

NATIONAL PARKS *Magazine*



South McKittrick Canyon, in the new
Guadalupe Mountains National Park, Texas

February 1967

Park Wilderness Planning

An Editorial

NEARLY A YEAR'S EXPERIENCE HAS NOW been gained with the administrative processes in the Department of the Interior for the designation of portions of the national parks and monuments as wilderness areas. A preliminary appraisal is in order.

The National Park Service Act establishes a priority for the preservation of natural conditions within the national park system, access to be compatible with preservation. The specific enactments establishing individual parks confirm this priority. The Wilderness Act sets up procedures for the permanent confirmation of such protection in designated wilderness areas, previous protection to be retained.

A broad consensus has emerged in recent months that the protection thus prescribed cannot be achieved in practice except within the perspective of comprehensive regional planning, designed to disperse the crowds into the immense reaches of public lands which surround most of our big parks, and into privately owned lands beyond the public lands.

This consensus indicates also that, granted such planning, a high measure of protection for the wild lands in the big parks is politically feasible. Despite this broad agreement, the National Park Service continues to offer wilderness plans in the current hearings which fall far short of the protection which public opinion demands.

The preponderance of testimony in these hearings has favored a higher degree of protection for the roadless regions, the trail and campfire country, than the Service has recommended. Seemingly without embarrassment, the Service has found itself supported in the main by the crowd-recreationists and speculative business interests in the localities. The hearings on Great Smoky Mountains National Park and Sequoia-Kings Canyon National Parks are cases in point.

We suggest that the time has come for insistence on certain fundamental principles for natural area protection within the parks, regardless of whether or not official policies ever emerge for comprehensive planning. Some of these principles would be as follows:

The largest feasible total of wilderness should be designated; suitable areas of less than 5000 acres should be included; access by foot or horse trail only would be normal in the protected areas, with some portions designated as trailless.

Wilderness areas should be thought of as beginning at the roadside; the notion that they must be removed at their edges from the sights and sounds of civilization should be abandoned completely.

Where existing permanent roads are retained, the regions on either side should be set up as separate wilderness areas; thus the area boundaries would come directly down to the road.

Where stub roads run into regions otherwise wilderness, and the establishment of a multiplicity of wilderness areas would be absurd, a narrow access ribbon should be run along one side of the road only; take-off points to the trails can be established here.

Small access areas would be retained where campgrounds of moderate size, ranger stations, and similar facilities, already exist, but these areas would be minimal.

Historical areas containing structures would be excluded from wilderness areas but protected as historical areas for their unique features; historical remains without structures should be included in the wilderness areas; this follows the definitions in the existing Wilderness Act.

Major access areas will continue to exist in the parks, but should be minimal in size, and should in many cases be reduced. The visitor centers, lecture halls, such lodges as may be retained, and parking lots, where necessary, would be located here. Visitors would be encouraged as far as possible to use public transportation in going farther into the parks.

In many cases it should be possible to set up reception centers completely outside the parks on public land, and public transportation would depart from such reception centers or from vacation resorts on private lands into the parks and monuments.

Where overcrowding becomes too serious, private automobiles could then be excluded entirely from the park; small observation buses would be substituted, preferably electrically driven, running frequently and stopping at points of interest and at the foot trails.

The "wilderness threshold" concept which the National Park Service has developed is in some respects similar to our concept of access areas and ribbons, except that the thresholds, as presented thus far in the public plans, have been much too large. Our adherence to a different terminology for the present is

dictated by these policy differences.

The Service apparently considers its threshold areas partly as buffers excluding the sights and sounds of civilization; as noted, this notion of exclusion is untenable. Instead, buffer zones should be established completely outside the parks; where public lands surround the parks, as usually is the case, the creation of such buffer zones should not be difficult, granted cooperation by the other public agencies, or the necessary comprehensive regional planning.

With buffer zones or thresholds established outside the parks, a framework of recreational and scenic protection around the parks could thus be created. The elimination of mining, and a firm adherence to ecological timber harvesting, where cutting occurs, would be of primary importance in such buffer zones.

Protection of this kind for natural values within the parks cannot be achieved unless the National Park Service abandons its competition with privately operated vacation business outside the parks. If private vacation resort operators are to establish well-planned, high-quality facilities to absorb visitation and diminish the load on the parks, they must be assured that public agencies will not engage in business rivalry with them. In turn they must accept good zoning and other restrictions to protect themselves and the public against honky-tonks.

The present series of hearings, administrative in nature, initiated under the Wilderness Act, may never eventuate in legislation; nor need they do so. If a new Wilderness Act emerges, dealing with wilderness in parks, its premises may be quite different from those of the present Wilderness Act, which applies mainly to the national forests.

A firm administrative determination, incorporated in the master and subordinate plans for the parks, protecting the great majority of all lands within the big parks as wilderness, with reasonable subordinate access or threshold areas, is the requirement of the moment; our participation in the hearings is directed toward such administrative planning.

The problem here, as we have stated on many occasions, is not to safeguard wilderness against people, but rather to protect the people, the parks, the scenery, and the wildlife, against the overwhelming pressures of the traffic; if there is will toward such protection, the way is open.

—A.W.S.



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During the fall of 1966 a fine new park was authorized for addition to the national park system—Guadalupe Mountains, just across the Texas-New Mexico state line from existing Carlsbad Caverns Park in New Mexico. Guadalupe Mountains is the first new national park to contribute lands to the system since Virgin Islands was authorized in 1956 (though since then one national monument has been reclassified as a park and one park split into two parks). Of some 77,500 acres, Guadalupe Mountains will bring to the park system a unit somewhat similar in general aspect to Big Bend, farther south in the same State, with perhaps more emphasis on geological significance.

The Association and the Magazine

The National Parks Association is a completely independent, private, non-profit, public-service organization, educational and scientific in character, with over 32,000 members throughout the United States and abroad. It was established in 1919 by Stephen T. Mather, the first Director of the National Park Service. It publishes the monthly *National Parks Magazine*, received by all members.

The responsibilities of the Association relate primarily to the protection of the great national parks and monuments of America, in which it endeavors to cooperate with the Service, while functioning also as a constructive critic; and secondarily to the protection and restoration of the natural environment generally.

Dues are \$6.50 annual, \$10.50 supporting, \$20 sustaining, \$35 contributing, \$200 life with no further dues, and \$1000 patron with no further dues. Contributions and bequests are also needed. Dues in excess of \$6.50 and contributions are deductible for Federal taxable income, and gifts and bequests are deductible for Federal gift and estate tax purposes. As an organization receiving such gifts, the Association is precluded by law and regulations from advocating or opposing legislation to any substantial extent; insofar as our authors may touch on legislation, they write as individuals.

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The New Guadalupe Mountains National Park

77,500-acre unit in scenic highlands of west Texas presents a variety of plant and animal associations in an outstanding geologic setting

By Natt N. Dodge

PICTURE, IF YOU WILL, TWO RUGGED mountain systems resembling a great V, or two sides of an isosceles triangle, converging to form a fastness of canyons, sheer cliffs and peaks blanketed with a wealth of native herbs, shrubs and primeval forest. Thus, rising from the desert near the southwestern corner of New Mexico, the Brokeoff and Guadalupe Mountains of Otero County and the Barrera del Guadalupe of Eddy County thrust their combined bulk southward across the state line to merge, in Texas, like the head of a giant javelin.

Southernmost tip of this massive spearpoint is the imposing 1000-foot rock face of El Capitan, behind which towers the 3751-foot summit of Guadalupe Peak. This Texan climax to New Mexico's Guadalupe Mountain complex has recently been authorized as a 77,500-acre addition to the national park system—the Guadalupe Mountains National Park.

From Guadalupe Peak and its surrounding canyon-cut, pine-covered highlands the vigorous hiker or horseman may look down a vertical mile, across cliff and canyon, to the hot, dusty barrens of west Texas; the Salt Basin to the west; the Delaware Plains to the east. Extending south to the distant, hazy horizon, where the Rio Grande marks the frontier of northern Mexico, there spread the vast reaches of the Chihuahuan Desert with its array

of thorny plants, drought-resistant shrubs and dwarf trees.

Stretching away to the northeast is the mesa-like Barrera del Guadalupe with its steeply dipping, deeply incised, south-facing escarpment behind which lies famous Carlsbad Caverns and, quite possibly, other great caves not yet discovered. To the northwest, imposing Dog Canyon separates the cliff-girt Brokeoff Mountains from the main range of the Guadalupes, whose mélange of pine-clad peaks fades into the distant Pecos Valley beyond the northern limit of vision.

To the lay visitor the chief attraction of the high Guadalupes lies in their scenic splendor; but the geologist sees in them a rare phenomenon, the acme of the world's most extensive fossil reef. In Permian times, some 235 million years ago, a large part of west Texas and southern New Mexico lay beneath the waters of a shallow sea. A 10,000-square-mile portion, roughly oval in shape—the Delaware Basin—was connected to the open ocean by a broad channel leading toward the southwest. For millions of years the deposits of lime-secreting algae and other creatures gradually built, along the margin of the basin, a massive limestone reef extending for more than 350 miles around the basin's periphery.

With the great convulsion of the earth's crust of some 60 million years ago (geologists call it the Laramide

El Capitan, imposing remnant of a great Permian fossil reef, stands at the southerly termination of the Guadalupe Mountains in west Texas. Behind Capitan rises Guadalupe Mountain and other peaks of the range which, from bases to summits, display a fascinating variety of botanical associations.

Revolution) the entire region was raised and the reef stood exposed to the destructive agencies of mechanical and chemical weathering. Time and erosion have since carved deep canyons, reduced surface rock to soil, and dissolved and removed great volumes of limestone along fracture lines to leave caves and caverns in the very heart of the reef.

The Texas portion of the Guadalupe Mountains shows outstanding exposures of many of the old Permian rocks that were deposited in the Delaware Basin, including superb canyon-cut cross-sections of the reef. Here is a magnificent story of earth history clearly visible to the trained geologist and, with a little graphic interpretation, understandable to the layman. It is this remarkable display of marine deposits and of reef-building and cave formation that has made the Guadalupe Mountain region classic in geology.

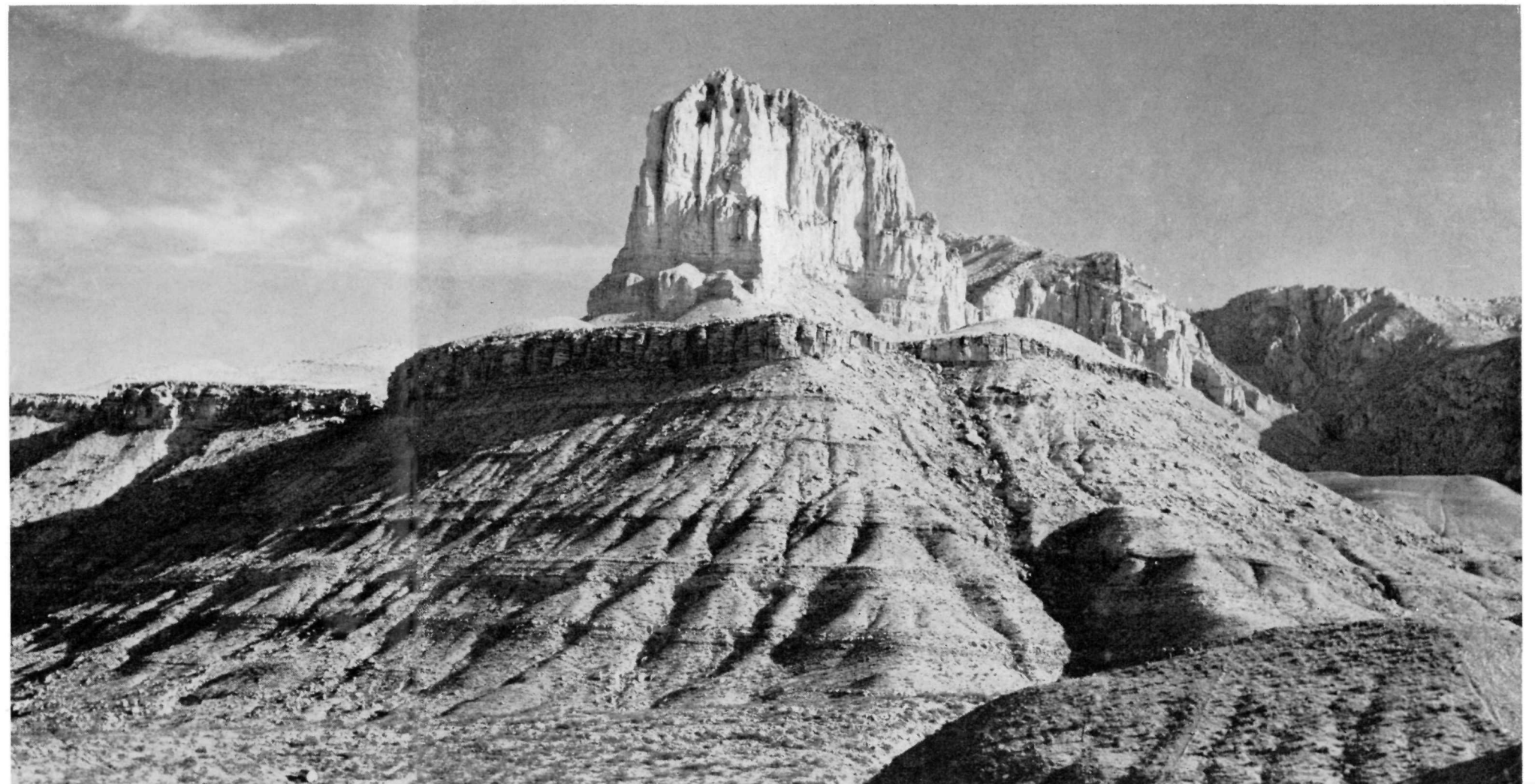
Although no caves of a grandeur comparable to nearby Carlsbad Caverns have been discovered in the Guadalupe Peak terrain, a number of

grottos and solution chambers have been found, some of them containing evidence of use or occupation by prehistoric men. A March, 1965, excavation of one such cave near the mouth of McKittrick Canyon by archeologist Albert Schroeder of the National Park Service uncovered a cremation burial and numerous artifacts including shells of *Olivella*, a marine mollusk. If the shells came from the Gulf of California, they might indicate trade into the Guadalupe region as early as 500-600 A.D. If they were brought from the Gulf of Mexico a much earlier period of human occupation might be inferred.

Archeological studies in the Guadalupe Mountains beginning in 1925 have provided evidence that man may have been in the region almost continuously for at least 6000 years. Bones of now-extinct mammals like the musk-ox, four-horned antelope, and Taylor bison have been found associated with cave sites showing human occupation. Hermit Cave, in Last Chance Canyon, has produced carbon-14 dates of more than 12,000 years before the present.

Finds of pottery approximately 600 years old point to cave occupation of more recent times, and numerous mescal-roasting pits scattered throughout the lower elevations give evidence of the domestic activities of Apache Indians. Most recent inhabitants were Mescalero Apaches, who were present when Coronado traveled northward along the Rio Grande Valley to pass west of the Guadalupe Mountains. In the late 1500's two Spanish groups followed up the Pecos, paralleling the eastern base of the Guadalupe uplift. Might it have been one of these that named the range in honor of the Virgin of Guadalupe, patroness saint of Mexico?

Beginning in 1849 the U.S. Army sent forces into the region to explore and to protect from Indian attack travelers bound for the goldfields of California. In 1854 Captain John Pope, surveying a route for the Pacific Railroad, passed close below the southern tip of the Guadalupes, and in 1858 the Butterfield Line (Tipton, Missouri, to San Francisco in 25 days by stage) established a station at the mouth of





National Park Service photograph

Seen from the air the 5000-foot western escarpment at the southern end of the Guadalupe Mountain range shows the stratification of Permian marine sediments of the Capitan Reef, classic type locality of its geologic age.

Pine Spring Canyon. Ruins of the station still stand.

Following the end of the Civil War, ranchers began to settle in the Pecos Valley and in the canyons of the Guadalupe where springs provided adequate water. Sheep and goat ranches were established higher in the mountains in the early 1900's. Fortunately, the owner of nearly all of the Texas portion of the Guadalupe concentrated his goat herds farther north, in the Dog Canyon area in New Mexico, basing his management of the Texas highlands on sound conservation principles. Since the early 1920's he and his father had not only protected the native vegetation and animal life of the highlands but had also re-established forms

known to have been present earlier in the Guadalupe Mountains. Prominent among the animals are elk and wild turkey, both presently increasing in numbers.

Reached only afoot or on horseback—except for one rough and dangerous Jeep trail—the Texas Guadalupe has remained relatively inaccessible for four decades. They provide a rare ecological exhibit approaching the climax types throughout, and show little evidence of human activity.

Contributing as much to the scenic aspects of the Guadalupe as cliff and gorge is the diverse vegetation blanketing slopes and canyon bottoms. Climbing the lower bajadas of the foothills and invading the mouths of many can-

yons, creosotebush, saltbush, javelinabush, snakeweed, lechuguilla, walking-stick cholla, prickly pear, and other plants typical of the surrounding desert dominate the ground cover. Higher on the slopes these mingle with and gradually give place to sotol, century plant, several varieties of acacia and mimosa, Texas madrone and scrubby one-seed juniper. In the sandy channels of dry watercourses occupying canyon bottoms, such small trees as desert willow, netleaf hackberry and Texas walnut cast a sparse shade.

Here are found such flowers as greenthread, goldeneye, desert senna and globemallow. Jackrabbits lope across open flats and cottontails scuttle for cover at the approach of their arch-

enemy the gray fox. Three species of skunks search for mice, dig for grubs, or harvest tunas—the juicy, mahogany-colored fruits of prickly-pear cactuses. Rock squirrels sun themselves on stony outcrops, a wary eye turned skyward where a hunting redtail hawk makes wide circles in the blue. At night raccoons and ringtails come out of hiding, and the booming voice of the great horned owl echoes from limestone walls.

Bird life is abundant throughout the canyons of the Guadalupe. Cactus wrens, thrashers, mourning doves, road-runners and black-throated sparrows prefer brushy flats and open canyon mouths. Vireos, tanagers, sapsuckers, flycatchers and flickers hunt insects among the shrubs on rocky slopes, or fly from tree to tree along the bottoms of narrow gorges. On north-facing slopes, where ponderosa pine finds suitable conditions, white-breasted nuthatches, brown creepers and winter wrens investigate nooks and crannies where insect larvae might hide. As dusk deepens, the haunting call of the poorwill is borne on the breath of a down-canyon breeze.

Water, the Magic Key

Water is the vital ecological control in this arid country, and where seeps and springs christen cliff-bases with the magic touch of moisture a luxuriant growth of native grasses and herbs brings an aura of springtime to the canyon floor. At such moist locations—and particularly along stretches of South McKittrick Canyon, which boasts a permanent stream harboring rainbow trout and sunfish—thickets of chokecherry, chinquapin oak, Rocky Mountain juniper, walnut and madrone crowd the canyon floor. Here the broken walls of the defile are covered with grasses and shrubs with an occasional ponderosa pine, gray oak or alligator-bark juniper.

As the winding canyons penetrate deeper into the mountain wilderness they become narrower, with steeper walls. Trees found on the lower slopes are replaced here by limber pine, hop-tree, shrubby big-tooth maple, and occasionally a spectacular faxon yucca reaching a height of 15 to 18 feet. Sending up a spike of creamy-white blossoms in April, *Yucca faxoniana* is

a fitting rival of the giant dagger, *Y. carnerosana*, of Big Bend National Park.

Some of the canyons head behind the high rim of the escarpment, thus topping out on the crest of the mountains adjacent to the depression between peaks known as The Bowl. This rolling, 7800-foot highland wilderness is covered with an open forest of ponderosa and limber pines, with pinyon pine on the south-facing slopes. Here, too, are thickets of Gambel oak, a scattering of velvet ash and serviceberry and, on northern exposures, stands of Douglas fir and quaking aspen.

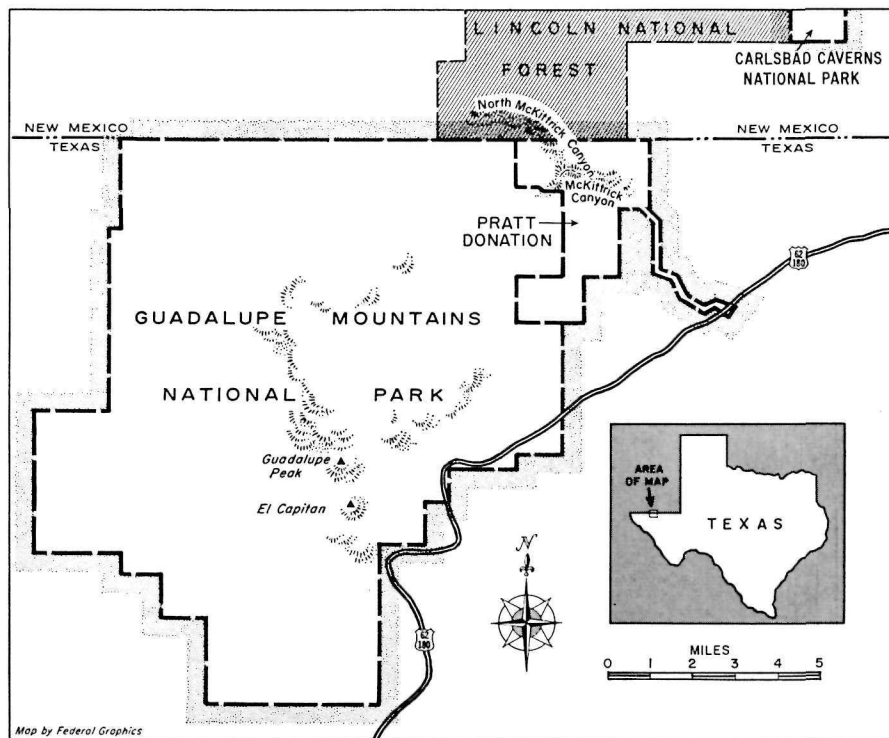
In addition to elk, mule deer, bear, and a few mountain lions, smaller animals find a favorable habitat among the pines and Douglas fir covering the Guadalupe highlands. Porcupines leave their feeding-scars on the trunks and branches of trees. Coyotes and bobcats help to hold in check the otherwise burgeoning populations of chipmunks, ground squirrels, mice and other rodents. Birds are numerous in all sizes, from the tiny “hummer” to the golden eagle and wild turkey.

White-throated swifts sweep the air for flying insects, and soaring vultures ride the rising thermals that sweep up the faces of perpendicular cliffs. Band-tailed pigeons and acorn woodpeckers

frequent oak thickets, while mountain chickadees and western bluebirds tend their young in nest holes in pine trunks. Chipping sparrows and gray-headed juncos are summer residents of the highlands, descending in a leisurely fashion to lower, warmer elevations for the winter.

When, in 1959, Wallace F. Pratt donated to the National Park Service his McKittrick Canyon summer home with 5632 acres in North McKittrick Canyon—accepted in 1961—he provided Americans with an exceptional, if fragile, ecological laboratory. Biological studies conducted there during the summer of 1962 by Dr. Frederick R. Gehlbach, presently a member of the Biology Department staff of Baylor University, revealed a wealth of plant and animal life with communities and associations varying greatly because of such factors as slope, exposure, soil, presence or absence of moisture, elevation, previous activities of mankind, and other conditions.

Now the addition of South McKittrick Canyon and the highlands surrounding Guadalupe Peak to the Pratt donation has provided another major unit for our national park system—a preserve of scenic splendor and a scientific exhibit featuring a mountain wilderness in a desert setting. ■



A New Look at the

TO THE SPORTSMAN, THE FEDERAL public lands mean forage for millions of big game animals. To the rancher, they mean forage for livestock. To the city dweller, they mean potential recreation sites for the nation. To each of us the Federal public lands may mean something different; for their uses are as varied as their terrain. The 774 million acres of remaining public domain include virtually every type of land and resource to be found in the United States.

Many years ago, conflicts of use on the public lands were few. A rancher, for example, might have gone all year without seeing a hunter, a camper or a miner. But this is no longer true. Population of the United States has tripled since most of our major public land laws were passed, and competition for the use of these lands has grown in proportion. What, then, should be the policy governing our public lands to-

day in keeping with changing American needs?

This was the fundamental question facing Congress when it established the Public Land Law Review Commission in 1964. In essence, the Commission must study all the public land laws and recommend whatever changes are needed to enable the public lands to serve the maximum benefit for the general public. To a great extent this means delving into the roots of American economic and political growth, for the policies governing the public lands are woven inextricably into our history. Let us review.

The public domain was born when the original States involved ceded to the Federal government some 233 million acres of land lying westward to the Mississippi River. Thereafter, through purchase and treaty, the United States acquired an additional billion and a half acres, the last acquisition being

the purchase of Alaska from Russia in 1867. Altogether nearly two billion acres of land have been part of the public domain at one time or another.

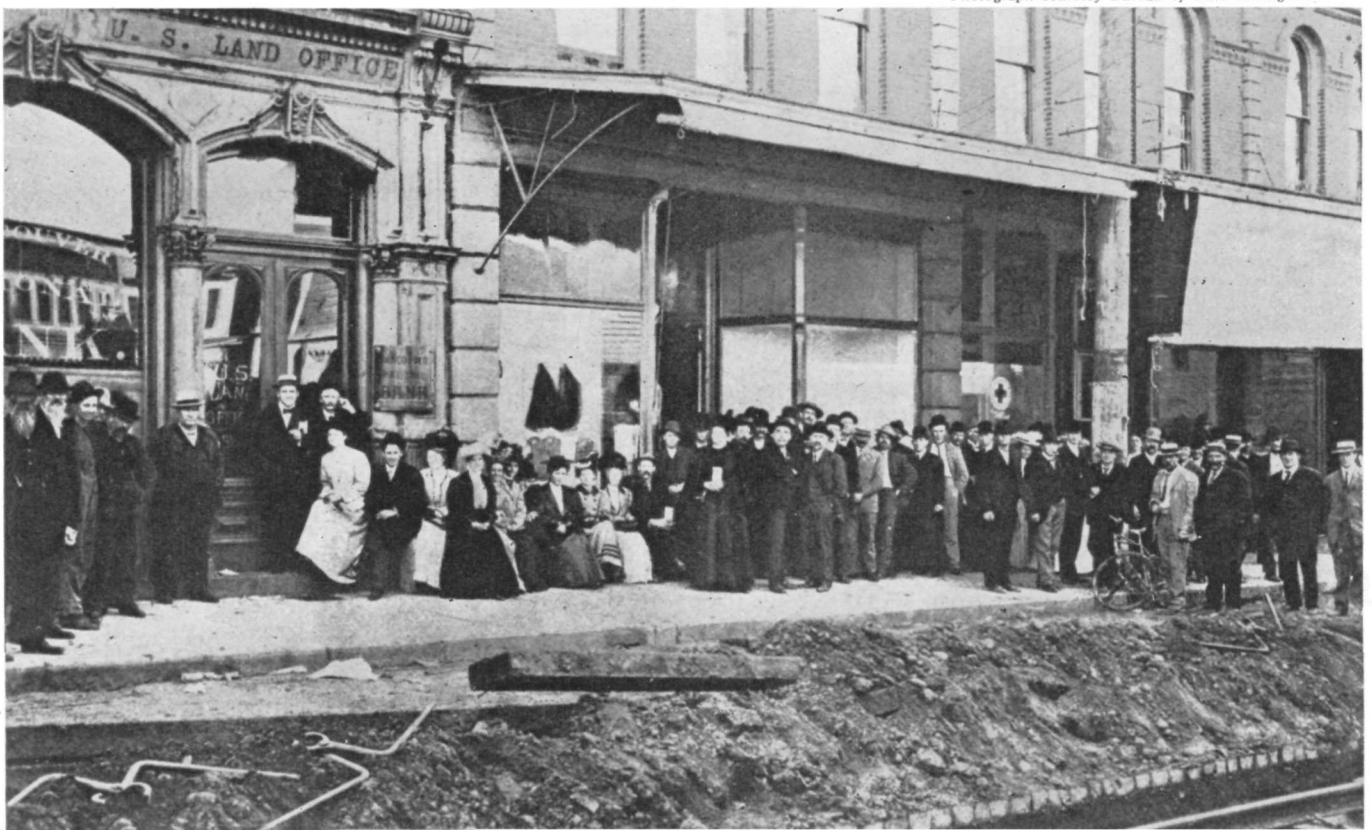
Debts incurred during the Revolutionary War had to be paid, as well as expenses of the fledgling government. It was only natural that, in their search for a means of raising revenue, the Founding Fathers turned to the only surplus asset available—the public domain. An act of 1780 provided for Congress to regulate the granting and selling of these lands.

The policy of selling public lands for revenue continued to be paramount until the passage of several land laws in the 1860's. Among these were the Homestead Act of 1862, which came into being as part of a new policy that emphasized settlement and development of land; and the Morrill Act, passed in the same year, which was the basis of our land-grant college system.

The maximum of 160 acres allowed

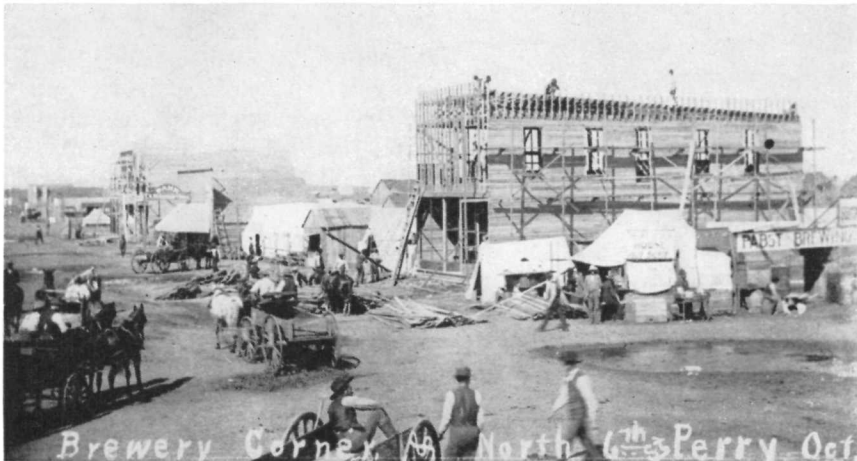
A "lineup" at the Vancouver, Washington, Land Office during a "rush" for timber claims in the early years of the 19th century. Such rushes took place whenever a large body of Government land was thrown open to public entry.

Photograph courtesy Bureau of Land Management



Public Lands

By Milton A. Pearl



Bureau of Land Management

A view of Brewery Corner in Perry, Oklahoma, during the land rush created by opening of the Cherokee Strip in 1893.

for any one homesteader proved insufficient, in many instances, for a livelihood. As early as 1878, observers warned that shortcomings were apparent in the homestead law insofar as meeting conditions of the West was concerned. The brilliant geographer John Wesley Powell, in his *Report on the Arid Region of the United States*, pointed out that "the homestead . . . methods are inadequate to meet these conditions." He held that the farm unit should be not less than 2560 acres, and that "the division of these lands should be controlled by topographic features in such manner as to give the greatest number of water fronts to the pasture farms."

Recognition of Western problems led to the passage in 1877 of the Desert Land Act, which provided for the sale of up to 640 acres of land after irrigation. The acreage limitation was reduced to 320 by legislation of 1891. Then, in 1894, recognizing that irrigation was, in many cases, too expensive an undertaking for individuals, Congress passed the Carey Act, which offered one million acres to each arid State which could provide for the rec-

lamation and occupation of lands by individuals. This was the forerunner of the National Reclamation Act of 1902, by which the Federal Government assumed the responsibility of reclaiming public and other lands, with costs to be borne by the landowners.

Other attempts were made to adapt the original homestead legislation to meet unique conditions of the West. Among these was the Stock Raising Homestead Act of 1916, which provided for homesteads up to 640 acres on those lands determined to be suitable only for grazing livestock. The law provides for retention of all mineral rights by the Federal Government on all stock-raising homesteads. This was the first of two disposition laws which would contain provisions for Federal retention of mineral rights. The second was the Small Tract Act, enacted in 1938.

The Railroad Grants

A parallel effort to settle the West was through the railroad land grant, the first of which was made for the Illinois Central Railroad in 1850. The Union Pacific and Central Pacific re-

ceived grants in 1862, consisting of rights-of-way plus alternate sections of land for twenty miles on each side of the rights-of-way. Altogether these grants, and others which followed until 1871, transferred more than 94 million acres of public lands directly to railroad ownership. (Another 37 million were granted to states for railroad construction.)

The transcontinental railroads made it possible for many more settlers to go west. Trade and commerce were encouraged. The development pace accelerated. The railroads received alternate sections across wide swaths of public domain, but the government retained and then sold the sections in between.

This procedure, coupled with the rectangular survey system,¹ also resulted in millions of acres lying unsettled. Purchasers and homesteaders naturally chose those tracts where water was located in order to control use of surrounding lands. In this way, one individual frequently could buy a section of railroad land and have free use of thousands of acres of unoccupied public lands. The checkerboard pattern of public domain still exists in many areas of the West today.

From the early days of the Continental Army until passage of the Homestead Act of 1862, about 65 million acres of public lands were transferred to individuals in payment for services rendered by the Federal Government. They were issued "scrip," which was redeemable for public lands.

Another land disposition and development procedure, referred to briefly above, involved some 225 million acres of public lands granted to the States for various purposes, including support of common schools, support of

¹ The Ordinance of 1785 established the 640-acre square grid system of public land surveys. The railroad grants were made in units based on this system.

universities and other institutions, and reclamation of swamplands.

The first general mining law came in 1866. Prior to its passage, the "49ers" of California and early prospectors had been mining freely on the public lands. The miners formed districts of their own. They adopted and enforced regulations covering claims. Under the principles used, the discoverer or developer of a mine was entitled to the fruit of his labor. The pattern was followed by the other mining areas of the West.

The self-imposed rules proved so successful that most of them were incorporated into the Mining Act of 1866. This act dealt primarily with lode mining. The Mining Law of 1872—the basic mining law of the country to this date—was based on the 1866 act but contained changes providing for placer mining. The source of the right to minerals was in their discovery, but procurement of title depended on development. A person with a claim based on a valid discovery can mine all the minerals he is able to produce; there are no fees or permits. But if he wants a patent to the land, he must pay \$2.50 per acre on placer claims and \$5.00 per acre on lode claims.

By inference, the Mining Law of 1872 established the policy that mining was the highest and best use of

lands upon which valuable minerals were discovered. What constitutes a valuable mineral, however, is not stated in the law. The question was academic until a "preemption" homesteader, Martin Womble, challenged the validity of Walter Castle's mining discovery some twenty years later.

An Important Decision

In 1889, Womble filed a preemption declaratory statement for 160 acres, but before time came to submit final proof of his homestead, Castle and his mining party located a mining claim on the property. Womble maintained that Castle did not have a valuable discovery as required by the Mining Law, but the Secretary of the Interior ruled otherwise. In his 1894 ruling on the case in favor of the mining claimant, Secretary Hoke Smith gave what has become the standard definition of a valid mineral discovery, ever since known as the "prudent man" rule:

"A mineral discovery, sufficient to warrant the location of a mining claim, may be regarded as proven, where mineral is found, and the evidence shows that a person of ordinary prudence would be justified in the further expenditure of his labor and means, with a reasonable prospect of success in developing a valuable mine."

Later upheld by the Supreme Court, the "prudent man" doctrine is still the basic principle underlying the rule of discovery today. However, the problem of establishing a valid discovery has become more complex each year, involving many factors other than the mere existence of the mineral in place.

Just after the turn of the century, oil and gas began to loom as important fuels. At that time, the conservation movement also was expanding. In the first two decades of this century, upon the recommendation of the Department of the Interior, most of the public domain containing known or suspected deposits of oil and gas, coal and phosphate, were withdrawn by Presidential order from location under the general mining law. The need for development of the nonmetallic minerals led to passage of the Mineral Leasing Act of 1920, providing for mineral leasing and payment of production royalties. The act applies to coal, oil, gas, oil shale, phosphate, sodium, and potassium. By later amendment, it included sulphur in Louisiana and New Mexico, and more recently native asphalt, solid and semi-solid bitumen, and bituminous rock.

As the settlement era of American history progressed, there came a gradual acceptance of a new policy, viz.

The nation's public lands, still totalling some 774 millions of acres, include such remote wilderness fastnesses as that in the vicinity of Cook Inlet, Alaska, below. Mountain in background is the still-active volcano Iliamna.

Bureau of Land Management: James E. Lee



that certain areas of the public domain should be reserved in public ownership for future needs of the nation or for their unique natural features. The reservation policy had its significant beginnings in 1872—the same year that the mining law of 1866 was substantially revised—with the establishment of Yellowstone National Park. The next year, an act was passed which led indirectly to the establishment of forest reserves. This was the Timber Culture Act, which provided for a grant of 160 acres of public domain to anyone who planted one-fourth of the acreage to timber and managed it properly for ten years. Conceived as a means to restore some of the timber resources that were removed when land was cleared for agriculture, the Timber Culture Act never achieved its objective, and was repealed in 1891. A “rider” attached to the act of repeal authorized the establishment of forest reservations on the public domain.

Presidents Benjamin Harrison, Cleveland, and McKinley, in turn, set aside forest reserves which totaled nearly fifty million acres by the time President Theodore Roosevelt took office. During his Presidency, Roosevelt upped this figure by nearly 150 million acres.

Considerable acreage has been added to the national forest system since

Roosevelt’s time. The Weeks Law of 1911 made possible the creation of national forests in eastern States where there was no remaining public domain or where there never had been public domain. Some lands have been removed from the forest reserves, primarily for inclusion in national parks. There are some 180 million acres in national forests today. In addition to the lands in national forest reserves, about 18 million acres of public domain have been reserved for national parks.

The first national wildlife refuge, the Pelican Island Refuge in Florida, was established by President Roosevelt in 1902. Its purpose was to protect colonies of birds that were being slaughtered for their plumage. The Federal refuge system has now grown to 27 million acres, nearly 19 million of which are in Alaska.

Western Grazing Lands

Observers of the western scene had recognized for many years that much of the arid region could never be farmed successfully. Rough, mountainous, and dry, this was the open land of the West—the free range where ranchers grazed their livestock on the basis of “first come, first served.” No improvements were made by the Federal

Government on these lands, and little effort was made to control use because no user owned the land or even had exclusive use of any acreage. According to law, the lands were slated for disposition: so the Federal Government had no authority or incentive to improve them. The result was widespread deterioration of the range from overuse, and range wars between competitors for the scant forage available.

This situation continued until 1934 when Congress passed the Taylor Grazing Act to provide for Federal administration of grazing lands “pending final disposition” of the public domain. This act (with later amendments) provided for the establishment of grazing districts covering a maximum total of 142 million acres in the West, which is the approximate area comprising such districts today.

The Taylor Grazing Act brought law and order to the western range. In great measure, the act achieved its objectives, but obviously there is much to be done, since it was enacted thirty years or so ago as a stop-gap measure.

Although the Taylor Act is the most recent comprehensive public land law, many individual acts of significance became law during the interim period. These included acts for sale of small tracts of land suitable for development,

Moving dunes along coast of Oregon north of Coos Bay create fresh-water ponds which add to the charm of the back-dunes. Some of this BLM shoreland is under consideration for inclusion in an Oregon Dunes Seashore.

Bureau of Land Management: James E. Lee



for the sale of materials not classified as valuable minerals, and provision for multiple use of lands covered by mining claims. In addition, laws were enacted in 1964 to provide temporary authority to classify public lands for their management under principles of multiple use if they are to be retained in Federal ownership during that period, and for sale if they are classified as being chiefly valuable for community expansion, industrial, and residential development, and other specified uses.

Nation's Needs Are Changing

It is obvious that the demands of the 1960's and 1970's and the foreseeable future are significantly different from those that existed when the basic development laws were enacted a century ago. Nonetheless, we have paid lip-service to the idea that, under the classification procedures of the Taylor Act, we could utilize the framework of the settlement laws for the continued development of western public lands. A brief examination of how this has operated is revealing.

A study by the Department of Interior's Bureau of Land Management covering the ten-year period between 1950 and 1959, revealed that of the 4,000 applications for original homestead in the western States, 86 percent were denied because the land was judged incapable of crop production. Of the 14 percent allowed, only 50 percent went to patent. Similarly, about 80 percent of the applications under the Desert Land Act were denied, with only half of the allowed entries going to patent.

When authors of the Stock Raising Homestead Act of 1916 provided for retention of mineral interests by the Federal Government, they could not foresee the future conflicts that would ensue in an urbanized West. When grazing homesteads were patented, they became private property. Some, as urban areas expanded, became heavily populated subdivisions such as those surrounding Tucson, Arizona. But this did not abrogate the right of mineral entry. The House Committee on Interior and Insular Affairs, in commenting on the Tucson matter, reported there was "a flurry of prospecting activity in the Tucson area including the location of claims in the heart

of residential developments . . ." Prospectors came and staked their claims—even began digging on private lawns—and the law was on their side. Home owners were subject to annoyance, loss of privacy, and damage to property. In the critical area around Tucson, relief came through statutory withdrawal of the area from mineral entry by Congressional Act.

Year by year, conflicts for use of the lands by a growing population had multiplied. Expanding communities could not expand by purchasing public domain for subdivision or industrial use. There was no legal authority to permit this. In addition, they had no control over the Federal Government's sale of small residential tracts (under the Small Tract Act of 1938) which frequently proved a burden on county service facilities. New industries, requiring large mineral acreages for economical operation, were stymied statutorily by acreage limitations. And ranchers maintained that expenditure of private funds on Federal permit lands could not be justified without some assurance of tenure.

Wide open to everyone, the public domain attracted more visitors each year, but there were no provisions for accommodating their sanitation and protection needs. Recreation sites were where people found them, anywhere and everywhere. The result was despoliation of natural beauty, with the public domain becoming a litter barrel in many instances.

This was the state of public land affairs which prompted Congress in 1964 to take a long look at existing public land laws. To carry out the needed study, it enacted Public Law 88-606, which provided for establishment of a four-year Public Land Law Review Commission of nineteen members. Briefly, the commission must: (1) study all existing statutes and regulations governing the public lands; (2) review policies and practices of the Federal agencies administering these lands; (3) determine present and fu-

ture demands on the public lands; and (4) recommend changes in laws and administration which will enable the general public to realize the maximum benefit from the public lands. The act gives the commission until December 31, 1968, to report to the President and the Congress.

Unlike past groups created to study the public lands, the commission membership represents both Houses of Congress and the President—with six members appointed by the Speaker of the House, six by the President of the Senate, six by the President of the United States. Among the Congressional members, majority and minority parties are equally represented. The nineteenth member of the commission, in accordance with provisions of the act, was elected by the 18 appointive members and serves as Chairman. He is Representative Wayne N. Aspinall of Colorado.

Requirements of the Act

The act provides for a 33-member Advisory Council and representatives of the 50 Governors of States to assist the commission in its deliberations. Eight of the Advisory Council members are representatives of Federal departments and independent agencies chiefly concerned with public land administration; the other 25 represent the various user groups and state and local governments.

The commission's formation marks the first time that all the acts comprising the public land laws of the United States have been brought before a group of this nature for review. It affords the nation an unprecedented opportunity to adapt its public land policies to the needs of the future, as well as those of today.

Our population is expected to approach or exceed 300 million by the year 2000. From our forests—public and private—we may need to double the current harvest of timber each year by the year 2000. By 1980, our water needs are expected to increase 60 percent. Demand for minerals may jump at least 40 percent by 1975.

The public lands, covering a third of the nation's land area, can play a key role in satisfying these future demands. To do it, our public land policies must conform to the realities of a changing world. ■

Mr. Pearl, formerly a member of the professional staff of the House Committee on Interior and Insular Affairs, is Staff Director of the Public Land Law Review Commission created during the Second Session of the 88th Congress.

Dotting a large area between the cities of Centralia and Olympia in Washington State are the Mima Mounds, whose origin has been a puzzle to geologists for more than a hundred years.

Photograph by the author



MIMA MOUNDS

By Henry Pearson

OVER THE COURSE OF GEOLOGIC time many things have happened to the earth's surface that, in spite of man's constant probing, have remained mysterious.

For example, in the southwestern part of Washington State, on open prairie land ringed by forests, homes, roads and a transcontinental railroad, nearly a million grass-covered mounds stand in almost perfect symmetry like haystacks groomed by a farmer's patient hands. Known as the Mima Mounds, these pimples on the earth's surface range in height from a mere foot or so to seven feet, with an average base diameter of 20 feet. They cover some 30,000 acres in an area roughly four miles long and from one to two miles wide, situated about midway between the cities of Centralia and Olympia.

The first public account of the Mima Mounds was made by Charles Wilkes, leader of the United States Exploring Expedition, who made a special trip into the area in 1854 to study the unusual formations. Wilkes offered no explanation as to their origin.

Over the years there have been many theories advanced in account of the natural phenomenon; these have run the gamut from ancient buffalo wal-

lows and fish nests to glacial action and the work of pocket gophers. Only the latter two suppositions remain today as serious contenders, and even these have been the cause of spirited controversy.

Proponents of the glacial theory of origin point out that the Mima Mounds are located at the approximate point where the Pleistocene ice sheet ended its southerly advance some 12 to 15 million years ago. They hold that inorganic agencies—wind, water and ice—were responsible for the strange topography. On the other hand, the gopher proponents say that the mounds represent gopher nests made of the gravel outwash of the Pleistocene ice. (This hypothesis has been advanced in explanation of such earthen "pimples" in other parts of the world.)

Public Indifference Hurts

Although the Mima Mounds have been of keen interest to geologists and other specialized groups for many years, the general public has apparently showed only casual interest; and the encroachment of civilization has taken its toll. New homes have sprung up in some parts of the mound area; mounds have been leveled by farmers; a railroad and highway bisect the re-

gion; a canal has been proposed that will slice through the middle of the mound prairies; and there are even garbage dumps in some sections.

Fortunately, in the past year there has been an awakening of interest among many people and an effort has now been made to save a sizable portion of the mound area for future study and public enjoyment. In May, 1965, the Department of the Interior approved Mima Mounds as eligible for registration in the national natural landmark program of cooperation between private owners and the Federal government—a program aimed at encouraging protection of outstanding natural phenomena without Federal acquisition. The Nature Conservancy has taken steps to set aside 580 acres of the land for five years, during which time it hopes to interest a public agency—preferably Washington's Parks and Recreation Commission—in setting up a research center and maintaining the strange terrain for public use.

Meanwhile, if you should take a trip along the old highway that skirts the Mima Mounds, you might see someone atop a mound probing diligently into it. If so, he will no doubt be trying to find an answer to this natural riddle—one that will satisfy all hands. ■

Some Problems and Opportunities at Mammoth Cave National Park

By Philip M. Smith

A scientist examines one of our great cave preservations and concludes that its geologic and geographic unity can only be maintained through cooperative regional planning.

TWO RECENT ARTICLES in this Magazine discussed caves and cave conservation. One described the animal life at Mammoth Cave; the other cited good and bad general cave conservation practices. Neither article emphasized the relationships between man's use of the land immediately above and also inside the caves, and neither mentioned crucial conservation problems within Mammoth Cave National Park in Kentucky. The National Park Service itself has only lately begun to grasp the vital relationships between surface usage and the caves at Mammoth Cave, and the consequences of some previous management decisions. Many problems at Mammoth Cave relate to past park management and involve future management opportunities. The size and scope of the park, relations with nearby communities, water supply, pollution of the cave system with human wastes, incompatible Job Corps use, interpretation of the cave to the visitors, protection, and development of a national park research center are among them.

These problems are not exclusive to Mammoth Cave, but they make this one park a microcosm of management dilemmas facing the Park Service today. Some of the problems cannot be resolved, but those that can should furnish insight for other areas of the park system.

History of Cave Management

Some management problems at Mammoth Cave were born with the park. As with other eastern parks, land at Mammoth Cave was privately owned for nearly 150 years before the park was established. Agriculturally poor except for the bottom lands along the Green and Nolin Rivers, the land nonetheless supported about 500 families at the time the park was formed. For 100 years farm income had been supplemented by a vigorous and competitive "show cave" industry featuring cave tours of every description. Some 30 caves were open for public viewing in the years following World War I. Information about finances and the areal extent of each cave was closely guarded because of the competition. Explorers looked for caves to commercialize or to strip of cave onyx for sale to tourists. Prior to the development of the park, Mammoth Cave itself had

been exhibited by a succession of owners for 100 years. Before the park was formed, in 1941, two ends of Mammoth Cave were separately owned, and the confused visitor heard persuasive claims from roadside hawkers about the wonders in the rival portions of the cave.

Mammoth Cave was acclaimed as a unique geographic feature in Europe and to a lesser extent in the United States in the 19th century. Its inclusion in the National Park System was first proposed by Stephen T. Mather in 1918. Momentum for a park was slow to develop, partly because advocates of the park stressed tour entertainment rather than natural values. Although authorized in 1926, it was not until the mid-1930's that the park became a reality. Considerable acreage was purchased by the Mammoth Cave National Park Association and the Kentucky National Park Commission in the late 1930's, and the park was dedicated formally in 1942. Two privately owned caves inside the original boundaries of the park, Floyd Collins' Crystal and Great Onyx Caves, were purchased in 1960, adding approximately 600 acres to the park. Today we know more about the park, its interesting surface features and vast system of caves, than anyone knew when the proposals for the park were first advanced. A long history of tourism and enhancement of future drawing power predominated early planning. Now we know that the park contains two of the three longest cave systems in the world. Mammoth Cave has a surveyed length of 24 miles. The Flint Ridge Cave System contains at least 60 miles, of which 58 have been surveyed. The only other cave known in this size range is Hölloch in the Muota Valley, Switzerland. When government studies of a possible park began, the Flint Ridge Cave System was unknown except as isolated passages of five separate caves. Of these, four caves were significant—Floyd Collins' Crystal Cave, Great Onyx Cave, Salts Cave, and Colossal Cave. Crystal and Great Onyx were exhibited to the public. Salts and Colossal were unsuccessful as tourist caves, but the archeological importance of Salts Cave was well known.

In the 1940's and 1950's the management of Crystal Cave encouraged research and exploration. Before the cave was added to the park it was known to be the nucleus

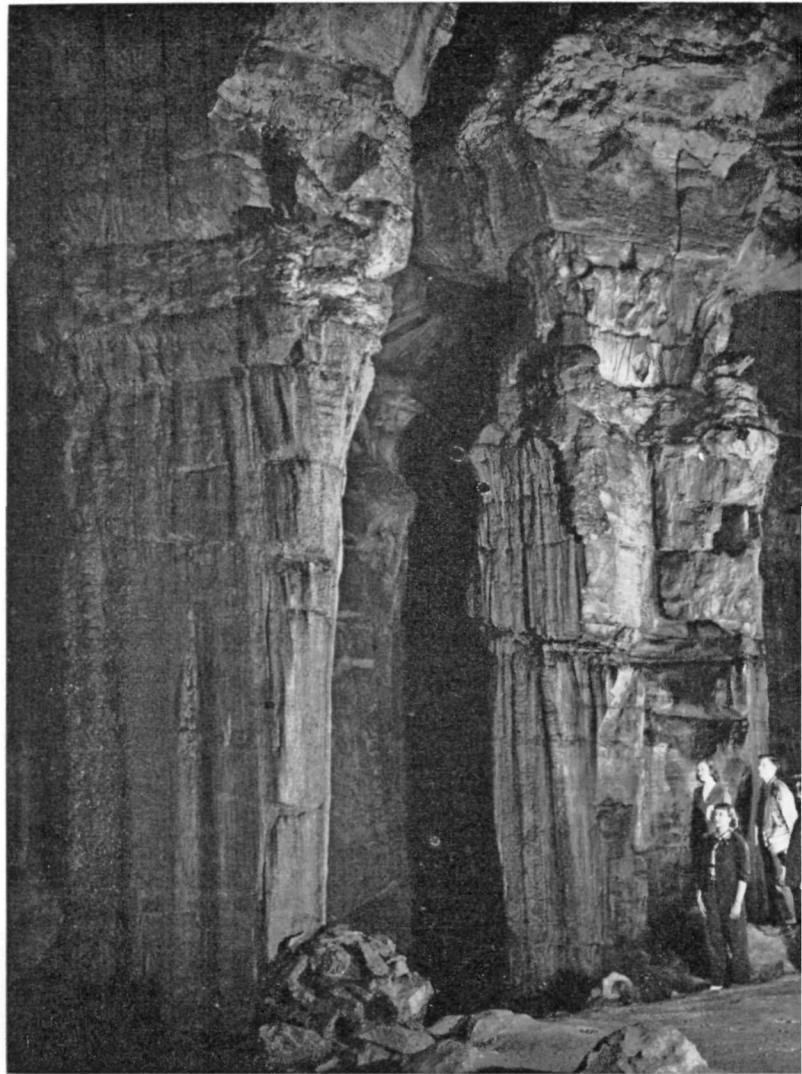
of a huge network of passages extending throughout the length and breadth of Flint Ridge. Exploration, cartography, and initiation of a considerable speleological research program in the Flint Ridge Cave System, as the interconnected cave is called, has all occurred during the last twenty years. Exploration and survey of the cave lead to a realization of the interrelationship of surface and the subterranean hydrologic and geologic processes. Today we can demonstrate that the formation of caves in Kentucky depends on water entering underground solution channels from three sources: the backflooding of the lowest level of the cave during seasonal fluctuations of the Green River; near-base level flow of water throughout the cave from the sinkhole area to the south of the park; and the water draining from the rocks overlying the caves. Rainfall in the park enters caves by way of vertical solutional channels or shafts at the edges of the ridges. An impervious shale underlying the ridges prevents water from reaching the caves except at valley walls. The first two of these water sources develop the long horizontal galleries in the cave system. The water from above the caves, on the other hand, forms spectacular silo-like voids called vertical shafts.

Underground water or its absence is also the key to the ecosystem. The most specialized subterranean animals, the fish and crayfish, are near the water table. Bats inhabit the cave passages protected from flooding. Beetles and other arthropods are found throughout depending on species need for food and a moist or dry environment.

Background of Management Problems

Some current management dilemmas at Mammoth Cave Park began when the park was established, prior to availability of the new knowledge of the caves. Other management decisions, however, are of quite recent origin, made against a full background of knowledge about the extraordinary wilderness values of recently discovered cave areas. Thirty years ago ignorance of the great extent of the wilderness cave systems and the relation of the geologic and hydrologic processes within and outside the park was understandable. Failure to apply the new information to the solution of current problems is another matter.

From the beginning in acquisition of private holdings have come two problems that are still with the Park Service and Central Kentucky 30 years later. As with many other parks, the legislative authorization for the park was written so as to permit a minimum acceptable tract. Much land intended for inclusion in the park was omitted. As visitor pressure has grown and demand for expanded park facilities has increased, absence of this land is indeed unfortunate. Bylew Hollow is one area of particular value because of its scenic sandstone cliffs, minarets, and overhanging shelter caves. Now Bylew Hollow will be subject to increasing private, unplanned development because of accessibility from the newly completed Nolin Reservoir adjacent to the park. A more important omission at the time the park was formed was a portion of the Chester Escarpment (formerly Dripping Springs Escarpment) and the Sinkhole Plain. These areas south of the present park boundary are geologically part of the cave story, just as Jackson Hole is a logical part of the Grand Teton Park



The photograph above, showing the Ruins of Karnak in Mammoth Cave National Park, was taken a number of years ago by W. Ray Scott of National Park Concessions, Inc. Today, "the charming and leisurely exhibition of the cave to small groups by lantern is a thing of the past."

story. A national natural park should include examples of geologically-related landscape. Purchase today would be prohibitive because of soaring land values, but Mammoth Cave Park is incomplete geologically and scenically. Lands representative of missing features are being covered by sprawl. Management decisions now and in the future should recognize and resolve as well as possible the inadequacies of the original planning.

A second problem rooted in the park's origins is a community relations crisis. Displacement of families living on land incorporated in the park, coupled with competition by the Park Service and its concessionaire with privately owned tourist facilities of the region, did little to convince local communities that the park was beneficial to the central Kentucky region. Passage of time has not improved the situation. Development of new and expanded visitor facilities inside the park keeps alive a mistrust of Federal officials. Developments within the park have em-

phasized commercial rather than natural aspects. When the new Mammoth Cave Hotel—a structure of uninspired design—was constructed in 1965, it was allegedly to replace a 50-year-old wooden structure that was at least representative of local architectural style. The old building continues in use, virtually doubling the capacity for overnight guests in the park. This proliferation has been permitted even though it is a half-hour drive to numerous accommodations outside the park. The same kind of growth occurred at a new campground. Again the Mission 66 development program assumed the appearance of expansion rather than replacement of outmoded facilities. Local and Federal officials have disagreed strongly on the location of new highways and access roads.

The Service has recently undertaken to improve its image locally, but mistrust on both sides lingers. Where the tourist industry has long been an important source of private income, the Service's competitive interest in motels, restaurants, and other accommodations of the tourist business simply forms no basis for a mutually beneficial relationship. Local feelings concede that natural features are best managed by the Service, but visitor facilities, they feel, are a responsibility of the community.

The Great Onyx Job Corps Conservation Center in the park, completed in 1964, has intensified bad feeling and has probably postponed mutual understanding. The predominantly urban group of trainees is not accepted in

communities where rural traditions and standards prevail. The question is raised, locally, about what else might be established in the national park because the land is available.

Within the park, the single most important management failure has been in planning for water supply. Like many parks, Mammoth Cave has a water shortage. There is no water table as such in cavernous limestone. The water flows through joints and fractures in the limestone, in the process enlarging the cavities by dissolving the rock. The solid limestone contains no usable water—it is all in the joints and fractures, or in the streams of the enlarged cave passages. Well drilling to the water table may or may not yield water; if a joint is not tapped, yield is minimal. Water consumption by visitors and the Job Corps camp is greater than the regular flow from the park's present supply. Annual flooding and attendant problems of water treatment have steered Park Service planners away from the Green River, a plentiful if not pure source of water. They have instead exploited the relatively pure but meager flow from a perched water table in the sandstone caprock overlying the cave-bearing limestones. The water from this sandstone overburden normally goes into the cave systems below by way of vertical shafts and open joints. These springs met water demands over a 150-year period for the farming families living in the park area, and engineering planners assumed that this same supply would be adequate

An aerial view of the Job Corps camp in Mammoth Cave Park. At lower right, portion of housing; upper right, heavy equipment and vehicle storage; center, gymnasium under construction; upper left, double sewage basin. Directly underneath the complex are some of the most extensive cave passages in the park.



for the park. The initial park water system utilized the three springs on Flint Ridge. As water demand grows, this spring proves inadequate. Attempts at drilling deep wells have not been successful. The expedient solution has been adopted. The system has been expanded to include more and more of the half-dozen or so springs discharging from the sandstone rocks capping the Flint Ridge Cave System. A catchment basin system and pipelines, with attendant pumping facilities, roads, and overhead power lines, now taps every major spring around the perimeter of the Flint Ridge. Now the Flint Ridge water network is at its maximum expansion, the terrain slashed and scarred by the engineering works. When the need for water is greatest—in August when the tourist population is the greatest—flow from these springs is lowest. Although reports by the Geological Survey and the Cave Research Foundation had recommended the use of the Green River as a water supply, the management continues to hope that the present system will suffice. The only way to increase capacity is to enlarge the reservoir holding tanks to tide the park over during minimum flow years or to tap springs on other ridges. If the rate of visitor population continues to increase, water crisis is a yearly threat. Meanwhile, insensitive management decisions have led to a proliferation of engineering projects that scar the park and remove life-water from the largest wilderness cave system in the world.

Some Other Water Matters

Other water problems face Mammoth Cave. A Corps of Engineers proposal for a dam downstream on the Green River hopefully is now dormant. The impounded water from such a dam would flood the lower levels of the cave system, interrupting the natural cycle in the dynamic, living part of the cave. As with all uncompleted Corps of Engineers projects, the proposal must be watched at all times. A second water problem has plagued the Green River—oil and salt brine pollution from an oil field upstream. This pollution was unchecked in the early 1960's as wildcatting led to a rapid expansion of the Kentucky oil industry. The light-weight oils were floated off the oil-brine mixture as an inexpensive separation process and allowed to flow directly into the Green River. Enforcement of pollution regulations subsequently passed by the State of Kentucky has been rigid. Inspectors stopped the flow of the oil sludge and the river has since cleaned itself. Though the Park Service was actively pressing for the correction of this pollution, the vigorous action by State officials was in response to local community demands for usable river water for human and industrial purposes.

With this up-river pollution problem solved, a new one from within the park has entered the picture. The Great Onyx Job Corps Conservation Camp is served by a sewage settlement basin inadequate to handle sewage outflow from the camp. Though the settlement basin is an accepted engineering technique, its application to a wooded karst area of relatively high rainfall is poor engineering practice. The basin's effectiveness requires a relatively high degree of evaporation, and a runoff into a more normal water table. In a karst area the expected filtration does not take place. Today sludge cakes, raw sewage, and undissolved solids



A conservationist from the National Speleological Society examines runoff of overflow sewage from Job Corps camp in Mammoth Cave Park. Sewage runs into the caves below and pollutes the underground streams.

from the holding basin enter the Flint Ridge Cave System. At the local level, at least, the Park Service is aware of this pollution problem and is anxious to correct it.

Few can argue with the goal of the Job Corps, but one can be disturbed by the large-scale developments that accompany location of a Job Corps camp in a national park. In the 1930's men from a Civilian Conservation Corps Camp at Mammoth Cave provided the basic construction of surface and cave trails that have served until now. The Job Corps camp may have a similar benefit. Unlike the CCC camp, however, there is nothing primitive about the Job Corps camp at Mammoth Cave, which has such conveniences as automatic washers and dryers. Though living units were pre-assembled for rapid construction, permanent installations include a water system sized to support a modern community of 350 persons year-around, a 40 x 196-foot steel-framed shop building on a concrete pad, a similar building serving as a gymnasium, and a network of roads hacked through the park forests where Job Corps trainees learn to drive and operate heavy equipment. Front-loader trainees have virtually stripped off some Pennsylvanian-age gravel beds of unusual geological interest. The gravel has gone to support the road building and the building of the Job Corps camp itself.

Considering the vast developments necessary to support the Job Corps in a small park such as Mammoth Cave, the Center's location over the Flint Ridge Cave System, the bulldozer approach to scenic treasures, the pollution problem and the additional demand for water in the park, one must conclude that the Job Corps is incompatible with Mammoth Cave Park.

The management crisis in interpretation is upcoming,

Philip M. Smith, a member of the National Speleological Society, is a spelunker of many years' experience. Since 1953 he has engaged in a special study of the great Flint Ridge Cave System in Kentucky's Mammoth Cave Park.

and may swamp Mammoth Cave in the 1970's. The number of visitors has tripled in the last ten years. Unlike Carlsbad Caverns, where the huge crowds are accommodated on a long tour around the perimeter of the spacious Big Room, tours in Mammoth Cave are confined to the examination of a series of long, relatively narrow passages. It is not easy to accommodate the throngs now arriving during peak days. The charming and leisurely exhibition of the cave to small groups by lantern is a thing of the past. The cave's silence and remoteness are gone. Present methods of dealing with the cave visitor cannot be multiplied greatly—"more of the same" will not do. An experimental self-guided tour into the Historic Entrance of Mammoth Cave to the Rotunda and to nearby features was conducted during the 1966 summer, and was highly successful. Longer tours into more remote areas, however, would be much more difficult to arrange. While more visitors can be accommodated through more rapid trips, greater use of trailside signs, or even such devices as mechanical conveyors or taped lecture systems, the esthetic quality of the experience will be totally lost. Already some cave trips resemble hurrying through a lighted hallway, an experience hardly different from dashing through the subway station beneath Times Square.

The Park in Its Regional Context

The human history associated with the park is rich and colorful, and much of it is well presented; but the presentation stops after 1900. This is inexcusable, as the arrival of the automobile changed the whole visitor pattern at Mammoth Cave and many interesting events make up recent history. Roadside turnouts along the entry roads into the park have scenic views, but there are no interpretive exhibits to describe the geology and its relation to the cave trip the visitor will soon take.

The interpretive program requires a naturalist staff trained in cave geology and the related features of the park. The transient management of a constantly rotating naturalist force is a learning experience for Service personnel, but not for the public. The future interpretive challenges are extremely difficult and complex, and the naturalist management must be cognizant of the problems. Perhaps the only way to find optimum solutions is a new career policy which would permit specialization in individual types of parks.

A similar degree of specialization might increase the effectiveness of the protective staff. There are some 30 cave entrances in the park, and protection of the entrances is a requirement. The protection has been poor, even at times nonexistent. Since the park was established some formerly commercial caves with superb formations, such as Colossal Cave, have been stripped of formations. Patrol and protection of such features as caves are full-time jobs for one or two men who must be on the job long enough to become familiar with the area.

On the positive side, the interpretation program at Mammoth Cave has many excellent features. Evening lectures are better than average, presenting a complex geological story with reasonable accuracy and in an intelligible fashion. The concessionaire has avoided flamboyant tourist mementos to a large degree and has featured excellent handicrafts brought from the Appalachian area east of the park.

An extensive research program has been in progress at Mammoth Cave for a decade. With the exception of two studies, research has been initiated by those having an interest in the research without Service financial assistance. Since 1960, as before, the research personnel have been housed in modest facilities near Crystal Cave. Much of this work has been basic research; that is, no immediate management problem necessitated the investigation. Even though it is not specifically directed to do so, the research is contributing to and being applied by those in charge of the interpretive program. The engineering staffs have apparently overlooked any new findings. Following the remarks by former Director Conrad Wirth, that an expanded research program would be planned for Mammoth Cave and that a research center would be included in the plans, two extensive studies of a possible research center were completed and forwarded to the Park Service. Both recommended some limited laboratory facilities in Flint Ridge Cave System and one report called for a laboratory and housing complex on the surface. A decision has not been made to expand the present limited facilities and no Park Service funding has been available to investigators desiring to study in the park.

Eventually, research center plans may go forward. When they do, the Park Service will have to decide whether to support a national research center or a national park center. However, delays in any action by the Park Service have caused some cave scientists to develop alternate plans for simulated cave environments in their own campus facilities. Some successful studies in cave biology are now being conducted in these laboratories. By the time the management decision is finally made by the Park Service, the research center question may have reached a solution.

A Discussion of Solutions

Are there solutions to problems such as those outlined? There are, but they are not all immediate. Existing facilities and programs cannot be overturned or abandoned. The problem is to plan effectively now for the eventual longer-term solution to the problems, to deal realistically with matters such as water supply; seeking ultimate resolution, not just getting beyond current crises. The key to most of the management decisions at Mammoth Cave is regional planning, encompassing the whole of the central Kentucky cave region, not just the park itself. The karst and cave features of central Kentucky are the unifying features of the region. The central Kentucky Karst represents an area of about 2000 square miles, while the park itself encompasses 70. Additional facilities for visitors must be in the areas surrounding the park and not in the limited space within the park. Drinking water for the

future park visitor depends on sources external to the park. Either a pumping station must be built in the park on the Green River, where water that comes from outside the park would be tapped, or the Park Service must plan to join a water district and pipe in its water. Lack of adequate land inside the park probably cannot now be relieved by purchases of more land. The geologic and geographic unity can only be maintained through cooperative Federal, State, and local planning for the region.

A regional planning commission could preserve the integrity of the area by zoning to insure wise locations of new industries, visitor facilities, and city expansion. The Service should help rally viable local planning. The interpretative program requires a deeper view as to what the visitor to the cave should experience and remember. The visitor should be encouraged to stay in the area, not necessarily inside the park. Longer, more meaningful visits can be encouraged by cooperation, not competition between government and area residents.

There are, of course, many problems involved in effective regional planning. In rural Kentucky, zoning laws are minimal and there is a tendency to ignore potential crises. Residents consider Service personnel outsiders. Indeed, they are; for they live in an enclave inside the park. I believe that responsible local citizens can and would rise to the opportunity of regional planning. At least one major community project has been successful of late. A broad-

based area fund-raising campaign with matching Federal contributions has made possible a 30-bed hospital. With the highway locations now set, a new period of planning for orderly development could begin. To take its place in a regional planning commission, the Service must give a new attention to its priorities, placing preservation of the cavern wilderness resources higher than what to do with next week's tourists. For the present, however, the Job Corps camp is the most difficult problem.

With the problems enumerated, it is evident that Mammoth Cave is a park where management has been less than adequate. One wonders how many other units of the park system face the same fate. It is clear that the focusing of citizen attention on the landmark conservation crises allows the Service to manage many areas without any review at all except at the appropriation hearing. Unfortunately, the water systems and sewage lagoons and the greatness of the parks do not get an airing at such reviews. Here is the greatest lesson in the Mammoth Cave microcosm—the management everywhere needs much more review than it is getting, and the inadequacies of the Service's transient management must be countered by an expanded interest among the citizens whose natural heritage is being abused. The Wilderness Act of 1964 provides the first clear opportunity for a citizen review of all the park areas and their management. There may not soon be another. Park management as well as park wilderness should be reviewed.

This area in Mammoth Cave Park, originally quarried by the Park Service for road-fill, was later also quarried by the Job Corps camp for construction projects. The area, leveled and planted since the photo was taken, is directly over part of the Flint Ridge Cave System.



News and Commentary

More Wilderness Hearings

Wilderness proposals for units of the national park, forest and wildlife refuge systems continue with four public hearings scheduled as of this writing. These are:

Lava Beds National Monument in northern California, beginning at 9 a.m., February 17, in the Home Economics Building, Tulalake-Butte Valley Fairgrounds, South Main Street, Tulalake;

Great Swamp National Wildlife Refuge in New Jersey (Dodge Unit), 9 a.m., February 17, Morris County Nature Education Center, Chatham Township;

Horicon National Wildlife Refuge in Wisconsin (Wisconsin Islands Unit), 9 a.m., February 15, Door County Court House, Sturgeon Bay, Wisconsin; and

Bear River Migratory Bird Refuge in Utah (Bear River Unit), 9 a.m., February 21, Indian School Auditorium, Brigham City.

People interested in submitting statements, either at the hearings or written for the hearing record, may secure detailed information from the various unit managers at the followings addresses: *Lava Beds*, Superintendent, Lava Beds National Monument, Tulalake, California 96134; *Great Swamp*, Refuge Manager, Great Swamp National Wildlife Refuge, 614 Meyersville Road, Gillette, New Jersey 07933; *Horicon Refuge*, Refuge Manager, Horicon National Wildlife Refuge, Route 2, Mayville, Wisconsin 53050; *Bear River*, Refuge Manager, Bear River Migratory Bird Refuge, P.O. Box 459, Brigham City, Utah 84302.

Speculation in the Redwoods

As a late bulletin on the galloping destruction of California we record a well-advertised speculative real estate project offering lots for sale on the spectacular Pacific seacoast in Sonoma County near the boundary with Mendocino County, prices beginning at \$5000 a lot, meaning probably \$20,000 an acre. The come-on is a second home, the coastline to be part of your private domain. You will escape the urban traffic (except what you and your new neighbors create for yourselves on the commuter highways and at the new development). The locale appears to be in the southern purchase unit of the coast redwoods forest within which Congress in 1938 authorized the Forest Service to acquire timberlands.

The coast redwoods could make a new start in this unit toward a commercially productive sustained-yield scientific for-

estry operation which would benefit the entire region economically; the great trees could be brought back in some measure for forest products, public recreation, and the restoration of a beautiful outdoor environment. But not if they are to be overtaken and demolished by unplanned urban sprawl.

Rocky Mountain Park Seminars

A program of three summer seminars with primary emphasis upon field observation and discussion of the many facets of the landscape of Rocky Mountain National Park and the adjoining areas is being offered again this year, sponsored by the National Park Service in conjunction with several Colorado university and conservation groups. Three seminars are given; one on the geology of the park, one on field identification of plants, and one on mountain ecology. The series runs from June 19 to July 8, 1967. Further information, including a detailed description of the seminars, fees, and accommodations, may be obtained from Glenn D. Gallison, Executive Secretary, Rocky Mountain Nature Association, P.O. Box 147, Estes Park, Colorado 80517.

Historic Lighthouses Need Help

The Hudson River Valley Commission is studying five historic lighthouses along the River to determine the feasibility of preserving them. The five are at Tarrytown, Esopus Meadows, Kingston, Saugerties, and Hudson. The Tarrytown light has been deactivated and is slated to be sold by the Federal government as surplus property. The other four lighthouses, once manned by Coast Guard crews, have now been automated. Unless local governments or private groups take responsibility for maintaining them, the automated light houses will be demolished and replaced by steel towers.

Among the possibilities being considered are converting the buildings for use as museums, recreation centers, youth hostels, or marina facilities.

A Report on Fuel-Cell Technology

The Office of Coal Research has released a report entitled "Review and Evaluation of Project Fuel Cell," which projects potential commercial prices for power derived from a coal-fired fuel cell. The cell is being developed for OCR by the Westinghouse Electric Corporation. The report examines and evaluates data developed by Westinghouse, and pro-

jects the technical potential of the work. A suggested research program includes construction of a 20-megawatt pilot plant.

The report indicates that the first commercial use of the cell will probably be in areas requiring large blocks of direct current. In all cases the plants would be expected to operate at an overall efficiency of 60 percent, or slightly more. No moving machinery would be required and no air pollution would result. A commercial plant would not release oxides of nitrogen or sulphur into the atmosphere, and would not require cooling water. The report, it is said, reflects a realistically conservative approach and forsee a tremendous impact upon the electrical industry by the coal-fired, solid-electrolyte fuel-cell power system.

Handbook on Civil War Sites

The Department of the Interior has announced publication of the 39th volume of its Historical Handbook Series, entitled "Where a Hundred Thousand Fell." It covers the Civil War battles of Fredericksburg, Chancellorsville, the Wilderness, and Spotsylvania Court House, all in Virginia, and was written by Park Service Historian Joseph P. Cullen. The 56-page handbook furnishes much information about the movements of the Federal Army of the Potomac and General Robert E. Lee's Army of Northern Virginia and the planning and strategy which followed. The booklet is illustrated and may be purchased from the Superintendent of Documents, Washington, D.C. 20402, for 70 cents, post paid.

Serious Situation of the American Alligator

C. Russell Mason, executive director of the Florida Audubon Society, has called upon conservationists everywhere to join in the battle to stop the illegal slaughter of the American alligator. Mason pointed out that the alligator, one of the animals listed by the Bureau of Sport Fisheries and Wildlife as an endangered species, is being killed by poachers at alarming rates to provide hides for purses, wallets, shoes, belts, and the like. He estimated that 50,000 alligators were destroyed in Florida last year.

Audubon Society leaders have agreed that perhaps the only way to save the American alligator is to eliminate the demand for its skin. Mr. Mason stated that articles made from genuine alligator skins are so stamped, and encouraged shoppers to select goods from the wide array of excellent imitation alligator products available.

Conservation Achievement Awards

Seven persons and two organizations were named today to receive National Conservation Achievement Awards by the National Wildlife Federation and the Sears Roebuck Foundation. Winners announced in nine specialized conservation categories are: John H. Dunlap, Williamsport, Ohio, Wildlife Conservationist of the Year; Edward L. Felton, Holland, Va., Soil Conservationist of the Year; Dr. George L. Gunther, Stratford, Conn., Water Conservationist of the Year; Cornelius De Ronde Dosker, Sr., Louisville, Ky., Forest Conservationist of the Year; Dr. Virgil S. Hollis, Tiburon, Calif., Conservation Educator of the Year; Rep. H. Thomas Urie, New Hampton, N.H., Conservation Legislator of the Year; Radio Station KMAN, Manhattan, Kansas, Conservation Communications Award of the Year; and the Western Pennsylvania Conservancy, Pittsburgh, Pa., Conservation Organization of the Year.

Park Service Appointments

Secretary of the Interior Stewart L. Udall has recently announced several National Park Service appointments. John A. Rutter, Superintendent of Mount Rainier National Park, Washington, was named Regional Director of the Park Service's Western Region, with headquarters in San Francisco. Rutter succeeds Edward A. Hummel, who recently became the Assistant Director for Policy and Program Analysis in the Washington NPS office. Announcement was also made of a new chief and assistant chief of information at the Park Service. Robert I. Standish was named chief, with the title of Assistant to the Director of Information, and Edwin N. Winge was named Assistant Chief of Information.

Sequoia National Park High Meadows Study

An ecological study of several high mountain meadows, begun in 1965 in Sequoia National Park, will be expanded as a joint effort of the National Park Service, U.S. Forest Service, and the University of California. Research, being carried out by Dr. Arnold Schultz of the University of California, Berkeley, will include a comprehensive study of a series of high-elevation meadows along Rock Creek in the eastern area of the park. The project, which may continue for ten years, will help determine both the obvious and the subtle ecological changes that occur as a result of increased use in the area.

Scenic Easement Donation

Tudor Place, early 5½-acre estate in

the heart of Old Georgetown (now part of the District of Columbia) was recently placed under Federal protection through donation by its owner, Armistead Peter III, of a scenic easement to the people of the United States. Mr. Peter, descendant of Martha Washington, wife of the first American President, said that it was his desire to safeguard Tudor Place from the "machinations" of the real estate industry. The estate was made a national historic landmark in 1960, and is the first scenic easement donation to be made under terms of the 1935 Historic Sites Act. The easement allows the United States to prevent lands of the estate from being used for unseemly purposes, and also prevents incompatible changes in the appearance of the building.

Support for End of California Bounty System

After thorough study of California's recent voluminous Master Plan for Wildlife, prepared by the State's Fish and Game Commission, the Desert Protective Council, southwestern conservation organization, has indicated its support for the Commission's proposal to end the State's bounty system on coyotes, certain birds, mountain lions, and some other non-game species. It also has, among other findings, disapproved a proposal which would give the Commission authority to abolish game refuges, and another that would permit hunting in State parks.

Job Corps Project

During January the only National Park Service-operated Job Corps camp in an urban setting opened with an initial enrollment of 22 people who will receive basic education and teaching in vocational skills. Their "campus" will be 400 acres of bleak, seedy waterfront land in New Jersey across the Hudson River from Lower Manhattan; part of their mission will be to clean up and landscape the 400 junk-strewn acres as a first move toward establishment of a Liberty State Park, riverfront recreational and cultural complex which will be part of Jersey City's contribution to a cleaner Hudson River.

Dr. Leopold Honored

Dr. A. Starker Leopold, presently acting director of the University of California's Museum of Vertebrate Zoology and chairman of the Secretary of the Interior's noted parks ecological study group (the Leopold Commission) has been awarded the Audubon Medal, highest honor of the National Audubon Society, for outstanding achievement in the field of conservation.

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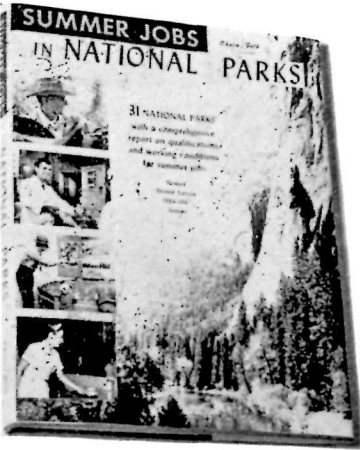
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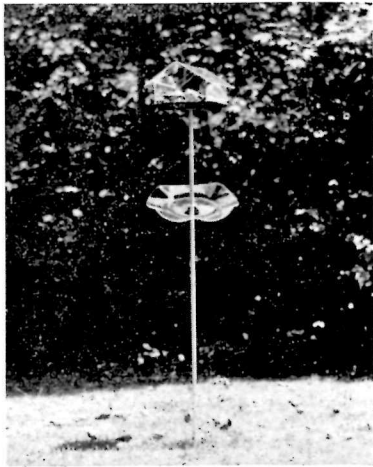


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THE CONSERVATION DOCKET

BY THE TIME THESE WORDS SEE PRINT THE first session of the 90th Congress, which convened January 10, will have been organized—that is, committee assignments will have been made, operating rules adopted, and party positions filled. Since all legislation being considered by the second session of the 89th Congress died with the close of that session, the process of committee hearings must commence anew for those measures which were in the legislative mill at adjournment; new bills to accomplish the purposes of the old must of course be introduced.

At this date, predictions as to new legislation of special interest to followers of national park system fortunes must necessarily be based on a survey of current conservation thinking in the nation's capital; granting the element of uncertainty, introduction of the following major legislation seems likely, which would authorize or create:

- A Redwoods National Park on the northern coast of California, of some 43,000 acres in Del Norte County (including about 25,000 acres of existing state redwoods parks) plus 1400 acres in a separate unit in adjacent Humboldt County. This is the so-called administration proposal. It is possible that proposals for a larger area, introduced as amendments to the administration's 89th Congress bill (the Metcalf and Saylor amendments) will also be re-introduced.

- A North Cascades National Park in Washington State of perhaps 700,000 acres, which might also add about 7000 acres to Mount Rainier National Park and at the same time establish several new and large wilderness areas in the national forests of the North Cascades.

- A Sonoran Desert National Park of nearly a million and a quarter acres in southern Arizona, which would include existing Organ Pipe Cactus National Monument, the Cabeza Prieta Game Range and some 80,000 acres of adjacent public lands.

- A Big Thicket National Park in East Texas of perhaps 75,000 acres to protect an outstanding botanical and zoological terrain.

- A Canyonlands National Park enlargement to nearly double its present size.

- A Kauai National Park on the island of Kauai in the Hawaii Archipelago, protecting nearly 100,000 acres. This possible park has been endorsed by both the National Parks Advisory Board and Secretary of the Interior Stewart L. Udall; it would protect some highly scenic beach, cliff, valley and canyon terrain supporting a superb native flora.

- Designation of Death Valley National Monument in southern California and Nevada as a national park, with abolition of existing mining activity.

- Designation of Glacier Bay National Monument in southern Alaska as a national park, with provision for elimination of existing mining rights.

- Creation of a Sleeping Bear Dunes National Lakeshore in Michigan. This proposal has seemingly become one of the conservation perennials.

- Creation of a 57,500-acre Apostle Islands National Lakeshore on the Bayfield

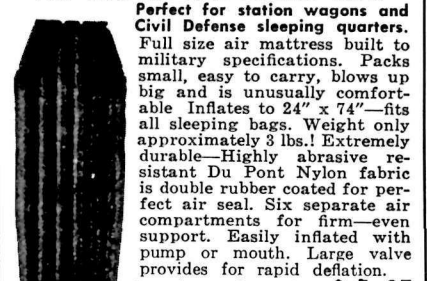
Peninsula of Wisconsin's Lake Superior shoreline. This reserve would protect a highly scenic and scientifically interesting mainland shore with adjacent islands; as proposed in the 89th Congress about 10,000 acres of Indian lands would be included.

During December the Secretary of the Interior published in the *Federal Register* an order temporarily regulating land use in Olympic National Park to prevent new or additional uses on inholdings—commercial or industrial development, or subdivision—except for single-family residences. The order is intended as an interim protective measure pending promulgation of a comprehensive land-use plan for the park.

Public hearings scheduled for the near future on legal wilderness in units of the national park and national wildlife refuge systems are: Lava Beds National Monument, February 17 at Tulelake, California; Wisconsin Islands Unit of the Horicon Wildlife Refuge, at Sturgeon Bay, Wisconsin, February 15; M. Hartley Dodge Unit of the Great Swamp Wildlife Refuge, Chatham Township, Morris County, New Jersey, February 17; and Bear River Migratory Bird Refuge, Bear River Unit, Brigham City, Utah, February 21.

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Reviews

THE ALIEN ANIMALS. By George Laycock. Natural History Press, Garden City, N. Y. 1966. 240 pages, illustrated. \$4.95.

Vivid accounts of the outcome of a dangerous game called "wildlife roulette" are presented by the author of this informative book, more as a warning to man "the supreme meddler" than for his entertainment. Nevertheless, the many episodes involving importation of such "exotic creatures" as the mongoose, starling, European rabbit, pigeon, Russian bear, and many others are fascinating.

Some experiments with foreign wildlife have been successful, from the sportsman's point of view at least, as in the case of the ringneck pheasant, which was transplanted from China to Oregon since prospering in many parts of the United States. Instances such as these, says Mr. Laycock, are a constant temptation to would-be animal movers.

Unfortunately, few importers stop to consider the lesson taught by the animal importations which have proven disastrous. Most notable, perhaps, of all the cases mentioned in this vein is the arrival and subsequent success of the street pigeon, ancestor of the rock doves of Europe and Asia.

In the final chapter of his book—after having documented many cases of wildlife importation, both successful and disastrous—the author sums up with a general statement of the practical dangers involved in the importation of exotic species. Such dangers include property damage, the spread of disease both to man and to native lesser animal species, and the gradual extinction of some native species through predation or territorial takeover.

Laycock states that the importation of exotic species is often not only dangerous to our natural inhabitants but is costly in addition; he suggests that funds once used for such ventures might be better spent in the encouragement and propagation of endangered native species. He says that, since often the decision to import or not to import falls on local and state fish and game authorities who have sporting constituents rather than ecological feasibility at heart, such decisions be "made by an international advisory board with representatives of all professional societies concerned with various classifications of wildlife". The suggestion seems to have great merit, and it is encouraging to note that, in a recent policy paper of the Interior Department, recommendations proposed in a study report by scientists of the Environmental Research Institute and the Conservation Foundation calling for "careful consider-



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ation of all circumstances before permitting foreign big game animals to be placed on public lands" have been accepted. This is but a small step in the right direction, and, as Laycock pleads, we must heed the lessons of the past when engaging in the dangerous and often irreversible game of wildlife roulette. —G.A.L.

A GEOLOGIST'S VIEW OF CAPE COD. By Arthur N. Strahler. The Natural History Press, Garden City, New York. 1966. 115 pages in hard cover, illustrated. \$4.95.

The formative period of the Cape Cod National Seashore in Massachusetts was a time of collaboration among many kinds of people—conservationists, botanists, geologists, some landowners, bulldozer haters, and others not so easily classified by profession or avocation.

The geologists in particular saw in the Cape a fragile sandy appendage to the somber old rocks of the New England hinterland; a dumping ground for the rock debris brought by the Pleistocene ice from farther north; all told, a fine cross-section of Wisconsin glacial history complete with most, if not all, the features appropriate to an outdoor glacial geology laboratory.

The geologic work of the moody Atlantic was also to be considered; since the Wisconsin ice decayed, ocean waves and currents have been clawing at the Cape like a scavenger chewing at the carcass of a mammoth.

Now the national seashore is a reality, and Arthur Strahler of Columbia Uni-

versity has taken the geological facet of the Cape's natural history story in hand and has clothed it with meaning for the serious seashore visitor (but not, probably, for the "casual visitor" hopefully mentioned in the dustjacket blurb). The volume tells, with a minimum of geologists's jargon, the manner in which the Cape was born, what is happening to it today, and its geological prospects for the future. —P.M.T.

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Bureau of Land Management: James E. Lee

A desert scene on the public lands near Las Vegas, Nevada.

SCATTERED ABOUT the nation's still-vast public land holdings are many areas well worth protection for outdoor recreation, public education, scientific study, or combinations of these. The nature of the public lands is as varied as the face of America; the photograph above, for example, shows typical desert country near Las Vegas, Nevada, with the Red Rocks, under consideration for a large recreation complex, in the background.

THE NATIONAL PARKS ASSOCIATION takes an interest in the protection of such outstanding bits of the public lands, feeling that they might one day constitute a system complementary in purpose to our great park, forest, and wildlife refuge systems. You can assist your Association in following the fortunes of the public lands, which are today much in the public mind, by contributing to its general funds over and above regular dues; by helping to secure new Association members; or by remembering the Association in your will. All dues over and above basic annual dues, and all contributions, are deductible for Federal income taxation, and gifts and bequests are deductible for Federal gift and estate tax purposes.

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