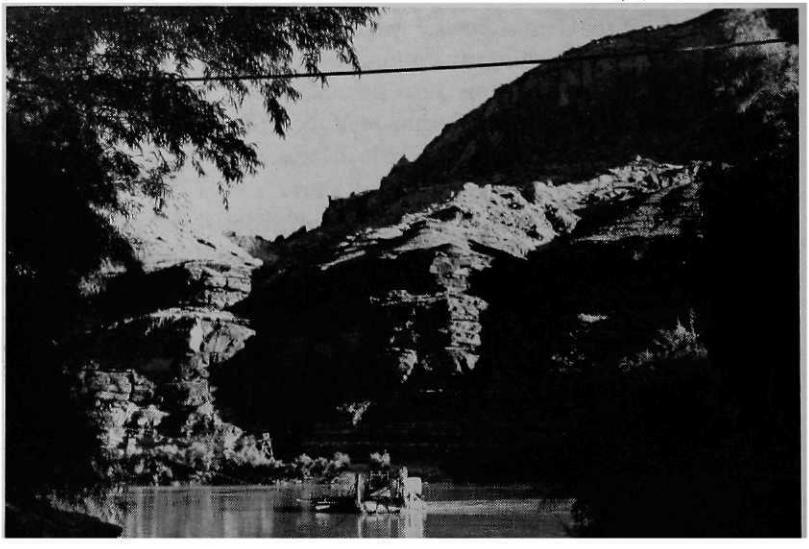
Two spectacular junkets, safely made in four-wheel-drive vehicles, pickup trucks, or other equipment boasting high clearances and reserve transmission power, lead directly to river country scenes which will be drowned out when the river rises. These are the rimrock trails leading down from the Escalante Rim toward Hole-in-the-Rock, and the shorter jeep route northeast from a point near the Utah-Arizona line on U.S. 89 to the Crossing of the Fathers.

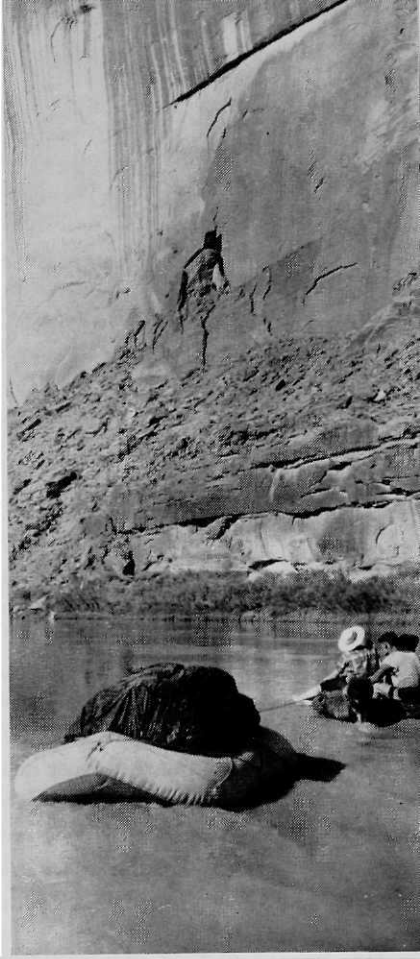
Nearly seventy-five miles in length, the Escalante-Hole route was hacked out by Mormon pioneers heading for extreme southeastern Utah in 1879. Seeking new home sites rather than recreation, the men who came this way proved covered wagons drawn by horses and oxen could venture where modern motorcars could not roll. Even today, the slick rock areas must be crossed at wagon train speed to prevent ripping the bottom from a car.

Camping out at Hole-in-the-Rock, where wagon wheels were locked and vehicles slithered to the river edge, is one sort of western experience increasingly hard to achieve. Another rendezvous with history in a still unchanged land can be had at the Crossing of the Fathers, where Escalante and his companions found a way across the Colorado in the very

The ferry at Hite as it appears today.

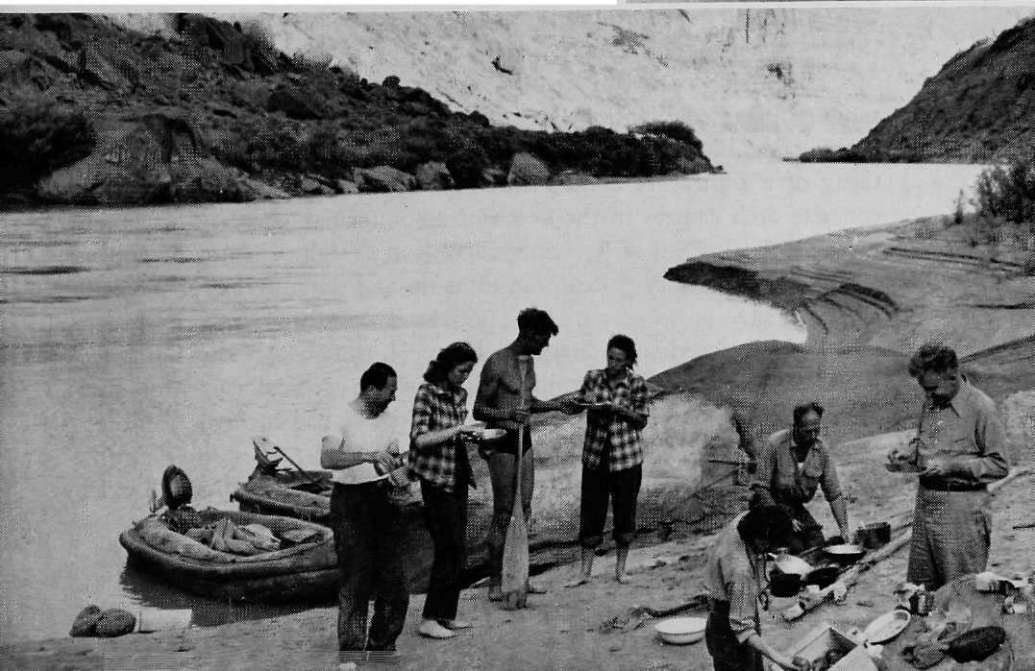
PHOTO, BUREAU OF RECLAMATION





The party towing the raft loaded with provisions and camping equipment steers in close to shore watching for the green spot of vegetation which usually indicates a fresh-water spring.

Early morning on the Colorado and breakfast cooked on the open fire. Piloting boats for such excursions should be left to experts.



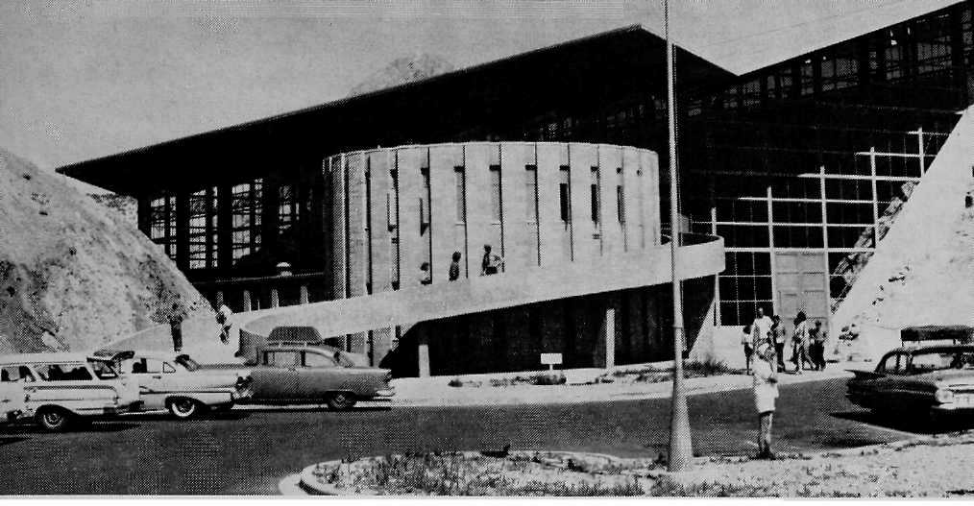
year the British colonials in Philadelphia were rising against their king.

Crisscrossing the Colorado River country by highway, venturing along such tributaries as the San Juan and Escalante, the muddy Frémont, the noisy Wahweap, and the canyon-hidden Paria can occupy a summer-long vacation or be compressed into a day or two of cursory sight-seeing. In planning a visit, remember the virtually roadless countryside at the southern end of the Upper Basin is as large as Massachusetts. It is likewise wise to remember that Glen Canyon Dam itself lies almost midway between Salt Lake City and Arizona, cities fully 690 highway miles apart. One form of sight-seeing might be to head out from Salt Lake City to Zion or Bryce national parks, or the lodge at Cedar Breaks. All are near the outer westernmost perimeter of the Colorado River Basin. Enjoy a fairly civilized glimpse of geology and geography with the assistance of park rangers and naturalists, then drive the 100 or more miles to the Glen Canyon Dam site to start your "inner basin" exploring. Or, begin at Moab, deep inside the basin, at lovely Arches National Monument with its newly paved road and fine new visitor center. Look through Delicate Arch to the snowy La Sals, then drive up onto Dead Horse Point to get your bearings in this seemingly limitless area before heading out onto the river itself.

In the era just ahead, participating projects built as a portion of the over-all Colorado River Storage Project will provide scores of lakes much smaller than mammoth Lake Powell. Among them Stanaker, Starvation, Bates, Mona, Current Creek, Hanna, Round Knoll, Hobble Creek, and an enlargement of present Strawberry Reservoir will provide new fishing holes and sizeable recreation areas for thousands of vacationists in portions of Utah now lacking in tourist attractions.

The major upstream item of vacation interest will be mile-high, mountain-framed Flaming Gorge, on the Green River north of Dinosaur National Monument. It is already giving today's vacationists something of a sight-seers bonus, since construction work on this slender concrete arch centers in the notch of a spectacular gorge. As at Glen Canyon, the Bureau of Reclamation welcomes sight-seer guests, with a ridge-top observatory permitting vistas up and downstream at the construction site.

Today's paved road, State Highway 44, runs nearly due north for 70 miles from Vernal, forming a link in the scenically exciting Red Cloud Loop. The road opens access to cedar-tipped mesas and rolling mountain country few recreation seekers ever roam; when the Flaming Gorge Dam is completed, a deep, cold-water lake will back up 32 miles



Visitors' Center at Dinosaur National Monument.

in Utah and another 59 miles north into Wyoming, a lake with 300 miles of fishable shore line.

The U.S. Forest Service, already guarding this sector of the Ashley and Wasatch National Forest, is planning a dozen major campsites and twenty more smaller centers; meanwhile pavement is being extended down from U.S. 30 in Wyoming. Eventually vacationists will drive as well as cruise along the upper Green River, and the road through the Uinta Range, crossing the Green at Flaming Gorge Dam near the present temporary bridge, will provide a fascinating wilderness country link between U.S. 40 and 30.

Meanwhile, you can still join the growing number of wilderness seekers who have discovered that the gorges cut by the Green and Yampa rivers thread some of the most amazing scenery in the nation. Excursions led by boatmen guides through this high country are not yet as prosaic as a boat ride on the Hudson, but Boy Scouts now navigate portions of these once dreaded streams annually, and a Chicago schoolteacher became the first woman to make a solo run down the main stream in 1950.

The "commercial party" season on the Green and Yampa gets under way in mid-May, when the snowmelt nears the zenith on the western slopes of the Rockies, and upstream in the Winds. Navigation, meaning travel without portaging of cataract craft or rubber rafts, nears its height on the Green in mid-June. Early season runs are made on the Yampa and Green between Elk Springs, Colorado, and Jensen, Utah; lengthier voyages down river from Green River, Wyoming, are also arranged.

On the Yampa-Green voyages, river sight-seers spend three or four days and nights within sight and sound of the rivers, pitching camp on the banks at night, trying a troutline or two in hopes of rounding out a rather sparse larder, and generally duplicating the experiences of the Mountain Men and survey groups who first ventured down river. Trips from Green River, Wyoming, take two weeks or even longer, with Flaming Gorge Dam construction setting up a midpoint barrier. But in 1964 or thereabouts, outboard powered boats will be able to cruise most of the way on placid water, as the rising lake drowns out rapids and rocks.

Twenty or so years ago, when river recreation was in its infancy and anyone venturing upon the Green, Yampa, or Colorado was deemed a bit daft, double-ended, wood or metal sheathed cataract boats steered by expert oarsmen were a necessity. In more recent times, neoprene-rubber rafts of the sort used in Navy rescue work during World War II have become increasingly popular, and more and more outboards of standard design are now being seen on calmer sectors of the river. However, while such river runners as Norman Nevills have long since voyaged to Valhalla, anyone planning to sail the upper Green and Yampa, or the Moab-Hite areas of the Colorado will continue to need a boatman guide — until those lakes fill behind Flaming Gorge and Glen Canyon dams, that is. Until those lakes rise, until the National Park Service builds its Lake Powell Recreational Area facilities, until the Forest Service builds its Flaming Gorge camps and lodges — the Colorado River Basin remains comparatively empty, comparatively rugged. Wet a line in the river and its tributaries, run the rivers, clamber along their banks, peer down into their canyons. Visit the national parks and monuments in the basin, pitch camp in the silent forests, thread lonesome deserts. True, man is changing this countryside, but not rapidly, not completely. It seems likely to remain a land of space enough, of time enough, certainly of scenery enough for all comers for at least another generation.

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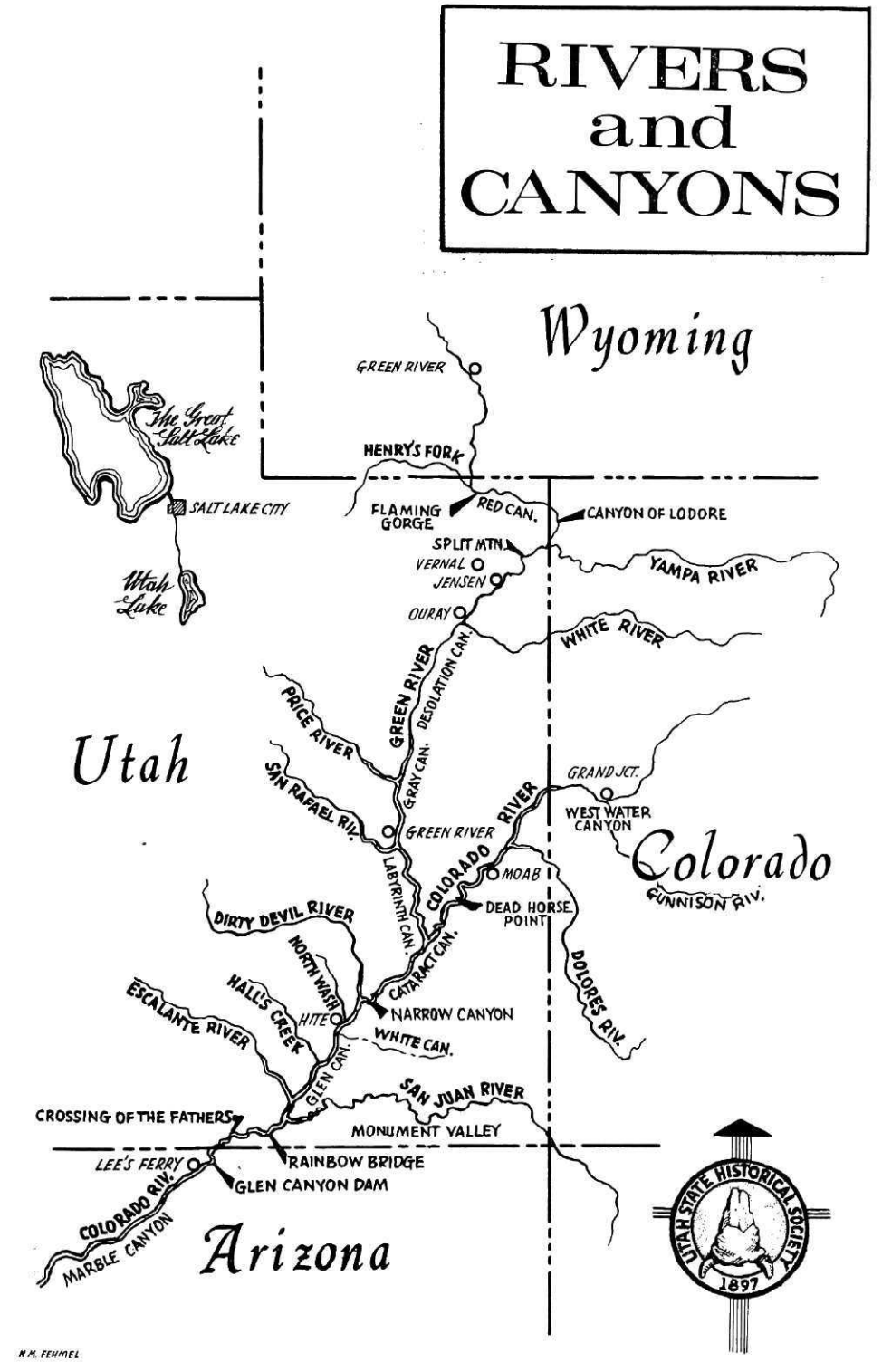
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