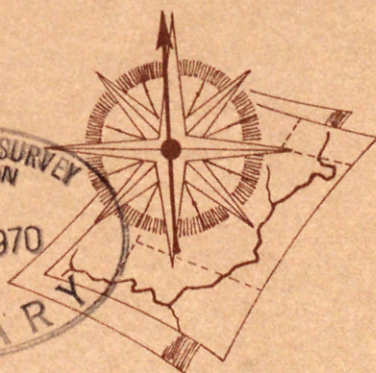
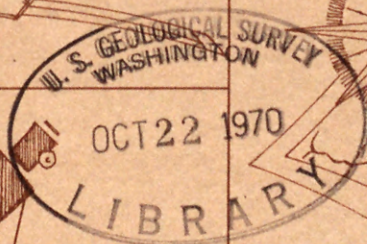
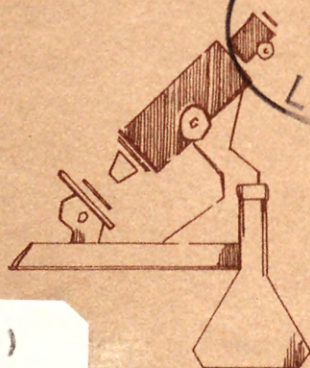
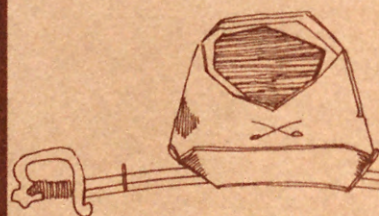


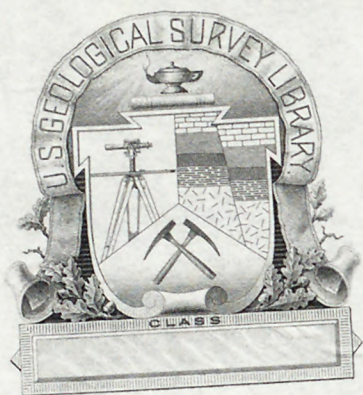


JOHN WESLEY *SOLDIER*
POWELL *EXPLORER*
SCIENTIST



UNITED STATES
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

(200)
Un3j



(200) ✓
Un38 U.S. Geological Survey.

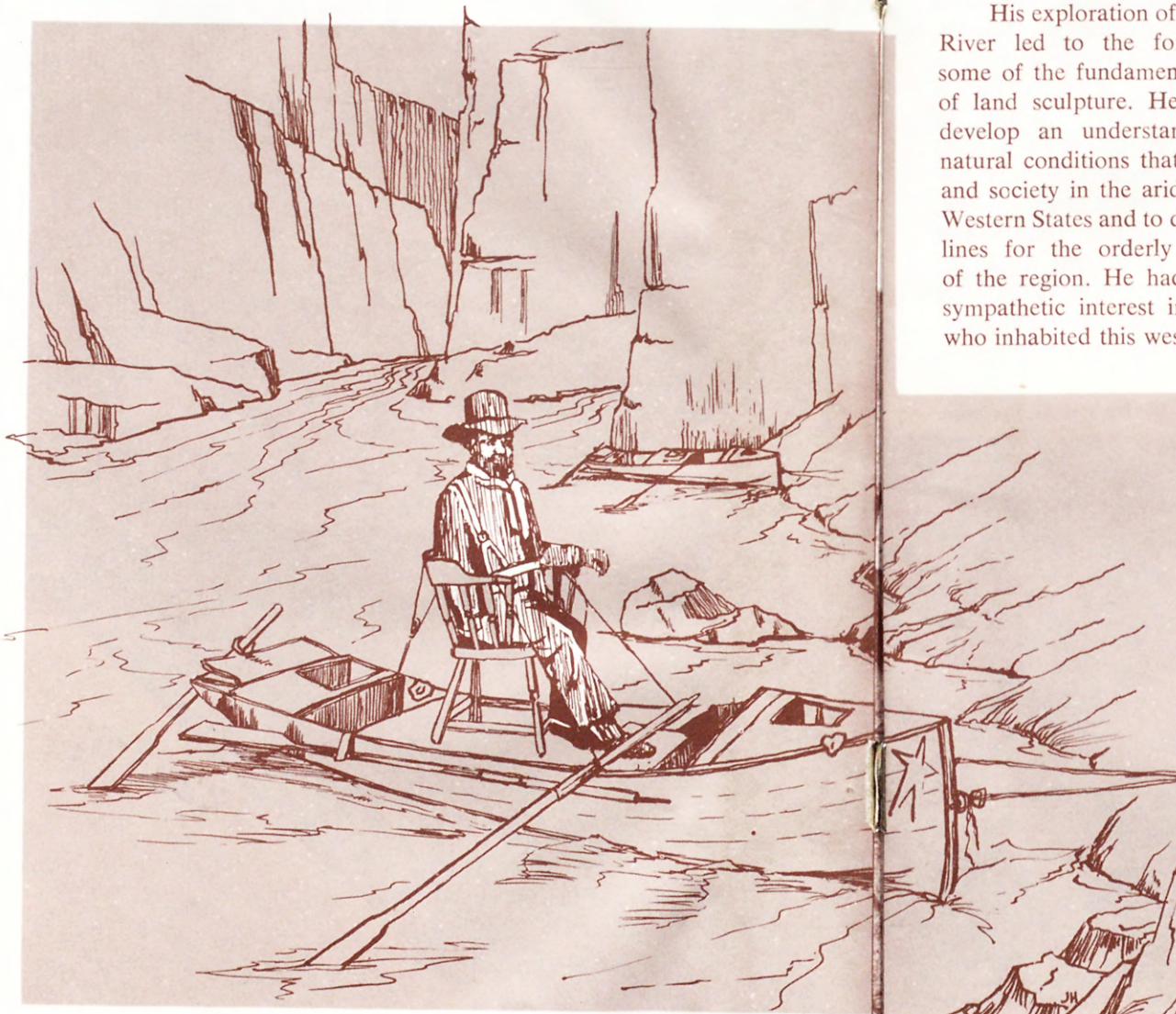
JOHN WESLEY POWELL

SOLDIER
EXPLORER
SCIENTIST



223574

One hundred years ago John Wesley Powell and nine adventure-seeking companions completed the first exploration of the dangerous and almost uncharted canyons of the Green and Colorado Rivers. By this trip, Powell, a 35-year old teacher of natural history, apparently unhampered by the lack of his right forearm (amputated after the Battle of Shiloh) opened up a large unknown part of continental United States and brought to a climax the era of western exploration.



Powell was not an adventurer, nor did he consider himself just an explorer. He was a scientist, motivated by a thirst for knowledge and a firm belief that science was meant to further the progress of the human race. He was also a man of action who endeavored at all times to put his beliefs into practice.

His exploration of the Colorado River led to the formulation of some of the fundamental principles of land sculpture. He went on to develop an understanding of the natural conditions that control man and society in the arid lands of the Western States and to develop guidelines for the orderly development of the region. He had a keen and sympathetic interest in the Indians who inhabited this western land and

made fundamental contributions to the sciences of anthropology and ethnology, then in their infancy. He had a talent for organization that has left its mark even to this day on agencies and programs for the development and conservation of the natural resources of the world.

On this hundredth anniversary of the exploration of the Colorado River, the Department of the Interior joins with the Smithsonian Institution and the National Geographic Society to commemorate not only his explorations and his fundamental contributions to science but to honor a man of vision whose ideas have changed the face of the land and, when reexamined today, still have a freshness and applicability that is startling.

"John Wesley Powell . . . was one of the few who believed in evolution by endeavor and who fought for intelligent and scientific planning for the development of society. He believed that progress comes by increasing cooperation among men, and he dreamed of developing a science that would provide the knowledge whereby men could live together in peace and mutual cooperation. It is to rekindle this spirit that the year 1969 is designated the John Wesley Powell Centennial Year."

William T. Pecora, Director
U.S. Geological Survey



John Wesley Powell was born in western New York in 1834, the son of a Methodist preacher who had come from England four years earlier. In 1838 the Powells moved to Jackson, Ohio, where they lived for eight years. The boy was for a time tutored by George Crookham, successful farmer and self-taught scientist, who was one of their neighbors. Powell accompanied his tutor on numerous junkets to collect specimens of plants, animals, birds, and minerals, which spurred his interest in natural history. When Powell was 12 years old the family moved to a farm in Wisconsin. Because his father was away from home much of the time, the management of the farm fell to the boy, an experience that perhaps accounts in part for his

life-long interest in the land. Though he attended school irregularly, he was determined to go to college to study science despite the objections of his father who wished him to become a minister.

At 18 he began teaching in a one-room country school, and for the next seven years alternated between teaching school, attending college, and exploring the Midwest. He was at one time or another a student at Illinois College, Illinois Institute, and Oberlin College. In 1858, he joined the newly formed Illinois State Natural History Society, and, as curator of conchology, made a fairly complete collection of the mollusks of Illinois. He began teaching at Hennepin, Illinois in 1858, and in 1860 became superintendent of its schools.

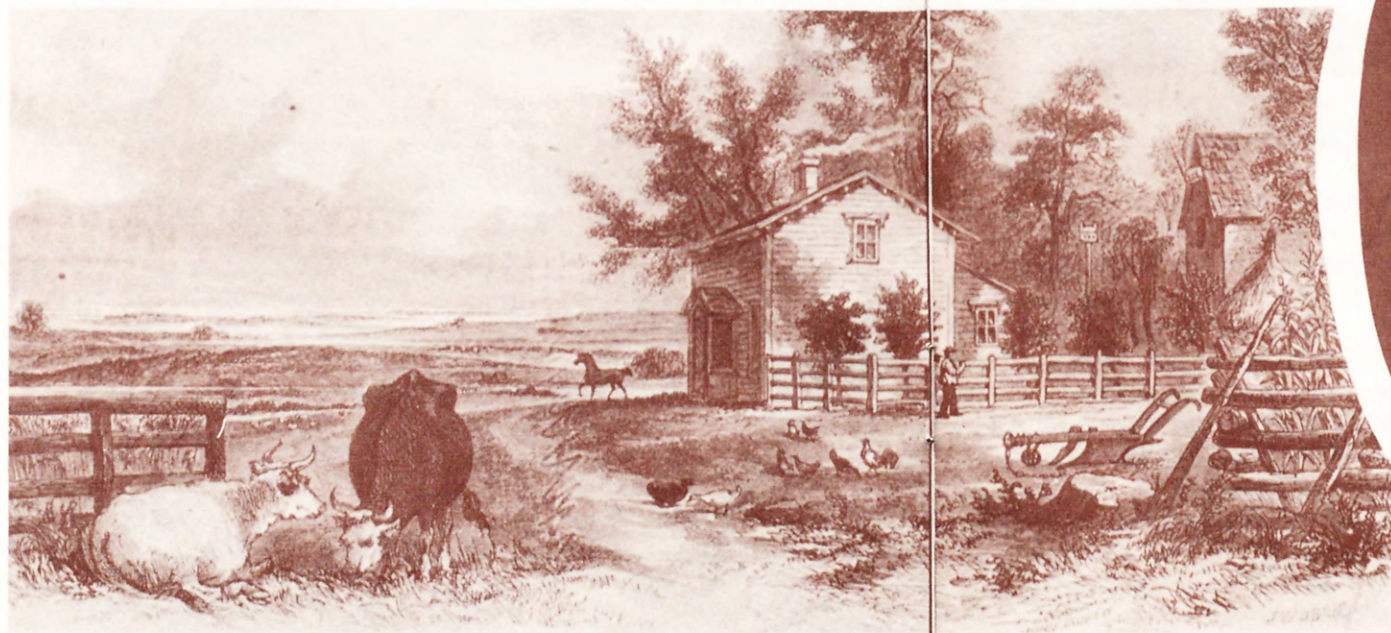
On a lecture tour during the summer of 1860, the young teacher realized that war between the North and the South was inevitable. That winter he prepared himself for service by studying military science and engineering. When President Lincoln issued a call for troops, John Wesley Powell was among the first to volunteer.

On May 8, 1861, he enlisted at Hennepin, Illinois, as a private in the Twentieth Illinois Infantry. He was described as "age 27, height 5' 6½" tall, light complected, gray eyes, auburn hair, occupation—teacher." He was elected Sergeant-Major of the regiment and, when the Twentieth Illinois was mustered into the Federal service a month later, Powell was commissioned a

Second Lieutenant. The regiment was sent to Camp Girardeau near St. Louis and Powell, because of his knowledge of engineering, was directed to prepare and later to carry out a plan for the fortification of the camp and town. In November General Grant authorized Powell to recruit and train a company to manage the siege guns.

That same month, November 1861, General Grant allowed him a short leave for a hurried trip to Detroit to marry his cousin, Emma Dean, who accompanied him back to camp after the ceremony.

A typical farm of the 1800's, similar to that on which John Wesley Powell was born.



Emma Dean Powell (nee Harriet Emma Dean) wife of Major John Wesley Powell.



The Battle of Shiloh. A drawing from the Matthew Brady collection.

Powell was made captain of Battery F, Second Illinois Artillery volunteers at the end of the year.

A few weeks later Powell and his battery were ordered to Pittsburgh Landing on the Tennessee River. During the Battle of Shiloh, on April 6 as Powell raised his arm to give the signal to fire, a Minieball struck his wrist and plowed into his arm, almost to the elbow. The wound was so severe his arm was amputated below the elbow.

After several months, despite his injury, Powell returned to active service. Mrs. Powell, on General Grant's orders, was given a pass to be with her husband. She served as



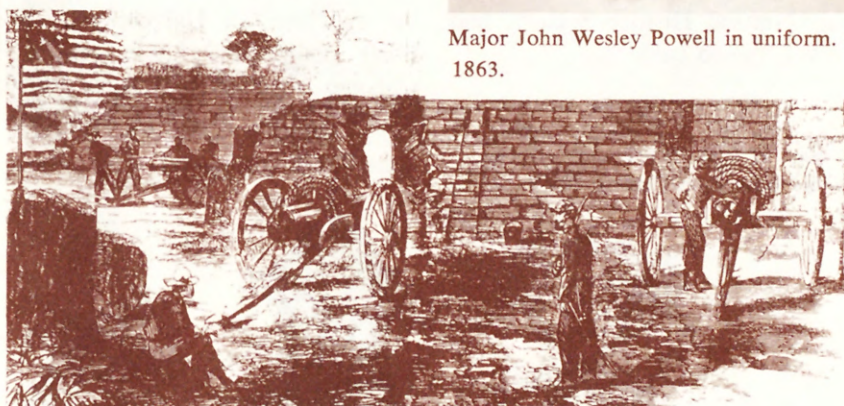
his right arm from then on. During May and June 1863 Captain Powell's battery took part in the siege of Vicksburg and, while in the trenches, he examined the rocks and made a collection of fossil shells that was later deposited in the Illinois State Museum. In late 1863 and in 1864 Powell was made an inspector of artillery for the Department and Army of Tennessee. He served as commanding officer of the Seventeenth Army Corps artillery brigade and took part in several operations after the fall of Atlanta including the battle of Nashville.

In January 1865, as the end of the war was clearly approaching and his term of enlistment had expired, Powell (who had been commissioned Major and later a Brevet Lieutenant Colonel although he preferred to be called Major) asked to be mustered out of service.

Frederick S. Dellenbaugh, who later was with Powell on his second expedition down the Colorado, wrote:



Major John Wesley Powell in uniform. ca 1863.



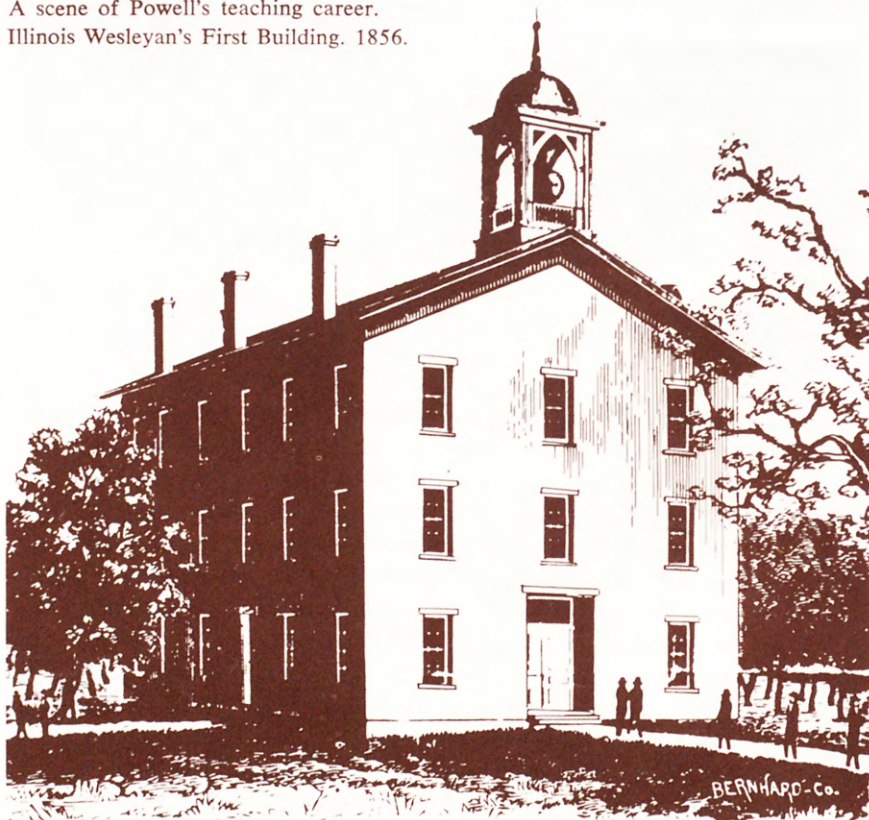
"Our Works before Vicksburg—Battery Powell." It is likely that John Wesley Powell, erroneously appeared in this illustration. Although Powell had lost his arm in the battle of Shiloh (April 6-7, 1862), he is shown uninjured at the Siege of Vicksburg (May-July 1863).

"As a soldier his career was marked by a thorough study and mastery not only of the details of military life; but of military science. Especially was he apt in utilizing materials at hand to accomplish his ends—a trait that was also prominent in his civil life. Bridges he built from cotton gin houses, mantelets for his guns from gunny sacks and old rope, and shields for his sharpshooters from the moldboards of old plows found on the abandoned plantations. All this time, whenever possible, he continued his studies in natural science. He made a collection of fossils unearthed in the trenches around Vicksburg, land and river shells from the Mississippi swamps, and a large collection of mosses while on detached duty in Illinois. He also familiarized himself with the geology of regions through which armies passed to which he was attached."

After the war Powell was offered a professorship in geology at Illinois Wesleyan University at Bloomington, at a salary of \$1000 a year. He taught a wide range of subjects and often took his students into the fields to collect fossils, minerals, and plants, and to observe animals in their natural habitat. The following year he gave a course of lectures at Illinois State University in nearby Normal, Illinois. The State Legislature had provided a small endowment for the museum of the State Natural History Society, and he was named curator.

Powell loved to travel; it had been one of his main interests before the war. In 1867 he led a party of students to the Rocky Mountains to collect specimens for the museum. Funds for the trip came from various sources. The Museum of Natural History allocated \$500 to help pay for the field expenses. Powell made arrangements to procure rations for his party from army posts at government rates and to obtain free transportation from the railroads. The Illinois Industrial University (later the University of Illinois) contributed \$500, and the Chicago Academy of Science added another \$100. In return he agreed

A scene of Powell's teaching career.
Illinois Wesleyan's First Building. 1856.





John Wesley Powell. Winter, 1869.

to supply them with specimens of the animals, plants, and any other materials collected. Scientific instruments were loaned by the Smith-

sonian Institution and in return Powell agreed to give the Institution the topographic measurements made by his party. Powell contributed his own salary to help finance the trip.

In May and June of 1867, the expedition, which included Mrs. Powell, travelled by train, wagon, and horseback across the plains to Denver and on to a valley known as Bergens Park on the west side of the mountains (Rampart Range) north of Pikes Peak. After climbing Pikes Peak they travelled west to South Park where they camped for several weeks to explore the mountains and hot springs and to make a variety of natural history collections.



Student members of Powell's 1868 expedition.

In September most of the group returned east but the Powells and a few others remained to explore Middle Park and the headwaters of the Grand River, as the upper part of the Colorado was then called.



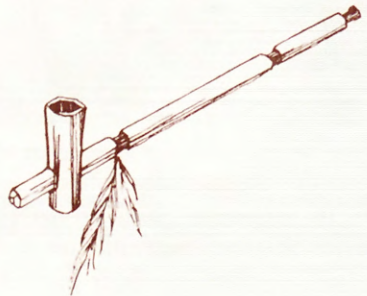
Ruins of an ancient Indian settlement on the rim of Grand Canyon.



In the summer of 1868 Powell, his wife, and about 20 others, largely neighbors and students, returned to Colorado to collect more specimens for the museum, to explore the Colorado mountains and to climb the 14,000-foot-high Longs Peak. Powell encountered several Indian tribes and he began the first of a series of ethnologic studies that commanded his attention for more than 30 years.



Tau-gu, a Chief of the Paiute Indian tribe and Major Powell in southern Utah.



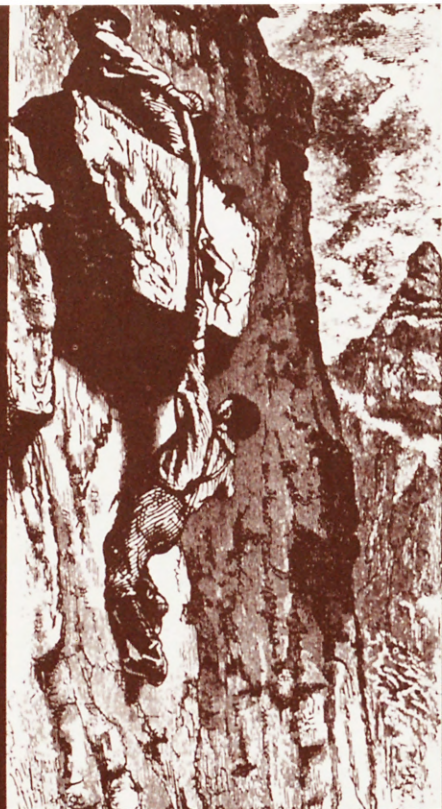
In October the party reached the White River about 120 miles above its mouth where cabins were built and winter quarters established. Powell was already thinking about the exploration of the Colorado River. During the winter of 1868-69 he travelled south to the Grand, down the White and Green Rivers, north to the Yampa River, and around the Uinta Mountains. The region to the southwest was largely unknown.

There were legends of expeditions that had tried to explore the Colorado River and the Grand Canyon only to perish in its unknown depths. Lieutenant Joseph C. Ives, who in 1857 explored the southern stretches of the river below Grand Canyon, believed "that the Colorado, along the greater part of its lonely and majestic way, shall be forever unvisited and undisturbed." But after studying the few reports, talking with Indians, hunters and

mountain men familiar with the area, and exploring tributary streams that seemed to represent the nature of the Colorado, he decided it was possible to explore the river by descending it in small boats. He obtained some funds from private sources and from the Illinois State Natural History Society and he gained permission from the government to requisition military stores. He had four boats built in Chicago to his own design and specifications and had them shipped to the proposed starting point at Green River Station, Wyoming Territory. He had selected a crew who, with the exception of his brother Walter, were simply mountain men experienced in living off the land. On May 24, 1869, Powell launched his boats on their historic journey.

Major Powell talking to Paiute Indian during northern Arizona Survey.





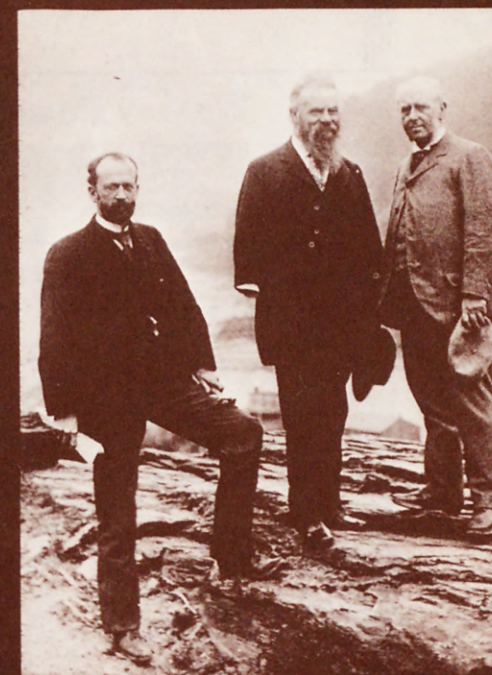
The Rescue



Running the Rapids



First Campsite, 2nd Expedition



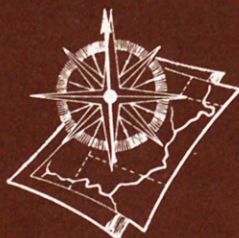
Powell and Colleagues, C. D. Walcott, (left) and Sir Archibald Geikie, (right)



Powell's Farewell Dinner, as Director of the U. S. Geological Survey



War Memorial at Vicksburg, Miss.

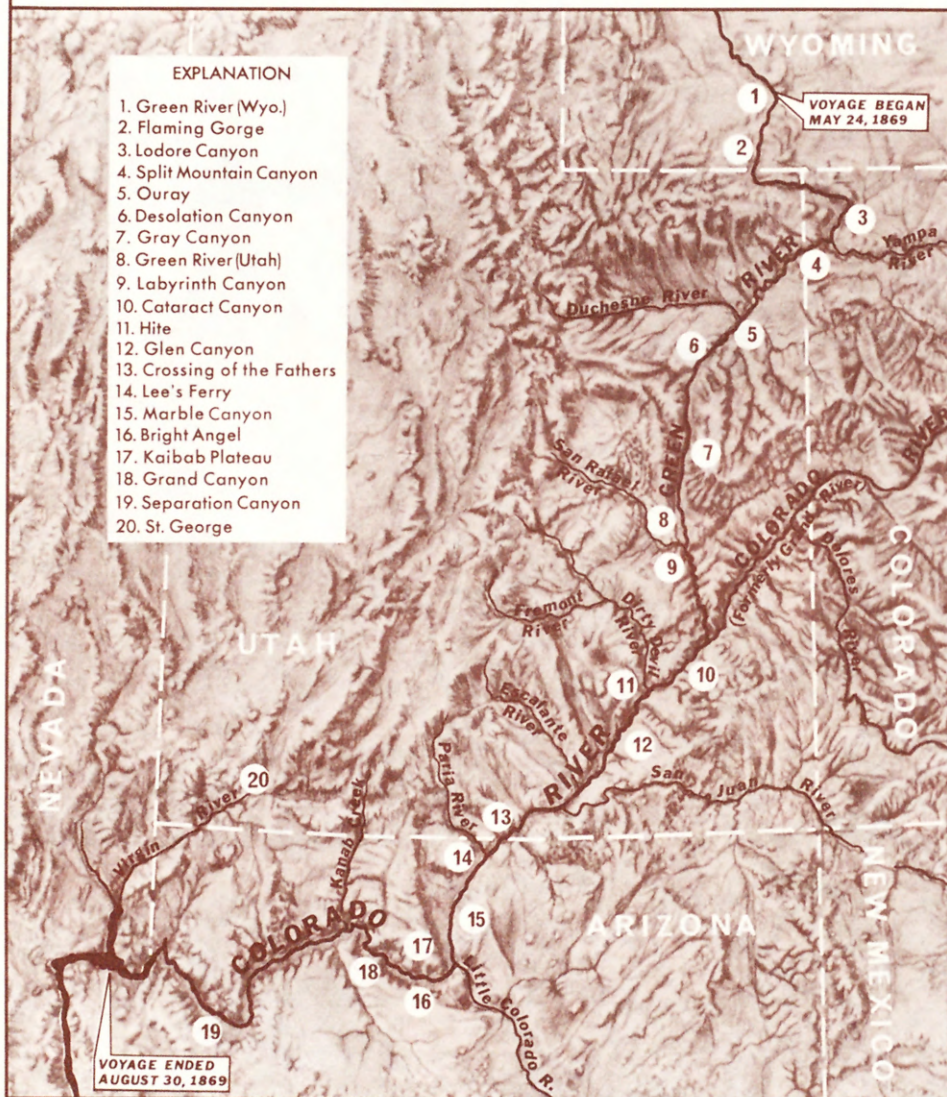


Indian Tribal Conference



At Riordan Ranch, Arizona

John Wesley Powell's Pioneer River Voyage-1869



Relief map of Powell's pioneer river voyage—1869.

Nine men accompanied Powell in the four small boats. The party travelled more than 1000 miles of river through winding canyons and over foaming rapids. Powell and five men in two boats emerged about

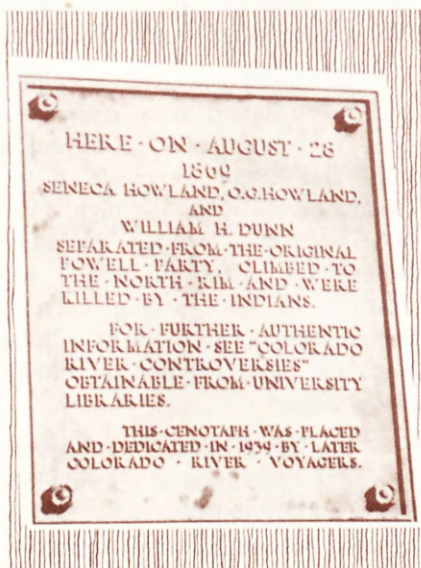
100 days later (August 30) at the mouth of the Virgin River, Arizona, long after hope for their survival had been abandoned. They were partially starved and suffering from exposure but their emotional ordeal

was probably best expressed in Powell's words—

"What falls there are, we know not; what rocks beset the channel, we know not; what walls rise over the river, we know not."

During the trip one boat had been lost along with more than half the food, clothes, supplies and equipment. One crewman had left the expedition early to make his way back to civilization. Three others left the group at Separation Rapids when they were almost through the Grand Canyon, and, after they had made their way to the canyon rim, were killed by Indians who refused to believe their story of having come down the canyon by way of the river.

A plaque marking the place where the Howland brothers and William H. Dunn separated from the 1869 Powell expedition. This plaque is located near the northeast bank of the Colorado River on the eastern side of Separation Canyon.



Powell immediately set about making plans for a second expedition. He had originally planned and supplied the first trip for what he thought would be a leisurely 6 to 9 months scientific expedition. Because of the loss of food and equipment and the scarcity of game the trip had been hurried. Powell's observations and notes on topography and geology were incomplete or not reliable because of the badly damaged instruments. Many of the notes of the trip were lost when they were taken out of the canyon by the three men who had been killed by Indians. The few specimens collected had been cached along the river.

Having succeeded so dramatically in conquering the Green and Colorado Rivers, Powell was equally successful in obtaining funds from Congress to continue his exploratory work. He decided that supplies should be cached along the river, and he spent most of the year 1870 in determining potential supply routes and in establishing friendly relationships with the Indians.

By the spring of 1871 Powell believed that everything was in readiness for the second survey of the canyon country. This time the party included a surveyor, Prof. Almon H. Thompson, Powell's brother-in-law, and an experienced photographer, E. O. Beaman who, together with his successors James Fennemore and J. K. Hillers, were able to fully and dramatically document the river voyage. The rest were largely friends and relatives.



The Powell expedition ready to start from a location just below the Union Pacific Railway Bridge at Green River Station, Wyoming.

On May 22 the party pushed three boats of improved design out into the stream. Major Powell rode in the lead, perched in a chair lashed amidships where he commanded an unrestricted view of the way ahead and could signal to the other boats. The expedition was planned to last about a year and a half. During the first 4½ months the expedition travelled from Green River Station to the mouth of the Paria River at the foot of Glen Canyon. Thompson was largely responsible for conducting the exploration of the river. Powell spent most of July and August travelling on horseback between the river and Salt Lake City, exploring the canyon lands and studying the Indian tribes. During the winter and spring (1871-72) while Powell was east seeking new appropriations, Thompson set about mapping the area, first establishing a base line for triangulation.



On the Colorado at the mouth of the Little Colorado River.

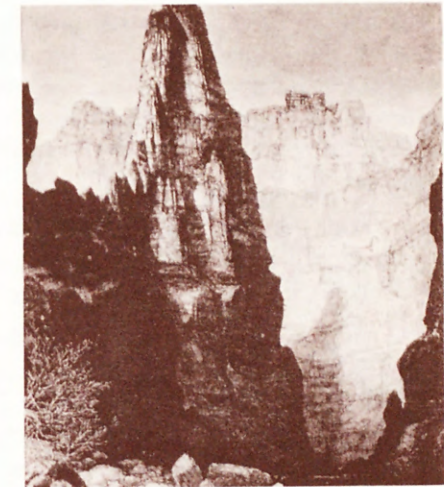
In the spring, while seeking another route to the river by which supplies could be brought in, they discovered the last unknown river in the United States and named it the Escalante.

In August 1872 the expedition once more started down river from Lees Ferry. Because of torrential rains and heavy snowmelt in the mountains the river was high, swift and dangerous. Finding that controlling the boats was nearly impossible in the rushing current, Powell called a halt to the expedition when the party reached the mouth of the Kanab.

The second expedition brought back a large amount of information. Professor Thompson completed a topographic map of the Grand Can-

yon region, and Powell's monumental account was published in 1875 by the Smithsonian Institution. Hundreds of photographs were taken, many of them stereoscopic views that brought the western canyons into eastern living rooms. Diaries and field notes were kept by several other members of the party. Dellenbaugh's story of the trip, *A Canyon Voyage*, was published in 1908 and the Utah Historical Society published the diaries of Thompson in 1939, and of Bishop, Steward, W. C. Powell and Jones in 1947.

Powell continued to study the Colorado River region under Government auspices. He became impressed with the problems of settling the arid western lands and in 1878, encouraged by Secretary of the Interior Carl Schurz, he completed his *Report on the lands of the arid region of the United States* which was published as a Congressional document. The book



The Kanab Canyon, near its mouth. The cliffs in the distance are on the far side of the Colorado River.

Major Powell's boat, the Emma Dean, moored on a bank of the Colorado River in Grand Canyon.



was not only a report on the physical characteristics of the land and the rainfall but it also discussed the land classification system needed and contained drafts of proposed legislation providing for the organization of irrigation and pasturage districts. The book has since been recognized as one of the most important ever written about the Western lands but it went unheeded at the time.

Four surveys—the Powell, Hayden, King, and Wheeler surveys—were mapping in the west and some conflicts of interest began to develop, especially between army and civilian scientists.

In the spring of 1878 Congress investigated the rivalry among the western surveys but was unable to come to a satisfactory conclusion. They called on the National Academy of Sciences for advice, and the Academy in turn called on Powell and others for suggestions. Legislation embodying the Academy plan that contained many of Powell's ideas was introduced, but before it was finally enacted several provisions were eliminated, including the provision to change the public land system in which Powell was especially interested. The bill that was passed on March 3, 1879 provided for the establishment of the U. S. Geological Survey, discontinuation of the western surveys, and appointment of a commission to codify the public land laws. Powell became a member of the commission and Clarence King, who had been in charge of the Geologic Exploration of the Fortieth Parallel, the first of the national surveys authorized by Congress, became the first director of the U. S. Geological Survey.

Members of the Hayden Survey packing a wagon, on mules, across the San Juan Mountains.



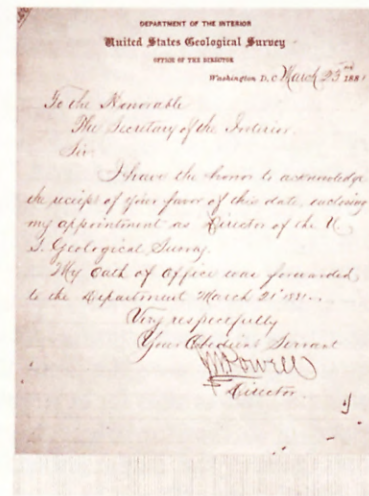
Campsite of Lieutenant G.M. Wheeler, and survey party near Belmont, Nevada (Wheeler 7th from left).



The bill that included the organic act of the Geological Survey also contained an appropriation for completing and preparing for publication, under the Smithsonian Institution, the results of Powell's research on the Indians and their cultures. This work led ultimately to the creation of the Bureau of Ethnology devoted to collecting information on the fast-disappearing Indian tribes of North America. Powell became its director, a post he held for the rest of his life.

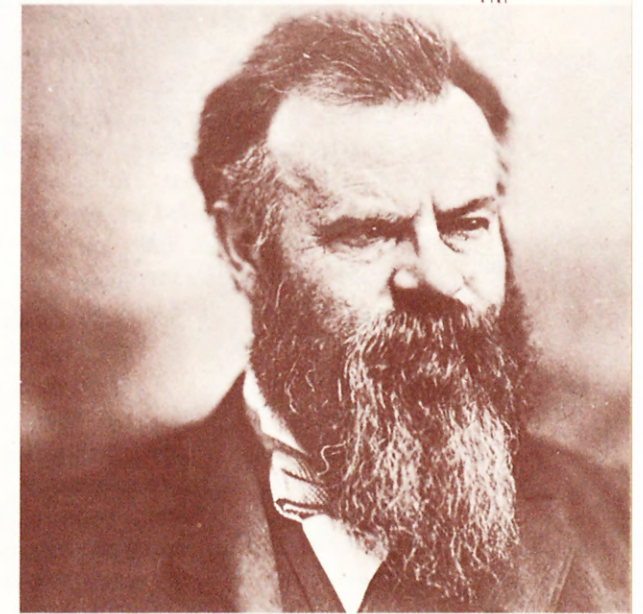
In 1881 King resigned and Major Powell was appointed Director of the U. S. Geological Survey. As Director from 1881 to 1894, Powell was the principal force in expanding geologic studies and topographic mapping throughout the entire country, and in stimulating investigations of soil, ground water, rivers, flood control, and irrigation.

Acceptance of Directorship of the U.S. Geological Survey.



Clarence King, first director of the U. S. Geological Survey, 1879-81.

John Wesley Powell, second director of the U. S. Geological Survey, 1881-94.



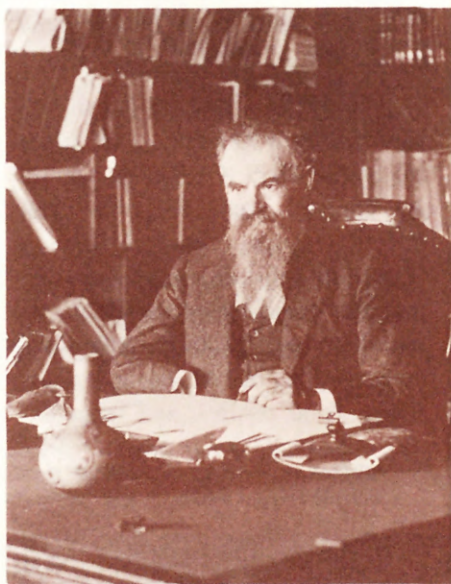
During the 13 years of Powell's directorate the growth of the Geological Survey was remarkable. Its field of operations, which at first was restricted to the far West, became nationwide. The annual appropriation was gradually increased and from time to time new functions were added, the most important being a program of topographic mapping and the investigation of water resources and irrigation. New divisions of chemistry, physics, paleontology and eventually of hydrography also were added.

In 1884 Congress set up a joint Commission to consider the organization of several of the scientific bureaus, including the Geological Survey, in order to "secure greater efficiency and economy." The National Academy of Sciences was again called on for advice, and its committee made some specific recommendations. They were chiefly interested, however, in establishing a general plan for science in government and proposed establishment of a Department of Science. In the lengthy hearings that followed, Major Powell was called on several times to testify, not only on the operation and management of the Geological Survey, but also on his views of the place of science in government.

Midway in the hearings there was a change of administration and the investigations for corruption that followed were far different from the search for efficiency and economy. Powell and the Survey became the target of bitter attack. In the end,

however, the Commission reported that they found the administrative part of the Geological Survey to be well conducted and also that they had no doubt of the wisdom of a geological survey of the whole country. Geologic research was established as a proper function of the government.

John Wesley Powell in his Adams Building Office, Washington, D. C. 1896.



In 1888, following a series of dry years, Congress, on Powell's recommendation, authorized the Survey to undertake a study of the arid regions of the United States; to investigate the storage of water in dams, the capacity of streams, and the cost and construction of reservoirs; to designate all the lands that could be used as sites for reservoirs, canals, or ditches for irrigation purposes and all the lands susceptible to such irrigation.

The House added an amendment requiring that all irrigable lands should be withdrawn from entry. This effectively closed the land to the homesteader. After about 2 years the irrigation survey was discontinued and Congress eliminated the power to reserve irrigable land. Powell's vision of an orderly settlement of the west was not to be. Ultimately, however, the irrigation survey led to the establishment of the Reclamation Service and then the U. S. Bureau of Reclamation.

On June 30, 1894, Powell resigned as Director of the U. S. Geological Survey. He had been in poor health for a number of years and surgery was required on the stump of his arm.

Major Powell's health steadily declined after his resignation and he died at his summer home in Haven, Maine on September 23, 1902, in his sixty-ninth year. He was buried at Arlington Cemetery among other heroes of the Civil War.



Major Powell and companions off the coast of Maine during retirement years.

SURVEY LOSES ITS HEAD

Maj. J. W. Powell Resigns His Place as Director.

Made Necessary by the Painful Condition of His Wounded Arm—Will Retain His Position in the Bureau of Geology—His Military and Scientific History—Wants Prof. Walcott to Succeed Him.

Great surprise will be felt in the scientific, literary and social circles of Washington and other cities by the announcement of the resignation of Maj. J. W. Powell, director of the United States Geological Survey.

Action was taken by Maj. Powell on the 24th instant in a letter to the President, transmitted through the Secretary of the Interior. Response was made on the 24th instant by Acting Secretary Sims, of the Interior Department, as follows:

"Sir: By direction of the President, I have the honor to advise you that your resignation of the office of director of the Geological Survey, tendered in your letter of the 24th instant, to take effect from and after the 30th of June next, has been accepted.

The President and the Secretary of the Interior greatly regret that the state of your health has necessitated this action.

Washington Daily News
May 11, 1894

Resignation of Directorship of the U.S. Geological Survey.

DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY
WASHINGTON, D. C. May 6, 1894.

To the President of the United States.

I have the honor to tender my resignation as Director of the United States Geological Survey, to take effect on the 30th day of June proximo.

I am impelled to this course by reason of wounds that require surgical operation.

With deep gratitude for the confidence you have imposed in me,

I am, with great respect,
Your obedient servant,
J. W. Powell
Director.

Through The Honorable,
The Secretary of the Interior.

during 1878 and 1888; a founder and president of the Anthropological Society of Washington, one of the earliest members of the Biological Society of Washington, and an organizer of the Geological Society of Washington. He helped establish the National Geographic Society and the Geological Society of America. In 1888 he was President of the American Association for the Advancement of Science, then considered the highest honor for an American scientist, and he received honorary degrees from several universities both at home and abroad.

His place among his contemporaries was fittingly expressed by G. K. Gilbert, the eminent geologist and his long-time associate, at a meeting commemorating Powell's achievements. Speaking of Powell before the Washington Academy of Sciences on February 16, 1903, Gilbert said:

"The glow of his enthusiasm, the illumination of his broad philosophy, the warmth of his friendship, are still with us....It was through this personality too that he accomplished much of his work for science. Gathering about him the ablest men he could secure, he was yet always the intellectual leader, and few of his colleagues could withstand the influence of his master mind. Phenomenally fertile in his ideas, he was absolutely free in their communication with the result that many of his suggestions—a number which can never be known—were unconsciously appropriated by his associates and incorporated in their published results.... The scientific produce which he directly and indirectly inspired may equal, or even exceed that which stands in his own name."

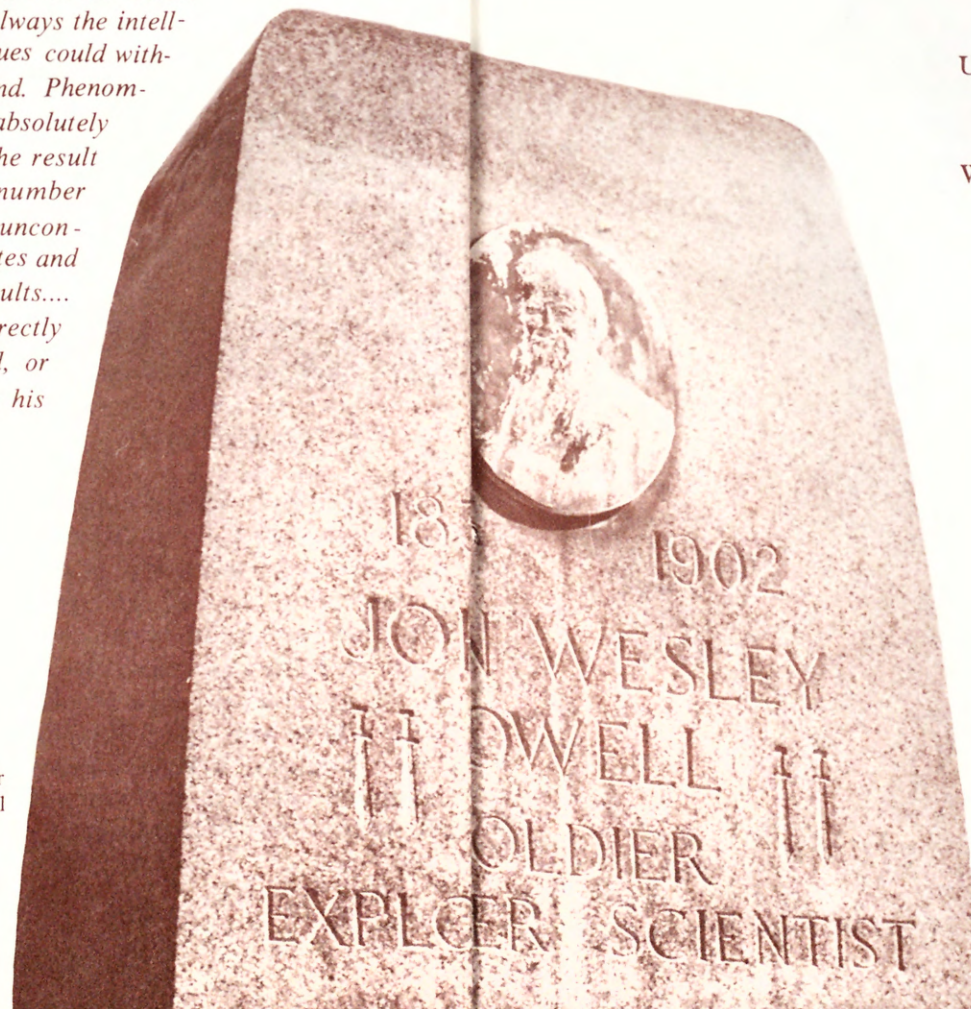
Monument erected about 1914 to honor John Wesley Powell. Arlington National Cemetery, Arlington, Virginia.

Selected References

John Wesley Powell

- Darrah, W. C. *Powell of the Colorado*. Princeton University Press, 1951.
 Dellenbaugh, F. S. *A Canyon Voyage*. Yale University Press, 1962.
 Goetzmann, W. H. *Exploration and Empire*. Alfred A. Knopf, Inc., 1966.
 Place, M. T. *John Wesley Powell, Geologist and Conservationist*. Houghton-Mifflin, 1963.
 Powell, J. W. *The Exploration of the Colorado and its Canyons*. Dover Publications, 1961.

- Smith, F. E. *The Politics of Conservation*. Pantheon Books, 1966.
 Stegner, W. E. *Beyond the 100th Meridian*. Houghton - Mifflin, 1960.
 Ullman, J. R. *Down the Colorado with Major Powell*. Houghton-Mifflin, 1960.
 White, D. (pseud.). *John Wesley Powell, Conqueror of the Canyon*. Houghton-Mifflin, 1960.







The Centennial of John Wesley Powell's Exploration of the Colorado River 1869-1969



As the Nation's principal conservation agency, the Department of the Interior has basic responsibilities for water, fish, wildlife, mineral, land, park, and recreational resources. Indian and Territorial affairs are other major concerns of America's "Department of Natural Resources."

The Department works to assure the wisest choice in managing all our resources so each will make its full contribution to a better United States—now and in the future.

USGS LIBRARY - RESTON



3 1818 00397933 1