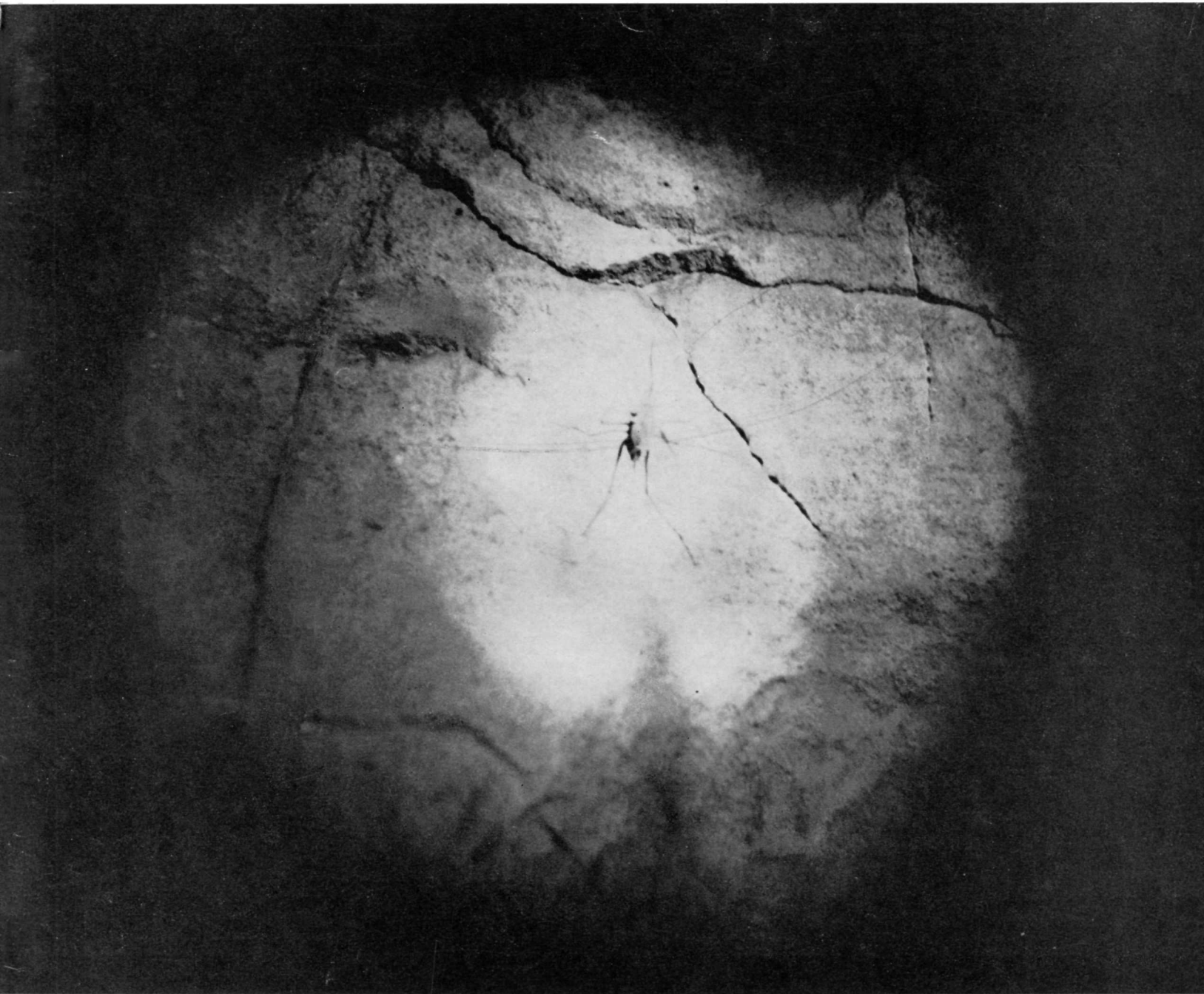


NATIONAL PARKS *Magazine*



In a lightless world, there is little need for color:
unpigmented cricket on gallery wall, Mammoth Cave National Park, Kentucky

February 1966

Potomac Tragedy

THE GREAT OPPORTUNITY TO DEVELOP a Model Program for the Potomac has been thrust abruptly aside.

The Interim Report of the Inter-Agency Task Force on the Potomac, submitted early in January to the President, cannot be considered as a Model, or as looking toward a Model.¹

Nor will it have the support of the powerful consensus of conservation, farm, labor, and citizens' organizations which has been working for such a Model for years.²

A TRUE MODEL PROGRAM WOULD HAVE started with the President's injunction, given months ago, to "clean up the river and keep it clean."³

This mandate was powerfully reinforced by the President in his State of the Union Message, in which de-pollution was made the keystone of river basin management.

The Interim Report, while it quotes the instructions, fails to honor them, recommending merely that secondary treatment of municipal and industrial waste water be installed throughout the Basin; whereas the complete renovation of all such water is the order of the day; renovation will permit recycling everywhere, and multiply water supplies many times over on their way to the sea.

Renovation and recycling through the fresh-water estuary of the Potomac are the answer to Washington's emergency and supplemental water supply problems throughout the foreseeable future.

This was the conclusion of the Sub-Task Force on Water Quality in its report to the Inter-Agency Task Force.⁴ A possible time-lag of 20 years was visualized in the Water Quality Report; but it recommended lower-estuary disposition and dispersal of treatment plant effluents if necessary in the meantime.

In our opinion there need be no such lag. The President's science advisor has said that renovation and recycling through the estuaries is the proper water supply approach now for the coastal cities.⁵ Numerous other competent studies prove that the technology is sufficiently available.⁶

Moreover, as studies by the Geological Survey show, there has been no water-supply emergency at Washington during the present four-year drought. The flow of the River has not dipped to anything like the low point of 1930-33; nor is it likely to do so in the future, because many good conservation measures have been taken upstream to stabilize croplands and watersheds.

We are pleased with all these conclusions as to the feasibility and desirability of renovation and recycling through the estuary, having advanced the proposal several years ago against considerable skepticism.⁶

DISREGARDING THE RECOMMENDATIONS of its own Sub-Task Force, however, the Interim Report proposes four major dams on the upper tributaries as "drought insurance" for Washington during the imputed interval of possible technical lag.

These recommendations of the Report, in our judgment, are based on a timorous adjustment to pressures from the Army Engineers, and not on a scientifically sound analysis of the situation, nor on any genuine need.

No doubt these erroneous results were inevitable when the re-study of the water supply and flood control problems was turned over to a Sub-Task Force under the Chairmanship of the Army Engineers; it is almost incredible that such a serious blunder should be made at the outset of the review requested by the President.

It is nonetheless true that when the President asked that the original Army Engineers' Report be reviewed, and that a Model Program be submitted to him for consideration, the responsibility was referred back immediately in that manner to the Army Engineers.

A TRUE MODEL PROGRAM, WHILE PRESENTING, as the Interim Report does, what is otherwise in many respects an excellent group of proposals for parks, recreation, and the protection of natural beauty, would have shown more concern about the natural recreational opportunities, and the beautiful stream valleys, which the big reservoirs will destroy.

The Report rejects the proposed Seneca dam near Washington for the present, but leaves open the possibility that with shifts in political winds the project may be revived. The area above Seneca is to be preserved by acquisition, easements, or otherwise, but for the wrong reason, reservoir site pre-emption.

The park and recreation proposals of the Report are in general attractive and will doubtless have widespread support. There will be a broad agreement that the old C & O Canal and appurtenant lands should be preserved in perpetuity as a National Historical Park. There may be more doubt about the scenic parkways, several of which are proposed; the nation may be losing interest in big highway construction, including parkways.

The Report proposes the Cacapon as a wild river, in addition to the portion of the lower Shenandoah which is in the present Wild Rivers Bill. But the main problems in the protection of the wild rivers are the big reservoirs and pollution; the entire Potomac should be a wild river, save for the small headwater impoundments of the soil conservation type which are needed for flood and siltation control, settled agriculture, and occasional urban and industrial enclaves.

But the problems at this point are largely budgetary; these recreational features will have to be developed mainly by the states, and financed from the Land and Water Conservation Fund, which is inadequate even for presently authorized projects. There might be a chance of getting special appropriations if great savings could be effected by dropping the major dams. But otherwise the plans for the parks and green spaces may die as plans on paper.

The President asked for a swimmable river. The Water Quality Report found pollution by surface run-off a problem, and that correction will be very expensive. We have doubts about these cost estimates, but probably the price will be high, and money must be saved elsewhere. It can be saved only by rejecting the major dams.

THE PRESIDENT IS RIGHTLY CONCERNED with budgetary economies. The Interim Report is a budgetary disaster.

This Interim Report proposes to spend \$85 million to begin with on big dams which are not necessary. Additional dams costing \$25 million were given sympathetic consideration. Another \$115 mil-

(continued on page 19)

¹ Potomac Interim Report to the President, Federal Interdepartmental Task Force on the Potomac, January, 1966.

² See *Summary of a Model Program for the Potomac*, A. W. Smith, National Parks Association, November, 1965.

³ Progress Report, Sub-Task Force on Water Quality, November 1, 1965.

⁴ Statement of Dr. Donald F. Hornig, Director, Office of Science and Technology, Executive Office of the President, before the Senate Interior and Insular Affairs Committee, September 8, 1965.

⁵ See *Report on Present Status of a New Simple Low Cost Coal Sewage Treatment*, E. R. Fosdick, National Parks Association, December, 1965.

⁶ *Analysis of the Potomac River Basin Report of the District and Division Engineers, U. S. Army*, A. W. Smith, National Parks Association, June, July, 1963, June, 1964.



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Potomac Tragedy: An Editorial	2
The Unseen World of Kentucky's Mammoth Cave	Jean Speiser 4
A Sleeping Bear Dunes National Lakeshore	Henry A. Raup 10
Shasta: Tepee of the Great Spirit	Weldon F. Heald 15
Sound of Wings (A Poem)	Paul F. Long 18
News and Commentary	20
The Conservation Docket	22
Reviews	23

Front cover photograph by Jean Speiser

In explaining the excavation of caverns like Mammoth in Kentucky, the textbook writers have always found it easy to say merely that percolating groundwaters have gained access to the underworld through dissolution of the limerock along joints and breaks in the stone, to create in time the caves and caverns that today delight visitor and speleologist alike. Essentially, the text-writers are on safe ground. But geologists have long been puzzled over the way in which water gained underground access in the first place; some of our great caves have formed beneath tiny cracks in the rock which are, investigation has shown, nearly as impervious to water as the solid limerock itself. Whatever the starting mechanism may be, it is a fact that some caverns—like Mammoth cave—are habitat for an assortment of animals, strange to the visitor from the outer world, which has adapted to a lightless life.

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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NATIONAL PARKS ASSOCIATION, 1300 NEW HAMPSHIRE AVENUE, N. W., WASHINGTON, D. C. 20036

THE UNSEEN WORLD OF

Eyeless fishes, non-pigmented crickets and dancing spiders are among the animals to be found in the dark underground galleries of an Eastern national park.

THERE IS A LARGE, BUSTLING, BUT almost totally blackened underground community in Kentucky's Mammoth Cave National Park of which few visitors are aware. Its inhabitants are quiet creatures that save their energy for survival rather than for show. Most of them have no need to make sounds, and their cavern homes are silent. They have no need of coloration for protection from light, for there is no light in this underworld. The cave creatures

have long ago lost their pigmentation, and have become pale, or transparent. They move around like white ghosts in the darkness of the cave, and all but the most perceptive humans are likely to miss them.

Above the silent cave trails, on the surface of the park, visitors may glide softly down the Green River, the park's most important stream; study the sinkholes, those peculiar signatures of dissolution that pit the rolling lowlands of

Kentucky; photograph the large and small mammals and many birds which enliven the oak and hickory forests; or search for blue and white violets, crested blue iris or the hepatica which color Kentucky's spring and summer.

But inside Mammoth Cave, formed over the ages by the slow erosive processes of nature, there is another world. Cave explorers, searching with official permission the remote galleries in the uncertain light of the lantern, have often come across the remains of men and other animals trapped in the cave by carelessness or fate. The things they have left behind—their bones, sometimes whole skeletons perfectly preserved with hair and teeth—are visible; examples are to be seen even along the electrically-lighted trails travelled by the casual park visitor. One can see their dust and examine the tools and clothing they left behind; but these are relics of a time gone by. Community life that goes on in the cave is concerned only with the today, and if the visitor is willing he can cultivate a closer acquaintance with the animals that flourish in a dark world: blind-fishes and crayfish; cave crickets and spiders; the little brown bat and the cave salamander. These animals are quite small, a characteristic of all cave inhabitants. The fishes and the salamander are perhaps the largest of the truly indigenous animals—sometimes they attain a length of eight inches!

The colorless blindfishes of Mam-

Department of Interior photograph



Two little brown bats, part-time residents of Mammoth Cave's galleries, are photographed in upside-down resting position on cave wall.

KENTUCKY'S MAMMOTH CAVE

By Jean Speiser

moth Cave's Echo River were first found by scientists more than a hundred years ago. The fishes were trapped there, it is believed, during late Pleistocene time when glacial meltwater from the north began to diminish in volume; over the course of countless generations the animals very slowly lost the use of their eyes—for eyes are useless in a lightless cave. Today some species of blindfishes have small bumps on their heads where once there were eyes. Other species of fishes, also found in cave water, possess both color and eyes; these animals spend part of their time in waters outside the cave.

Among the blindfishes there has been a compensation for the loss of one of the senses. The animals possess extremely sensitive nerve-endings that alert them to any change in their environment. Should an insect happen to approach—or even if a smaller fish of the same species moves into the immediate vicinity—a blindfish swims unerringly to the prey and eats it.

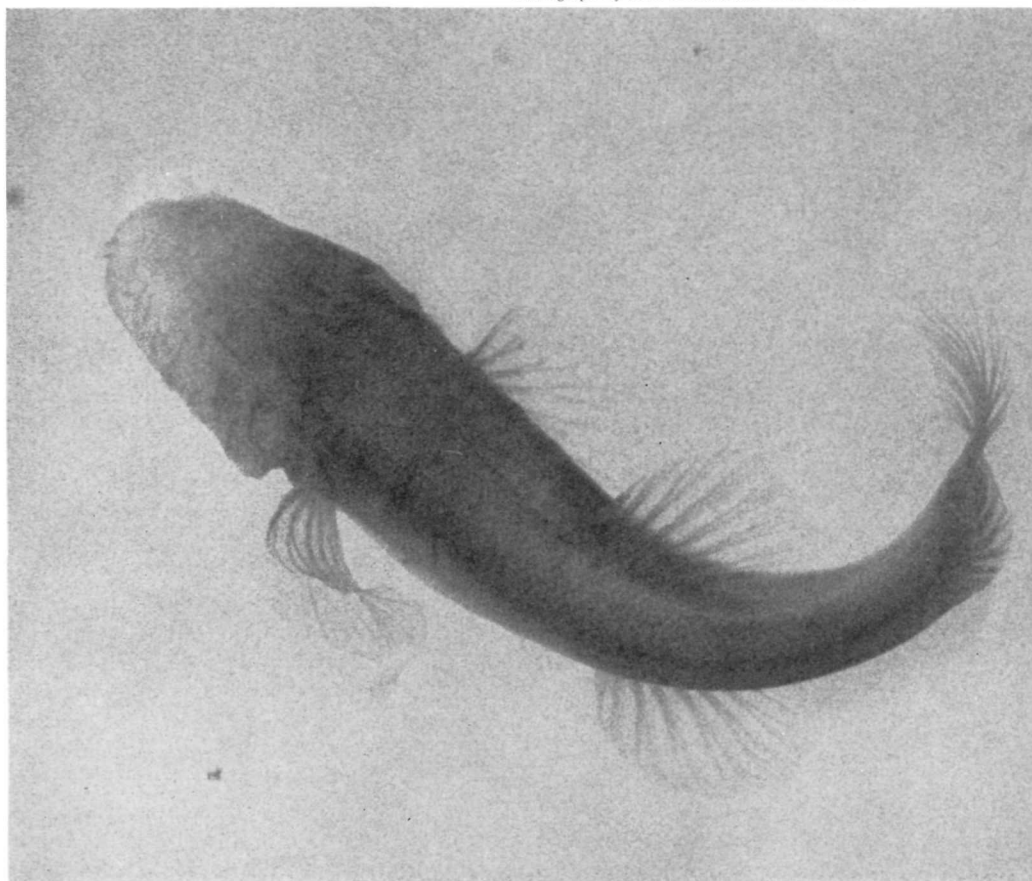
The blind crayfish of Mammoth Cave also has highly developed senses of feeling and smell, and can detect the slightest variation in the movement of the water in which it spends most of its time; it flees at the slightest ripple, or the spoken word that creates a sound-wave. So far as known the Mammoth Cave crayfish does not eat its own kind but exists on insects which are the descendants of those trapped in the cave ages ago. Insects also may be

brought into the cave by the little brown bats; these do not spend all their time in the cave but venture into the outer world for short periods.

The insect life of the cave is not easy to find, and may best be discovered off the beaten trails among the damp rocks. Even there one must look closely, for the cave insects are very small. Investigation may reveal a minute brown beetle, a white spider or, on one of the walls perhaps, a colorless

cricket, impressive for its preposterously long antennae. The animal uses its antennae in place of the eyes of outer-world animals—to “see” where it is going. In the light of an electric torch the cricket will stand perfectly still; on the other hand, the spider will very likely “dance.” For the most part cave animals are solitary in habit, possibly because of the difficulty in communicating with one another. But every now and then the dancing spiders—which

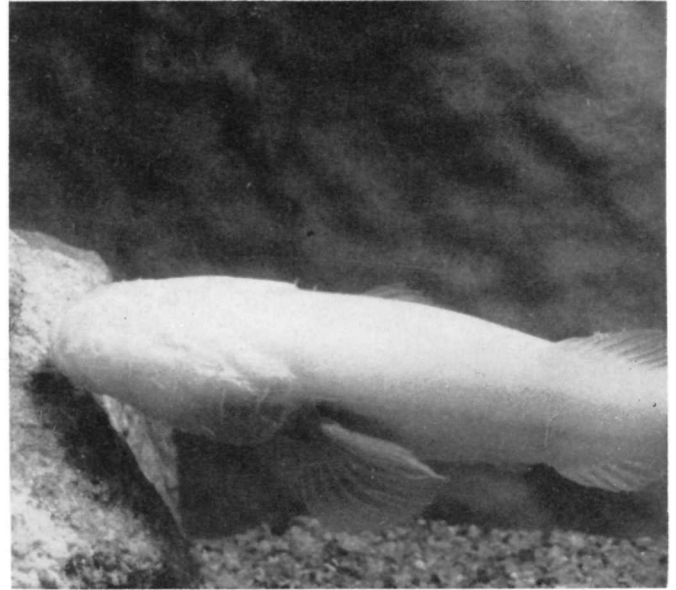
Photograph by John Howard and T. L. Poulson



A top view of Amblyopsis spelaea, one of the Mammoth Cave blindfishes. This particular species lives in Roaring River's deeper waters.



Photograph by Charles E. Mohr and T. L. Poulson



Photograph by John Howard and T. L. Poulson

At left, a cave fish having eyes and skin pigmentation, indicative of part-time residency in waters outside cave. At right, a lateral view of cave blindfish. Large head is characteristic of fishes living in total darkness; absence of eyes is compensated by delicate vibration receptors that enable animals to locate prey and avoid obstacles in black habitat.

resemble the daddy-longlegs of the upper world—will, in the panic of unaccustomed light, group together and wind their long, spindly legs about one another in a tangled maze.

Now and then the visitor may come upon a cave snail, undersized and sluggish. Movement of all the cave animals is relatively slow, since the prevailing temperature is a fairly constant and cool 55 degrees. Above-ground the air may be humid with the portent of an oncoming thunderstorm, or the cicada may be sawing away endlessly with its prediction of a long spell of hot weather. But the cave is cool, if breezy from the countless vent-holes that communicate with the outside world. Such freedom from radical changes in conditions make a haven of the cave for the tiny bits of life that have made so many adaptations in order to exist. Cave creatures may neither see nor hear; but at any rate equilibrium is assured in at least one area—that of weather.

There is a notable exception to this happy state of affairs weatherwise; flood-time, which ordinarily occurs in spring. Melting snow, overflowing the Green River into nearby sinks and rocky caves, raises the level of the region's groundwaters, creating wild changes within Mammoth Cave. Dry,

powdery underground passages become swiftly-flowing rivers of muddy water, bearing along a variety of animal passengers from the "outside." The bones of groundhog, squirrel, opossum, beaver, coon, cat, goose, and turtle have been found within the galleries of the cave; while nearer the cave entrances the remains of larger animals swept in by floodwaters have been discovered—deer and fox from nearby forests, and even bear.

The Little Brown Bat

One of the most interesting inhabitants of the cave is the little brown bat. It seems the most "alive"—but by no means the most lively—of all the cave-dwellers, for it spends a large part of its time sleeping, hanging to cave walls upside down by the toenails. Mother bats carry their young with their teeth or toes as they fly, and when they sleep.

During the cold months of the outer world the bats go into hibernation in certain parts of the cave. Because the body temperature of the bats—and of all hibernating mammals—usually closely approximates the temperature of the air about them, the heart-beat of the little brown bat becomes hardly discernible, and it seems not to breathe. Its energy is only slightly above the zero mark, and the animal may remain

in this condition for weeks. Upon awakening the bat stretches its wings, which are actually membranes between the "fingers," and off it goes in search of insect life.

The bat is guided in flight by its built-in "radar"; it is always "instrument" weather inside the cave. As it wings through the darkness it emits high-pitched squeaks, too high for the human ear to detect. The sound-waves rebound from wall and ceiling and from rocky obstructions in the cave, and are apparently monitored constantly and almost instantly by the bat. Veering swiftly this way and that, "sounding out" its flight course, the bat avoids collisions and secures prey in a manner marvelous to those unskilled in the use of natural radar.

Then there is the cave salamander which, like the bat, lives part of its life inside the cave and part outside. The tiny animal is often about the color of the sandy cave floors, mottled or spotted. It is quite active, and will stand still in the light of an electric torch only to dart away as soon as the light is extinguished.

The true Mammoth Cave salamander is blind; it has fragile legs, for it does not travel far. The head is actually larger than the body. It, also, depends upon its sensitive nerve-endings, feel-

ing its way about in a pitch-black habitat, living on insects brought in by the little brown bats or floated into the cave by high water.

After long centuries of existence in the gloom of Mammoth Cave, animal life has become more delicate and sensitive to change than its outer-world counterpart. The typical cave animal can not withstand large fluctuations in the force or temperature of pool or river waters. When events of this sort occur, disaster follows.

On the other hand, cave animals are better equipped to cope with lean diets and semi-starvation. They are all small, with low energy demands; furthering chances for survival is their ability to take what may offer itself in the way of food, unfamiliar though it might be.

Having adapted themselves to a

world perpetually without light, the true cave animals can not stand the direct rays of the sun. Blind and semi-blind species will die after prolonged exposure to light—even a few minutes of sunlight are fatal to mites and springtails. Sensitivity to sunlight seems to be directly proportional to size—larger cave animals are better equipped to cope with direct light than smaller.

A number of human animal relics have been discovered in Mammoth Cave, also—some in reasonably well preserved condition. The most famous mummy was discovered with body remarkably well preserved by the dry, constant atmosphere of the cave; death had occurred some 2200 years ago. When removed to the sunlight, the remains were attacked by fungus, and a government appropriation hastily

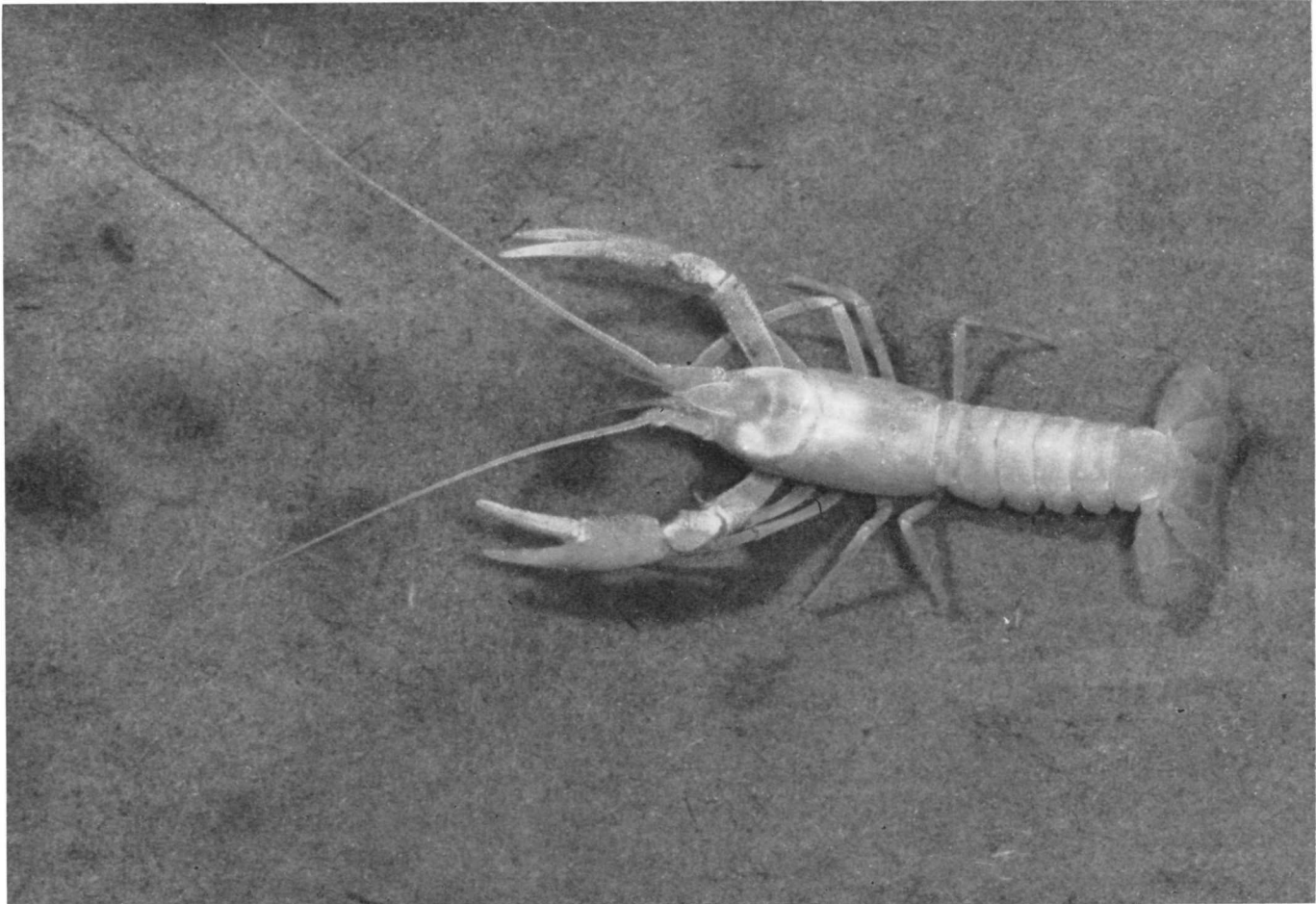
produced the funds with which to preserve the relic in the form it was found. Visitors now may see the mummy in a glass case within the cave.

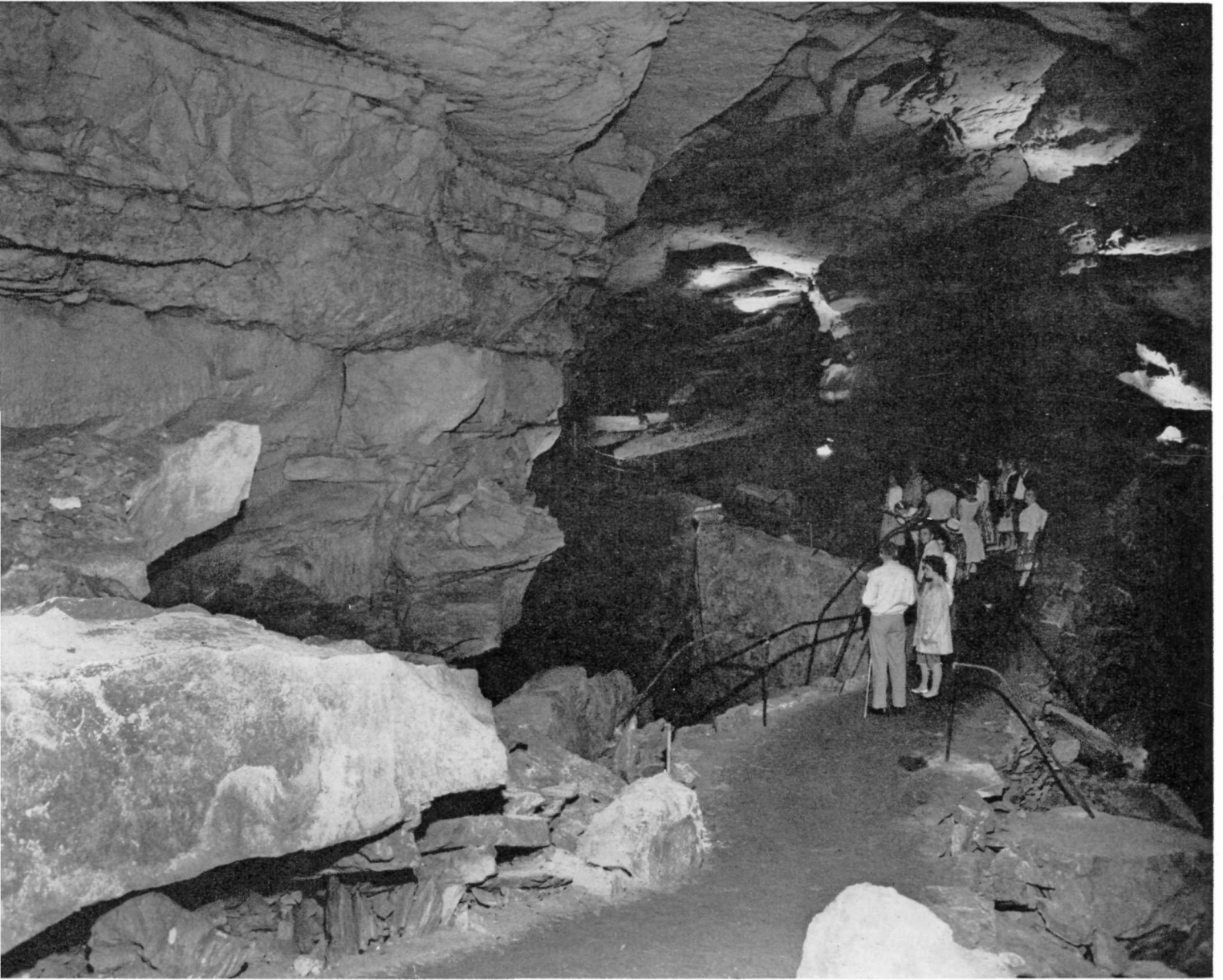
This particular reminder of earlier cave life was a member of an Indian tribe that lived inside one of the cave entrances. He apparently had ventured some two miles into the cave galleries on a gypsum-hunting trip. Exactly why this mineral was so highly prized by the Indians of the vicinity is not known—perhaps good specimens of so-called “cave onyx” were valued for ornamental purposes. In any event, the gypsum came at a high price for this particular Indian. He had apparently tipped a five-ton boulder while chipping away at the gypsum and had been pinned beneath the rock, to be found more than twenty centuries later.

The galleries of Mammoth Cave owe

The almost-transparent Mammoth Cave crayfish has, like some of the blindfishes, lost both sight and coloration, but has been compensated for the losses by extraordinary development of its senses of feeling and smell.

Photograph by John Howard and T. L. Poulson





Department of Interior photograph

A group of visitors pauses on a narrow Mammoth Cave trail to inspect some of the Cave's interesting rock formations. There are six organized trips available for park visitors, ranging from one and a half hours to seven hours. Groups of visitors may view the Cave's features from the trails, or from flat-bottomed boats on the three-hour ride on Echo River. Highlight of the Echo River trip would be the sighting of a cave blindfish. Should the ranger in charge of a guided tour detect one of the other tiny animals of the Cave—an unpigmented cricket or a dancing spider—he will very likely pinpoint the creature with his flashlight for the group to inspect.

much of their beauty and mystery to the presence of calcium sulphate, or gypsum. "Blisters" or "snowballs" of the mineral appear on the walls and ceilings of some galleries as ribbons, streamers, feathers and flowers; as spikes and spines, leaves and petals. Gypsum growths are found in the greatest profusion and greatest beauty in the drier parts of the cave. There are many dead-end passages where air currents are at a minimum, and here gypsum "blooms" unseen save by persons having official reasons or sanction for their visits. Streamers fifteen to eighteen inches in length wave gently back and forth like spindly banners in the slight air currents produced by the heat of a flashlight. The crystal growths are often contaminated by iron salts to produce multi-hued brown and white blooms utterly unlike the flowers of the upper world. New blooms "grow," and sometimes burst into cottony rosettes—but whatever the form, each is unique and entirely unexpected.

On a chilly winter day this flowery exhibit is almost duplicated above-ground. Looking down upon one of the vents that leads from meadow or forest into the cave one may see "frost flowers" produced by the precipitation

of moisture from temperate cave air by the cold above-ground air. Present also in the cave are many fine examples of travertine stalactites, stalagmites, and columns, all formed by the slow drip of water from the cave ceiling.

A Wide Choice of Tours

Guided tours through any of six different routes within the cave are conducted daily; the number and length of such trips varies with the season. Fewer trips are scheduled during the winter months of mid-October to mid-April. Children under twelve are not permitted on tours unless with an adult.

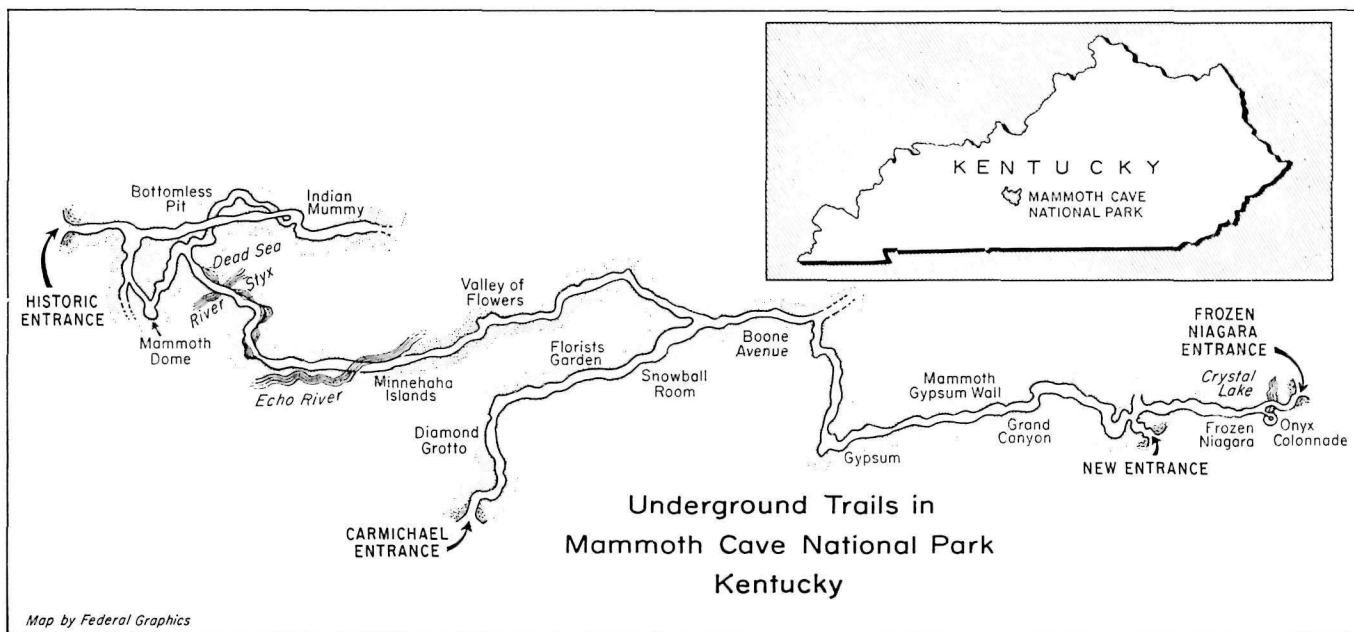
Many of the cave trips are strenuous, particularly the four and a half hour scenic tour from Carmichael Entrance to the sparkling Diamond Grotto and then to some of the cave's best-known formations: the travertine draperies of the seventy-five-foot high Frozen Niagara; Crystal Lake; and the colorful, winding passageways of Boone's Avenue. Some sections of this passageway have walls over fifty feet high; in some places the visitor can touch both walls with arms outstretched. Many historic features of past cave exploration are also seen along the trails.

The forests, animals and birds; the

frost flowers; the gypsum streamers; the bones and dust of long-gone yesterdays; the silent, colorless creatures of the dark within the great cave—all of these are part of the more than 50,000 acres of Mammoth Cave National Park, to be savored by the visitor of lively curiosity and keen eye.

An editor-emeritus of the *Louisville Times* once wrote of this part of Kentucky's limestone country that "the terrain is without grandeur, but it is not without great beauty." Less than two decades ago the Corps of Engineers proposed a dam below the park which would have backed water into the underground streams of Mammoth Cave and would have submerged a large part of the park's above-ground area. Gone would have been the habitat of the strange, blind creatures of the cave, their gloomy, crystal palace submerged in mud; gone, likewise, the surrounding countryside, "a superb land and water habitat." The people of the region, and people all over the country, said no, firmly; and today there is a steady stream of visitors at Mammoth Cave, who arrive to see and feel a thrilling pageant of natural history in one of the nation's most interesting preservations. ■

Many miles of underground trails are open for hiking, climbing, or boating in Mammoth Cave. Lowest point open to visitors is Echo River, 360 feet below land surface. Largest known dome is Mammoth Dome, which reaches a height of 192 feet above cavern floor.





*On its way toward Lake Michigan
the Platte River offers quiet boat
trips through marsh and forest.*



National Park Service

THE SLEEPING BEAR DUNES NATIONAL LAKESHORE

By Henry A. Raup

SOME TEN THOUSAND YEARS AGO THE massive continental ice sheet that had dominated the northern third of our present nation for nearly a million years melted and retreated northward. The presence of the Pleistocene ice had brought profound changes to the landscape of interior North America. Terrain which formerly had been rugged, stream-eroded hills underwent a general leveling—not by removal of earlier peaks, but rather by the filling of lowlands with glacial debris. It was during glacial times, too, that our modern Great Lakes were formed by a combination of extensive ice scouring, depression of the earth's crust by the

tremendous burden of ice, and by the occasional damming of meltwaters by moraines—long piles of rock and gravel debris dropped by the melting ice.

These major characteristics of the landscape of the north-central United States come together in the northwestern corner of Michigan's Lower Peninsula, where the Sleeping Bear Dunes National Lakeshore is being proposed as a new national preserve. Establishment of the lakeshore would save for Americans a fine example of glacially deposited terrain, a significant strip of scenic Great Lakes shoreline, and outdoor recreational and educational opportunities of the highest order.

Two separate but related elements are responsible for the molding of the Sleeping Bear landscape: deposition by receding glaciers and the later reworking and deposition of the rock debris by Great Lakes waters. While a number of glacial expansions and contractions have passed over northwestern Michigan, only part of the most recent Pleistocene stage—the Wisconsin—has directly affected present-day terrain; for the Wisconsin ice completely obliterated the features laid down by earlier glaciers.

The results of Wisconsin glaciation in the Sleeping Bear area are significant and impressive, and the proposed lakeshore contains a wide assortment of glacial deposition relics. The heavily-rolling topography, dominated by the strong ridges of recessional moraines; rolling interlobate moraines; the pitted appearance of depressions and knolls, and the poor, often swampy drainage

National Park Service photograph: Jack Boucher

The beautiful Sleeping Bear shoreline of Michigan's lower peninsula retains the imprint of the retreating ice which shaped it during the closing stages of the most recent continental glaciation. From atop a lesser moraine near Glen Lake, left-center in photograph, one looks north toward the heavily-forested southern slopes of the great Sleeping Bear Moraine on the skyline, beyond which are the still-active Sleeping Bear Dunes and the waters of Lake Michigan. Middle mainland unit of the proposed lakeshore.

patterns are all typical of landscapes of glacially-deposited origin.

Keystone for the Sleeping Bear region is the snake-like Manistee Moraine, formed during a period of temporary stagnation of the ice front. This great ridge, 250 to 300 feet high, was built along a stationary ice margin which resulted from equalization of ice flow from the north with the rate of melting in the south. Debris carried by the glacier was deposited along the outer margin of the ice to form this "end moraine." The ice responsible for the development of the Manistee Moraine was actually composed of a series of fingers, or lobes, projecting from the Lake Michigan ice mass; and marginal moraines were deposited wherever two lobes came together. As a result, a second dominant topographic feature of the Sleeping Bear region is the presence of "interlobate" moraines, shorter morainic ridges which are perpendicular to the Manistee Moraine and extend out to the headlands of the region, contributing to the scalloped effect of the shoreline. Thus Pyramid Point, Sleep-

ing Bear Point and Betsie Point each mark the position of an interlobate moraine. As assortment of other glacial features, such as irregular ground moraine, ice-block lakes, and outwash channels all contribute to the glacial diversity of the landscape.

The Post-Glacial Landscape

At the conclusion of Wisconsin glaciation, the shoreline of the Sleeping Bear region differed considerably from that of the present. The interlobate moraines formed long, narrow peninsulas, separated by deep embayments of the post-glacial Great Lakes. Erosion and deposition by Lake Michigan have since worked on the shoreline to wear away the morainic headlands and fill in the embayments. As a result, the shoreline is now much smoother than it was immediately following glaciation. The embayments, especially at the head of Good Harbor, Sleeping Bear and Platte Bays, are the only lowland areas of the Sleeping Bear region. The major lakes, including Glen Lake and Platte Lake, lie within such low embayments.

Most striking of the regional features, however, are the high perched sand dunes just south of Empire, at Pyramid Point, and the Sleeping Bear itself. The major dunes are closely associated with the interlobate moraines and their headlands. Where these glacial ridges meet Lake Michigan they have been exposed to continual attack by waves and wind, which have eroded the headlands into steep bluffs some 300 to 400 feet high. Cobbles and gravel have been sorted out of the jumbled debris of the moraines and washed along the shore. Lighter sand particles have been blown by the westerly winds up the face of the escarpment and over the tops of the moraines, where decrease in wind velocity caused dumping of the sand. Additional sand came from the tops of the bare moraines themselves.

The extent of dunes in the Sleeping Bear region is deceiving. Not only are exposed, active dunes and "blowouts" present, but there are extensive dunes now covered and stabilized by deciduous forests. Occasionally an upset in

Some of the recently active dunes of the proposed lakeshore are partly clothed by beachgrass and cottonwoods.

National Park Service photograph: Jack Boucher



the ecologic balance of the forest provides an opportunity for renewed activity of the dune. Active dunes, particularly the Sleeping Bear Dune, are continuing their march downwind, encroaching on the lakes and forests to the east.

Due to the considerable topographic diversity resulting from lake and glacial action, there is a great variety of vegetation in the Sleeping Bear area. The upland, morainic sections support northern hardwoods, of which sugar maple and beech are the most common species, and small areas of climax forest remain. The poorly drained morainic depressions and lakeshore embayments contain various bog associations, while the sterile sandy areas support species such as pines, oaks and aspen, which are more tolerant of the general dryness of soil. Ecological succession is demonstrated in many places, where there are gradual vegetational transitions from bare dunes to dense forest.

The high shoreline bluffs and extensive dunes of Michigan's Sleeping Bear

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region offered little encouragement to early visitors. Since there were few good harbors or docking areas, settlement tended to by-pass Sleeping Bear Point. South Manitou Island was a different story, for there a fine harbor on the east offered refuge in stormy weather. South Manitou became a regular stopping point, with its forests providing fuel for steamboats and its soils providing agricultural produce.

Settlement on the mainland at Empire, Glen Arbor, Glen Haven and elsewhere generally got started during the 1850's and the communities grew slowly. Logging and agriculture served as the foundation for the local economy, although neither activity ever became as important here as elsewhere in Michigan. Nearby hardwoods were cut for steamship cordwood, as well as

for lumber for other Great Lakes ports.

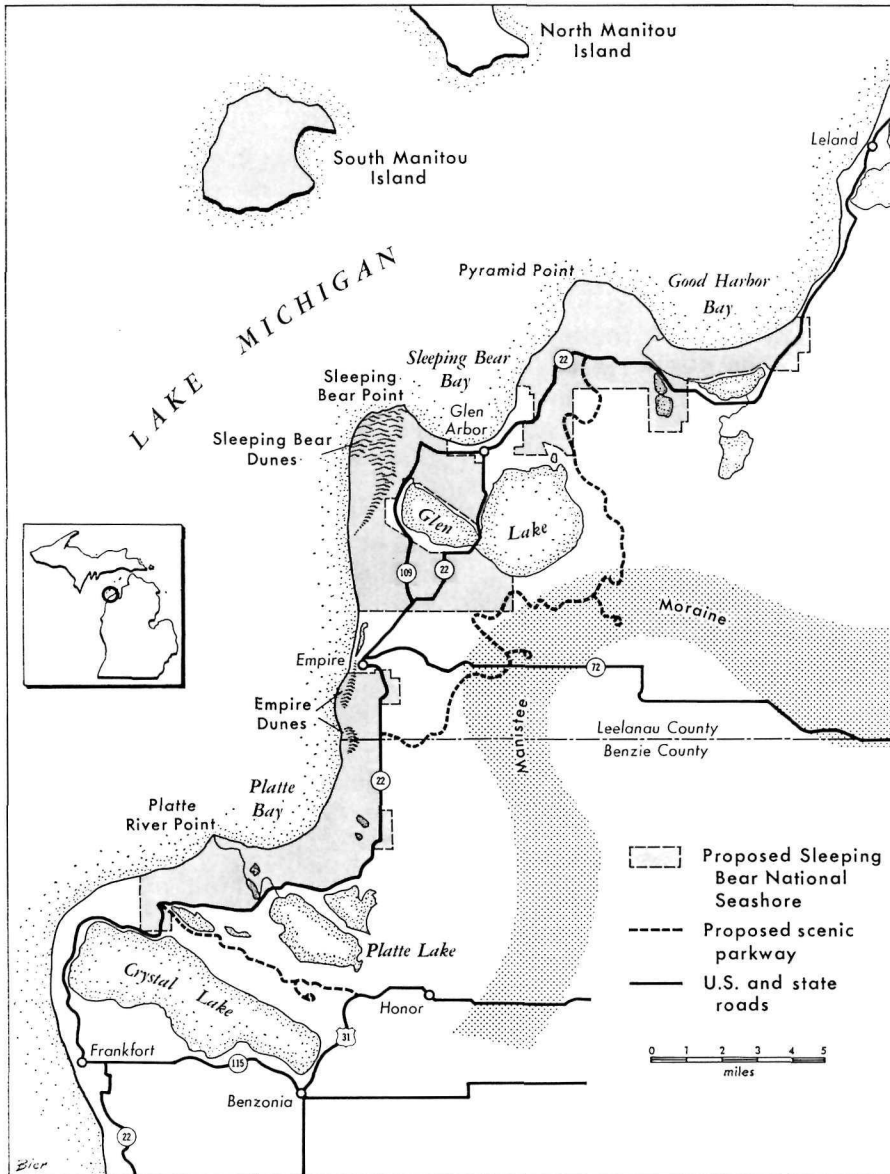
For the most part, the soils of the Sleeping Bear region are not of high agricultural quality, and the thin soils coupled with climatic limitations have resulted in a marginal agricultural situation. Fields which were carved from forests with nineteenth-century optimism are being abandoned in the twentieth-century race for greater acre-production. Production of sour cherries in a narrow coastal belt is the only important exception to a pattern of limited agricultural operations.

Even while logging and agricultural expansion continued, the first recreational visitors were arriving to see the Sleeping Bear Dune, the inland lakes and other regional scenic attractions. In common with most Lake Michigan resort areas, these turn-of-the-century visitor centers did not attract people like the transient recreationists of today, but rather summer people who came for the season, often by boat, from Chicago, Milwaukee and Detroit. The resort business continues today, with some 1500 summer cottages hav-

The headland dunes of Sleeping Bear Bluffs advance along a long front west of Glen Lake.

National Park Service photograph: Jack Boucher





ing been constructed around nearby lakes. While improved transportation has made the Sleeping Bear area accessible to the one- or two-day visitor, it is still the summer cottager who is most important to the local economy. Unfortunately, there is often a decided over-crowding of cottages, with resulting despoliation of the very scenic landscape which first attracted attention to recreational possibilities of the Sleeping Bear.

During the summers of 1957 and 1958 the National Park Service, in response to increasing public need for more lakeshore recreation areas, undertook an extensive survey of the Great Lakes shoreline in order to pinpoint sites of present and potential recrea-

tional value. Only five sections—including the distinctive Sleeping Bear region—along our “inland seas” were considered to be of national potential for the purpose.

A proposal for a national lakeshore—national seashore, as it was then called in the Park Service report—in the Sleeping Bear region was first introduced in Congress in 1961; it has since undergone much discussion and revision. Current planning looks toward a 51,000-acre lakeshore, incorporating many of the significant regional characteristics, along the shore from Good Harbor Bay to Platte River Point, and on the relatively secluded South Manitou Island. The three mainland sections of the lakeshore would, under National

Park Service plans, be tied together with a thirty-mile scenic parkway utilizing stretches of existing state highways as well as additional parkway to be constructed. Conservationists generally favor the lakeshore idea, but many of them are far from enthusiastic about the parkway, which would consume some sixty-five percent of the total funds needed for land acquisition and subsequent development for public use.

Boundary Adjustments

Severe restrictions in the lakeshore boundary are made necessary by the location of cottage areas and communities at Glen Arbor, Empire, and around several of the larger lakes. The presence of a developed resort economy in the Sleeping Bear area has generated considerable local opposition to the preservation idea. From the outset, local and summer residents have objected to the lakeshore proposal, and there still remains a great deal of local antagonism. Such opposition is reminiscent of the argument over establishment of the Cape Cod National Seashore several years ago. With the Sleeping Bear proposal, however, there is Cape Cod to serve as a guide in the necessary preliminary spadework, and also as an example of the success of this kind of recreational-preservation idea. Plans for Sleeping Bear, as has been the case in other similar reserves, provide for suitable protection for area property owners. With adequate zoning and land management and a minimum of development, essential natural characteristics of the region could well remain unimpaired for the use of all Americans.

At some time during the mythological past, relates an oft-quoted Indian legend, a mother bear and her two cubs set out from the Wisconsin side of Lake Michigan to swim eastward to the opposite shore. Pulling herself ashore to wait for the lagging cubs, the mother bear fell asleep atop the great dunes. She sleeps and waits still, for the cubs drowned within sight of the shore. North and South Manitou Islands mark their positions, while the tree-capped dunes on the mainland show where the giant bear sleeps today. A Sleeping Bear Dunes National Lakeshore would, many Americans think, permit mother bear and at least one of her unfortunate cubs to sleep on with as little human disturbance as possible. ■

SHASTA

TEPEE OF THE GREAT SPIRIT

BY WELDON F. HEALD

RISING IN MAJESTIC ISOLATION 10,000 to 11,000 feet above the forested uplands at its base, Mount Shasta in far-northern California is one of the country's most impressive mountains. "Lonely as God and white as a winter moon," its huge, shapely bulk dominates the region north of the Sacramento Valley and its snowy crest can be seen for a hundred miles in every direction.

However, this great solitary dormant volcano is not California's loftiest peak. In fact, there are five higher summits

in the Sierra Nevada far to the south. But for sheer, overwhelming size no mountain in the State rivals Shasta, and few in the world are bulkier. From an almost circular base with a diameter of some seventeen miles, its soaring cone sweeps upward to an altitude of 14,157 feet, and has a volume of some eighty cubic miles. Particularly remarkable, too, is the fact that the mountain stands more than 5000 feet above all surrounding peaks and ridges within a radius of seventy-five miles.

Shasta is one of the dozen or so

ancient fire-mountains that line the Cascade Range for six hundred miles, from northern California to the Canadian border. Topped only by Mount Rainier, it far outranks Hood, Adams, Baker and the rest of the Cascades peaks. The volcanic activity which produced the present cone probably began in the Pliocene Epoch, some sixteen million years ago. Through the ages successive eruptions of lava and ashes gradually built up the mountain around a central vent; but there were apparently long periods of quiescence

The great double-topped cone of Mount Shasta in northern California rises in majestic isolation 10,000 feet above its heavily forested base.

Photograph courtesy Eastman's Studio



between explosive outbreaks. In comparatively recent times an exceptionally active secondary vent opened high on the western flank and a steep subsidiary cone rapidly formed. Called Shastina, this crater is one and a half miles west of the main summit and rises to an elevation of 12,330 feet. Together, the two cones make Shasta a distinctive, double-topped mountain.

Just when volcanic activity ceased nobody knows, but steaming sulphur springs 200 feet below the highest point indicate that the subterranean fires are not completely dead. The mountain could, of course, break out again at any time, as did Lassen Peak, to the south, which was active from 1914 to 1921. The last eruptions probably occurred a couple of centuries ago, with a few feeble gasps as late as the 1850's. They were recent enough, at least, to

account for the Shasta Indians' belief that the mountain is the tepee of the Great Spirit, whose fires smoke by day and glow at night.

In any case, Mount Shasta is probably well past its prime, geologically speaking, and has lost the smooth symmetrical contours of a youthful volcano. Although undoubtedly younger than Hood, it has been reduced some 200 to 300 feet in altitude by erosion and its sides are seamed with ridges and canyons. The greatest erosion took place during the two million years of the Pleistocene Ice Age. Then four successive times the mountain was sheathed in a glacial mantle a thousand feet thick, which descended to the base on all sides. The present rugged surface of the peak is the result of the grinding action of these prehistoric glaciers. However, there are five small glaciers

still at work today putting the finishing touches on the steep upper slopes.

Spanish explorers probably saw Shasta from the Sacramento Valley, and the Russians may have had distant glimpses from Coast Range summits. But the first white man to record the mountain's existence was Hudson's Bay Company trapper Peter Skene Ogden in 1827. His diary for February 14 notes that he camped north of the peak and named it Mt. Sastise, after the local tribe of Indians. Actually, however, the origin of the name is obscure, and it has had many variations in spelling. The mountain was seen and described by Col. Fremont on his third western expedition in 1846, and by Lt. Williamson of the Pacific Railroad Survey, in 1851. The former estimated its altitude to be 15,000 feet; the latter thought it might be 18,000 feet.

Vast tracts of scrub chaparral to the south and west of Mount Shasta remain today as witness to the era of reckless lumbering that followed the coming of the railroad in northern California.

Photograph courtesy Southern Pacific Railroad



In the 1850's gold was discovered in the regions west of Shasta and for a decade thousands of fortune seekers poured into the wild, remote canyons of the Trinity, Klamath and Siskiyou mountains. But Shasta's immediate vicinity remained undisturbed and became famous as one of the country's leading big game areas. California poet Joaquin Miller, a mighty hunter, lived for several years in the area, and extolled it as being the world's most favored spot for hunting and fishing. He believed the Shasta grizzly bear to be an especially monstrous and terrible breed, and told of a giant McCloud River trout that pulled a fisherman into the water and nearly drowned him! The grizzlies, elk and bighorn sheep of Miller's day are gone, but king-sized trout still lurk in sparkling whitewater streams.

Period of Development

In 1887 the Southern Pacific Railroad's Shasta Line was completed from San Francisco to Portland, Oregon. Passing the west foot of the mountain in full view of the great, double-topped cone, it gave sudden impetus to resort development. Hotels were built and tourist facilities installed while alluring advertising and photographs spread wide the name and fame of Mount Shasta.

Unfortunately, the lumbermen arrived with the railroad and there followed a period of reckless devastation among the grand ponderosa pine forests on the mountain's south and west slopes. This purely utilitarian exploitation of Shasta's resources prevented the area from becoming the outdoor recreation mecca it might have been. In fact, the mountain's popularity suffered a decline from which it never really recovered. Today the scars of ax and fire show as extensive tracts of dense scrub chaparral, which from a distance look like expanses of green grass.

Appalled at the destruction of some of the world's finest forests, famed California naturalist John Muir in 1889 proposed that the area be set aside as a national park. Nothing came of this, however, and large-scale lumbering has continued to the present day. Now largely within the Shasta-Trinity National Forest, sustained-yield logging is one of the region's chief economic activities, and a huge sawmill is located



Photograph courtesy U. S. Forest Service

Three of Shasta's five east-side glaciers are seen in a photograph taken in 1923. The ice has retreated considerably since the above picture was taken.

at McCloud, at Shasta's south base. If the present rate of cutting is maintained the entire original forest will be gone in a relatively short time unless the people of California move to preserve the remnants.

The destruction has not yet reached the upper forests nor some sections on the east side, so between 6000 and 8000 feet the mountain is still banded with magnificent stands of pine, fir, cedar and hemlock. But they are threatened, and many conservationists think these still-virgin tracts ought to be preserved in a Forest Service scenic area, or in a state park. Altogether, eighteen species of conifers are represented on Mount Shasta. However, the mountain is dryer than those to the north, south and west, and almost completely lacks the lush, flower-spread timberline meadows that make the Sierra and Cascades so appealing. But Shasta's stark upper slopes have a grim, uncompromising fascination all their own.

Also, there is a paucity of streams on the mountain's long, slanting flanks. Most of the water from the melting snow and ice sinks into the porous

lava, to appear suddenly near the foot as copious springs. The two best known are Big Springs, an important source of the Sacramento River, in Mount Shasta City Park; and Shasta Springs, a few miles south. At the latter, bubbling "Shasta Water" is bottled and shipped all over the country.

The first recorded summit climb was in 1854. By 1862 the ascent had become so popular that Professors Whitney and Brewer of the California State Geological Survey found the top strewn with litter, which the latter called "California conglomerate." John Muir reached the summit in 1874, and in April of the next year he and a companion were trapped in a blizzard. They lay for thirteen hours in a hot sulphur spring, scalded on one side and all but frozen on the other. Besides humans, horses, mules and dogs have had their photographs taken atop Mount Shasta.

The much-used southside route is a long, stiff pull, but one devoid of difficulty, and in late summer little snow is encountered. Any person in reasonably good health can climb the moun-

tain, and several hundred do so each year. Takeoff point is the Sierra Club's Shasta Alpine Lodge, at an elevation of 8000 feet, where the night is usually spent. The top is made in six to eight hours, with the descent requiring about three hours. The panorama from the topmost crest is breathtaking in its immensity, and extends from Oregon's Mount Jefferson in the north to Mount Saint Helena, 192 miles south, and sweeps east-and-west from Nevada's desert ranges to mountains fringing the Pacific coast.

Shasta's glaciers were first explored and described in 1870 by Clarence King, chief of the Geological Survey of the 40th Parallel. He made a circuit of the cone above timberline, and his report indicates that the ice mantle was far greater than it is today. Maps from surveys conducted in 1883-85 show at least five square miles covered by glaciers, but these have probably lost a third of their area since. Nevertheless, they are California's largest and most active bodies of ice, and are still impressive. Finest is the Whitney Glacier, more than two miles long. It flows northward in a series of icefalls and wrinkled crevasses between the main cone and Shastina. Others are the Bolam, Hotlum, Wintun and Konwakiton. At present Shasta's glaciers end at

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elevations varying from 9150 feet to 12,000 feet.

It is disappointing that little permanent snow or ice can be seen from railroad or highway. All five glaciers are on the north and east slopes, and millions of people pass by without knowing of their existence. Shasta's glistening icefields can only be seen by driving the sixty-eight mile loop around the mountain.

In the past few years the region has developed rapidly as a summer and winter resort, and visitor accommodations and vacation facilities have greatly multiplied. The entire mountain has been designated the Mount Shasta Recreational Area by the Forest Service, and the south slope is now readily accessible by the sixteen-mile Everitt Memorial Highway. At the road-end is Panther Meadow, 7500 feet high, where a modern winter-sport center has been built, called the Mount Shasta Ski Bowl. It includes a lodge, restaurant, ski shop, rentals, instructors, two rope tows and

a chair lift. The last is open in summer and ascends to an altitude of 9212 feet. Skiable from November through May, the Bowl has one of the longest snow seasons in the country and is unrivalled in California for the sweep of its unobstructed downhill runs.

Thus, human activity around Mount Shasta is on the increase. But so are multiple uses. Forest Service policy, there as elsewhere, follows the principle that lumbering, grazing, mining and general resource development are compatible with recreation. The situation is further complicated by alternate sections of railroad land which were granted to the Southern Pacific as construction subsidies. These have made Forest Service administration and management difficult, and have contributed to haphazard exploitation.

Conservationists, too, have been remiss. On the theory that this great Cascade snow peak has already been "thrown to the wolves," they have neglected many opportunities to rescue pieces of our priceless natural heritage. It is high time a few of them converge on Shasta's slopes and determine what can be saved from the wreckage.

After all, California's biggest mountain is of national significance and its fate might well be the concern of all Americans. ■

SOUND OF WINGS

Ghost wings down corridors of time
Unseen where countless millions flew.
Now all one sees is empty sky.
No wingbeats shimmer morning dew.

Where myriads had flown to roost
The moonlight gleams on empty bough.
Plume hunters passed with eager guns:
Dead bodies float in silent slough.

No more is heard the curlew's cry
Wild, echoing, through moonlit night.
They have gone to join the vanished bands.
Birds long extinct, in ghostly flight.

Tomorrow will the condor soar?
Will eagles, symbol of our land?
Or will they too, on silent wings,
Forever join that specter band?

—Paul F. Long

Potomac Tragedy (continued from page 2)

lion will be involved if Seneca is built. The proposed reservoirs are clearly just the first step, and a total of \$300 million or more may eventually be involved for big dams.

This money should be spent instead on waste water renovation plants, water recycling systems, small headwater impoundments for flood and siltation control, parks and recreational developments, and the protection and restoration of natural beauty throughout the Basin.

TO THE CREDIT OF THE INTERIM REPORT, it dissociates itself from the contention that the big dams are needed for flood control. It gives a passing nod to the headwater impoundment system of flood prevention, and suggests that methods will be found to cope with the problem.

A basic error was made in assigning the Soil Conservation Service to the Chairmanship of a Sub-Task Force on Siltation and Erosion; the Service dutifully complied with the restriction, to the serious injury of the Interim Report.⁷

A genuine Model Program will tackle the flood prevention and water supply problem by the headwater impoundment system of the Soil Conservation Service. It will couple this system with vigorous flood plain protection against settlement by zoning and easements.

The headwater reservoir system can also be used for supplementary local water supplies and for attractive outdoor recreation.

ALSO TO THE CREDIT OF THE INTERIM REPORT, the notion of storing water in big reservoirs for the dilution of pollution has apparently been abandoned. Even the Army Engineers may now realize their monumental ineptitude in proposing storage at Seneca for the dilution of the estuary.

We are contented with this outcome, having made the point ourselves a number of years ago.⁸

The original Army Engineers program was based on storage for dilution. Lacking this justification, they are now falling back on the old argument for flood control, buttressed by unsound estimates of water supply needs and erroneous calculations⁹ of recreation values.

THE INTERIM REPORT ADVANCES THE makeweight arguments for the big reservoirs at various places in the Basin that they are needed for municipal and industrial water and the economic growth of the localities.

The Army Engineers base their esti-

mates of industrial water supply requirements on the need for cooling water, provided by the once-through system. Normal industrial practice involves the use of cooling towers, reducing demand by 95%. The Army Engineers misled the public on this point, and the Report falls into the trap.¹⁰

The big reservoirs are not needed on any of the tributaries of the Potomac for municipal or industrial growth. On the contrary, the complete renovation and recycling of municipal and processing water is indicated, coupled with normal industrial cooling processes, as the way toward unlimited economic development.

The Report will be deeply injurious to the Appalachian Program and the War on Poverty, because the great opportunity for the mountain country is the rehabilitation of its forests, and the flowering of a wide variety of recreational and educational institutions; the defacement of stream valleys throughout the Appalachians would injure, not aid, such growth.

THE THREE MAJOR RESERVOIRS PROPOSED at present, in addition to the authorized Bloomington, are the Little Cacapon, Sideling Hill, and Town Creek.

It is contended that they are needed as "drought insurance" for emergency and supplemental water supply purposes for Washington.

It is contended that because these needs do not exist at present, the water levels will not be drawn down at this time, and later only in the autumn and winter.

The purchasers of summer cottage sites, acquired before the drawdowns, will be left perched on mud banks later; the speculators will have long since fled. It is not likely that application of the normal benefit-cost formula will result in authorization of these structures; some new financial sleight-of-hand will have to be evolved.

LET NO ONE SUPPOSE THAT THE FOUR structures the Interim Report approves will be the last. The Governors' Advisory Committee argued for two more. Department of Interior propaganda earlier this year proposed three cooling water reservoirs on the North Branch, and six or eight others as "mountain lakes." The Interim Report of the Sub-Task Force on Flood Control and Water Supply¹¹ considers five major reservoirs mainly for flood control. All told, 22 major reservoir sites are still under consideration by the planners. The lightning of destruction can strike anywhere.¹²

As these attacks are mounted against

the localities marked for destruction, citizens organizations will no doubt spring up there, as it were out of the ground, just as they did when the original Army Engineers report was announced.

These valleys and mountains have been fought for before by the patriots determined to defend them. The love of country, in the sense of the love of the land we live in, has not yet died out in this Nation.

IT HAD BEEN SUPPOSED THAT THE GOVERNORS' Advisory Committee on the Potomac would act as a restraining influence on the construction of major reservoirs. The concurrence of the Chairman of the Advisory Committee in the Interim Report will shake public confidence in the Committee.

The Report also casts a grave shadow over the viability of the newly established Water Resources Council, the structure of which is essentially the same as that of the Inter-Agency Task Force on the Potomac.

The need for an Office of Natural Resources in the White House, separate from and superior to the engineering agencies, becomes rapidly more apparent.

THE TRAGEDY IS THAT HUMAN BEINGS can be threatened continuously in this fashion with the loss of farms, homes, businesses, and communities by the assaults of the dam builders.

And the tragedy is, for certain, that this beautiful river country should be submerged and defaced by dams and reservoirs which have no rational justification.

And the tragedy is, above all, that a golden opportunity has been missed thus far to create a Model Program for the Potomac which could be the admiration of the Nation and the World. —A.W.S.

⁷ The Progress Report of the Sedimentation and Erosion Sub-Task Force September, 1965, recommends acceleration of erosion control.

⁸ Analysis, note 6.

⁹ Statement of Mr. Francis T. Christy, Jr., Vice President for Conservation, Audubon Naturalist Society of the Central Atlantic States, before the Board of Engineers on the Potomac River Project, September 4, 1963.

¹⁰ *The North Branch of the Potomac*, A. W. Smith, National Parks Association, November, 1965; *Clean Water for Municipalities, Industries, and Recreation in the North Branch, Potomac River Basin*, E. R. Fosdick, National Parks Association, October, 1965.

¹¹ Interim Report, Water Supply and Flood Control Sub-Task Group (Army Engineers), about December 1, 1965.

¹² As to the devastating effect of the big reservoirs, see the photographic folder, *A Statement on the Basic Facts About Reservoir Drawdowns*, National Parks Association, December, 1963.

News and Commentary

The Storm King Project

The Consolidated Edison Company's plans for construction of the Storm King pumped-storage hydropower plant at Cornwall on the Hudson River—recently licensed by the Federal Power Commission over strong conservationist and other opposition—were halted just before New Year's Day when the United States Court of Appeals set aside the licensing order.

The Court held that the Commission had issued its license order in the spring of 1965 on an incomplete record, after the Scenic Hudson Preservation Conference and the New York towns of Cortland, Putnam Valley and Yorktown had petitioned it to review and set aside the FPC's order. The Court said in part that the FPC had not sufficiently considered alternatives to the project; in particular, the possible use of gas-turbine generating equipment. Use of gas turbines as an alternative power source had been suggested by a widely experienced consulting engineer, but the suggestion had been rejected by the FPC early in 1965 as "untimely."

The Court said that the FPC had failed to compile a record sufficient to support its decision; that the record on which it bases its determination must be complete; and that the FPC's refusal to receive testimony in regard to the gas-turbine proposal exhibited "a disregard of the statute and judicial mandates instructing the Commission to probe all feasible alternatives."

The Court's opinion, written by Judge Paul R. Hayes and concurred in by Chief Judge J. Edward Lumbard and Judge Sterry R. Waterman, contained this significant statement: "The Commission's renewed proceedings must include as a basic concern the preservation of natural beauty and of national historic shrines, keeping in mind that, in our affluent society, the cost of a project is only one of several factors to be considered."

Water Resources Council Organized

Henry P. Caulfield, Jr. has been selected as Executive Director of the new Water Resources Council which has coordinating authority over Federal agencies engaged in river basin management. Mr. Caulfield is known as an advocate of the Wild Rivers Program, which conservationists support. It is hoped that he will not be receptive to compromises with the Army Engineers whereby their large-inundation, mass eviction, deep-drawdown reservoirs, designed, on the

Potomac and elsewhere, for the dilution of pollution, would be justified as so-called "mountain lakes." The powerful and well-organized consensus opposing the Army Engineers on the Potomac, and much other public sentiment as well, would undoubtedly oppose such weak-kneed compromises. The great opportunity for the Council and its Director will be to initiate a completely new approach to river basin planning. Unless it does so, serious social conflict will be inevitable, not only with respect to the Potomac, but in many another river basin across the land.

The President's Message

Our members and readers may wish to write to the President, The White House, Washington, D.C., to commend him on the State of the Union Message to Congress.

Among many admirable features, the Message contained vitally important proposals on river pollution, air pollution, and population, of deep concern to conservationists.

Members and readers are free to express their views at the same time on the subject matter of the editorial on page 2.

Lewis & Clark Trail

For two years the Bureau of Outdoor Recreation has been conducting a study on the proposed development of a Lewis and Clark Trail. Recently Secretary of the Interior Stewart L. Udall forwarded the report of the study to the Lewis and Clark Trail Commission, which was established by Congress in 1964. The study report recommends retracing the route of the historic Lewis and Clark expedition of 1804-1806 from St. Louis to the Pacific Ocean by highway and also by foot-trail; adopting a symbol and using it throughout the length of the trail; providing facilities for boaters along the hiking trail's route; construction of hiking and horseback trails; control of water pollution along the lower Missouri River; assistance to private enterprise to provide trail facilities; acquisition of important segments of the trail's route, and the initiation of many educational programs.

The report has recommended that much of the financing of work along the trail be accomplished under the Federal Aid Highway Program, the Land and

Water Conservation Fund, and existing Federal programs of aid to private interests developing outdoor recreation facilities for profit.

Redwoods Park Grant

Now that California's State Highway Commission has by resolution decided not to invade a precious tract of redwoods to build a freeway, the Save-the-Redwoods League, based at Berkeley, California, has undertaken the task of what League Secretary Newton B. Drury calls "rounding out, within logical watershed boundaries, the outstanding representative examples of majestic Redwood forests in Jedediah Smith, Prairie Creek, and Humboldt Redwoods State Parks, including the remaining six miles along the spectacular Avenue of the Giants."

To aid the League in its "rounding out" project, the Ford Foundation recently made a grant of \$1,500,000, part of which is to be used to complete acquisition of 2000 acres of forested lands, including Gold Bluffs Beach and Fern Canyon at Prairie Creek Redwoods State Park, Humboldt County, California. The funds will be matched on a two-to-one basis by private contributions through the League.

"This generous offer is a challenge that the League hopes and expects to meet," Mr. Drury said. "Already private contributions and pledges of close to \$500,000 have been received and are available to be matched."

Desalinization Benefits

Many conservationists, both in government and in private organizations, now feel that one of the most pressing natural resource problems to be faced by this and other developed nations in the near future is lack of fresh water for still-growing populations. To ward off potential future water shortages President Johnson recently signed an agreement with Mexico for cooperative research into a proposed large nuclear sea water desalting project.

The President indicated that the agreement, which is also in effect with several other nations, is just the beginning of a crash program to find a way to desalt sea water and convert it into fresh water, while at the same time generating large amounts of electrical energy. Desalination has been urged by this and other conservation organizations as a way of obtaining needed water supplies without building large and destructive reservoirs of the type proposed for the Colorado River at Bridge and Marble Canyons. The Presi-

dent reportedly told delegates of sixty nations attending an international desalination conference in Washington, D.C. that "unlocking the door to an unlimited supply of pure water is as significant as the development of atomic energy."

African Wildlife Destruction

Along with other vital decisions recently made in Rhodesia, the nation's officials have decided to go ahead with a highly controversial program to kill off animals in some of its parks and sanctuaries in an attempt to control the disease-spreading tsetse fly. On the theory that the fly infects wildlife which in turn spread disease to domestic animals and thus to humans, the Ministry of Mines and Lands and the Director of National Parks and Wild Life Management have declared that "the destruction of the favoured hosts of the fly within such [land] corridors, in conjunction with bush clearing and spraying, was the only practical approach which had reasonable expectation of success. It therefore supported Government's proposal to eliminate buffalo, kudu, bushbuck, wart-hog, and wild pig within such control corridors in the critical areas."

Such a program, long on the horizon in Rhodesia, has been tried before without success; scientists of many nations have already pointed out that vaccination, not destruction, is the answer to the tsetse fly control problem. Conservationists feel that since wildlife is practically the only abundant natural resource of many African nations, and since that resource has too long been misused, a more constructive approach to the problem should be advanced. In spite of this scientific opposition, Rhodesia has gone ahead with

its program of destruction, saying at the same time, however, that there is an "obvious gap in fundamental research into the transmission of the disease by wildlife," and that "justification for any operations based on this technique must lie very largely in their being conducted as a research exercise."

Archaic Bounty System

More than 120 years ago the Michigan State Legislature placed a bounty on the skin of the timber wolf, apparently hoping to eliminate this so-called "destructive" predator. It almost succeeded, too, for today there are no more than forty of the animals roaming the State; over half of them live safely in Isle Royale National Park in Lake Superior. Studies on the wolves there prove that a wolf population is actually beneficial to other wildlife, for wolves eliminate old and diseased animals and thereby improve breeding stock; the moose population in Isle Royale has improved greatly since the wolves became permanent park inhabitants (see *National Parks Magazine*, December, 1965). Presumably wolves would improve other prey species as well in other parts of the State—and the country—if allowed to exist normally. Realizing this after more than a century, the State of Michigan has finally repealed the bounty on wolves.

Once widely spread over North America, the wolf has been reduced to remnant populations in remote areas of Michigan, Wisconsin, Minnesota, and Montana, in the conterminous States. The Governor of Minnesota recently also terminated bounty payments on wolves, but in Alaska, the only State where the wolf

is not declining, the State wildlife department opened areas previously closed to wolf hunting, and has recently offered bounties for the killing of wolves anywhere in Alaska.

Economics of Redwood Park

Creation of a Redwood National Park in California now seems to be a reasonable expectation, and it might be worth while to look at the economic as well as the esthetic implications of such a preserve. The economics involved in creating a national park to protect additional redwood groves have, of course, received prior attention; but too few laymen can parry the protests of the lumber interests with facts about the impact of a Redwood National Park on the economy of the North Coast of California.

John Kenneth Decker, economic consultant to the National Park Service at Berkeley, California, has compiled an impressive study of the economic effects of the proposed redwood national park. Decker comes to the general conclusion that "The proposed national park will attract several million visitors annually who will contribute to the economy of Humboldt County and Del Norte County substantially more than the park will displace . . ."

With careful studies on visitor expenditures in the park vicinity, visitor expenditures en route, capital outlays, operating expenditures, and assessed values and tax revenues as background, Decker declares that visitors to the proposed national park will not merely come in for daily hikes or casual overnight stays, but will make the park region the target of

(continued on page 22)

Occasional Publications of the National Parks Association

On the Potomac River Basin

The North Branch of the Potomac. 3 pages with chart and map.
Clean Water for Municipalities, Industries and Recreation in the North Branch Potomac River Basin. 5 pages with table and map.
Summary of a Model Program for the Potomac. 2 pages.
Analysis of the Potomac River Basin Report of the District and Division Engineers, Corps of Engineers, U.S. Army. 20 pages with tables and map.

On Other Conservation Topics

Water for Arizona and Bridge and Marble Canyon Dams. 4 pages.
Report of the Advisory Board on Wildlife Management (The Leopold Report). 6 pages.
A Statement on the Basic Facts About Reservoir Drawdowns. (folder).
Report on Present Status of a New Simple Low Cost Coal Sewage Treatment. 5 pages with schematic diagram.

Single copies of the above publications are available without charge. Larger quantities are available at cost.

. . . also

Exploring Our Prehistoric Indian Ruins

By Devereux Butcher. 64 pages, illustrated, in paper cover. \$1.50, postpaid.

Planning for America's Wildlands

By Arthur H. Carhart. 97 pages in paper cover. \$2.50, postpaid.

. . . and

The Jesse Jones Volume Binder, which accommodates a year's issue of *National Parks Magazine*. \$2.00, postpaid.

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long-range vacation planning. "Its [the park's] location will favor very high visitation," says Mr. Decker, "both because of access from major through north-south and later east-west routes and its proximity to other places of great interest to travelers such as the Oregon Caves, Crater Lake and Lassen National Parks, Mount Shasta, the Trinity Alps, and the grandeur of the coast of Northern California and Oregon."

In addition to the rising expenditures expected from visitors over a fifteen-year period, residents of the proposed park area may expect additional income from Park Service expenditures for development of the park, including money for wages and salaries, and employment opportunities ranging up to 388 full-time jobs in the fifteenth year of establishment of the park, considering direct employment only.

Motors in the Wilderness

The 1965 annual report of the Outboard Marine Corporation, whose Chairman of the Board of Directors is the well-known Ralph Evinrude, may hold a happy portent for company stockholders but might signal trouble for conservationists.

The report showers praise upon one of the newer pests in national forests, parks and public lands—the snow vehicle. "Once as rare as the print of lynx or catamount, the track of the snow vehicle appears with ever-increasing frequency on the slopes and trails of our snow-states,"

the report says. The vehicles zoom along at speeds of "thirty miles per hour or better," but they often usurp trails made for hikers or horsebackriders. If not used properly, these little snow vehicles could easily make the print of the lynx even scarcer. All shy animals—and the peace-loving outdoorsmen for that matter—may constitute an endangered species if roaring vehicles of this type are allowed to plow up the trails.

Making Extinction Fashionable

Four prominent professional conservationists, representing large conservation organizations, recently joined in a vigorous protest against five well-known New York City clothing and department stores. Reason: the stores are selling the skins of endangered animals, thus encouraging killing of the species in various parts of the world at a time when the animal populations are close to the extinction level. Rugs of polar bear; rugs, pillow covers and coats of tiger; coats of Brazilian jaguar; and rugs of African lion and cheetah are among the items being offered for sale at the stores.

The conservationists—presidents of the National Audubon Society, the World Wildlife Fund, the New York Zoological Society, and the Conservation Foundation—voiced their opposition to the sales in a December 10 letter to the *New York Herald Tribune*, asking all Americans to "refrain from buying" from any store which offers the skins of endangered animal species for sale.

Shrinking Natural Habitat

The African elephant is now literally eating itself to death in several of the African national parks, it is reported. Compressed into small land areas by human overexpansion and development, the huge animals cannot maintain themselves on the available habitat without killing off other species of animals. Now the elephants themselves face the prospect of starvation. The problem is particularly acute in Kenya's Tsavo National Park. Management experts there must soon decide whether to shoot at least a third of the park's elephant population or allow the animals to die of starvation. Roaming the park's 8000 square miles and stripping trees of bark, pushing over forests and ripping up bushes upon which to feed, the elephants have caused less versatile feeders like the black rhino to die of starvation. Experts estimate that the park holds about 15,000 elephants which may be posing problems not only for rhino but for zebra, giraffe, waterbuck, and other large mammal species.

The Ford Foundation has recently ap-

proved \$726,300 in grants to be distributed to Kenya, and to Uganda and Tanzania, for the study of wildlife problems of this nature.

THE CONSERVATION DOCKET

The second session of the 89th Congress convened in Washington on January 10; ordinarily, there is little committee and subcommittee organizational work to be done other than filling vacancies that have occurred since the end of the first session; it is likely that the thread of conservation legislation work will be picked up with little delay. This Docket, written not many days prior to convention of the second session, will canvass the position of some of the more important park or park system-related proposals that seem likely to receive Congressional attention.

At least ten potential national park system areas may be considered by the House and Senate Interior and Insular Affairs Committees or their subcommittees (National Parks and Recreation, House, and Parks and Recreation, Senate). These are:

Apostle Islands National Lakeshore in Wisconsin. Hearings on this lakeshore, which has aroused little or no controversy to date, have been held up by lack of cost estimates, which may be forthcoming in second session.

Cape Lookout National Seashore in North Carolina. Passed by Senate during first session; has had no House hearings as yet.

Oregon Dunes National Seashore in Oregon. Hearings on this area have been held by both House and Senate subcommittees. Has been stalled over size, and question of Government condemnation powers.

Pictured Rocks National Lakeshore in Michigan. House subcommittee has held field hearings; no Washington hearings have been held by either body.

Sleeping Bear Dunes National Lakeshore in Michigan. Passed Senate in first session; House subcommittee held field hearings in late 1965.

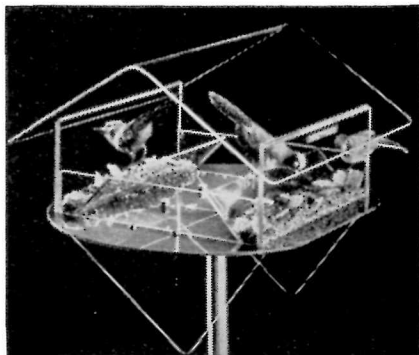
Indiana Dunes National Lakeshore in Indiana. Passed Senate in first session; field hearings held by House subcommittee during fall of 1965. Despite reduction in size of reserve, steel companies still oppose, hoping for deep-draft harbor at Burns Ditch.

Great Basin National Park in Nevada. Has been stalled for years over questions of size and activities permitted if created; most recently proposed as a national recreation area rather than park.

Guadalupe Mountains National Park in Texas. Both House and Senate subcommittees held hearings during first session. Difficulties over gas and oil lease acquisition must be resolved before this park idea moves.

It is quite possible that legislation will be introduced into the second session of the 89th Congress to create a Kauai National Park encompassing some 97,000 acres in the northwest part of Kauai Island in the Hawaiian Archipelago. It appears at present that sporting interests will be quite insistent on a hunting-in-the-park provision should such a proposal materialize.

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Reviews

NATIONAL PARKS OF NEW ZEALAND. The Government Printer, Wellington, New Zealand. 1965. 158 pages, illustrated in color. 35 shillings, New Zealand currency (\$4.50, U.S.).

In 1886, when Maori tribal claims to Ruapehu (the highest peak on the central upland plateau of the North Island) made it likely that the area would fall into the hands of Europeans for private exploitation, it was suggested that Ruapehu and neighboring summits might come under Crown control. Te Heuheu Tukino, the aged tribal chief, eagerly embraced the idea. He said, "yes, this is the best course, the right thing to do. They [the volcanic peaks] shall be a sacred place of the Crown, and a gift forever from me and my people."

Thus came into being the nucleus of the first national park of New Zealand. There are now nine, of great beauty and significance. One-fifteenth of the land area of New Zealand is in preservation as national parks:

Urewera National Park memorializes Maori history; in Tongariro are volcanoes; there are the Nelson Lakes; tidal seascapes in Abel Tasman; the great, almost symmetrical cone of Egmont; alpine plants and mountain beeches at Arthur's Pass; Mount Cook with its mountaineering; lakes, waterfalls and sounds, and European history, at Fiordland; rain forest and glaciers in Westland.

This is a beautifully printed book, modestly telling in text, and with lovely pictures, of the remarkable achievement of our neighbors "down under," as we say. "The seedling sown in Wyoming [meaning our Yellowstone National Park] was transplanted to flourish in both islands of New Zealand," says the introduction. Every North American conservationist will feel a glow of satisfaction in the association that has resulted in such a magnificent tree. Incidentally, for such a fine production in bookmaking, the price of this volume seems remarkably low.

—Freeman Tilden

THE BLACK CANYON OF THE GUNNISON: TODAY AND YESTERDAY (U. S. Geological Survey Bulletin 1191). By Wallace R. Hansen. U. S. Government Printing Office, Washington, D.C. 20402. 1965. vi + 76 pages, illustrated, in paper cover. 50¢.

The January Magazine carried reviews of two Geological Survey publications on earth-history studies in Mount Rainier and Sequoia National Parks. These were so-called professional papers, written for an audience for which geology is assumed to be either a vocation or, at the very

least, a serious amateur study. Observation and fact are interpreted in a way which reflects that assumption.

There is another type of occasional Geological Survey publication called the *bulletin*, in whose pages a Survey author has considerably more latitude in the treatment of a topic. He may, if subject and purpose allow, employ much broader language in telling his story, providing only that it be equally accurate as to fact; he has a chance, with the happy collaboration of a talent for writing, to blend purely esthetic considerations into his factual material and to indulge himself in good natural history interpretation for the public.

Hansen has taken full advantage of both a bulletin's flexibility and a grand setting in maneuvering his readers through the unthinkably long yesterdays and into the today of the Black Canyon in a first-rate job of geological interpretation. One cannot progress far into this small volume without feeling the large measure of rapport between the author and the mighty canyon; writing this book was work, but surely not of the drudging sort.

A good portion of the Black Canyon is, of course, protected in the Black Canyon of the Gunnison National Monument, and potential visitors to the Park Service area will find this volume well worth reading before or during their visit; it might well save the visitor from being a mere tourist.

BIRDS OF ZION NATIONAL PARK AND VICINITY. By Roland H. Wauer and Dennis L. Carter. Zion Natural History Association, Springdale, Utah. 1965. 92 pages in paper cover, illustrated in color and black and white. Price unlisted.

This good little volume continues the Zion Natural History Association's series on the natural features and the non-human inhabitants of a great Southwestern park, introducing in this instance the surprisingly large assortment of birds which either pass through the park or make their homes there. Contents of the volume are exceptionally well organized, commencing with a discussion of the park's various habitat zones, continuing with seasonal and regular inhabitants of the spring, summer and winter months, and concluding with an annotated list of species. Most of the illustration is in full color (by Wauer) with substantial assistance from Colorado artist Howard Rollin, who permitted the Zion Natural History Association to reproduce a number of his water colors of the Zion area birds.

The publications of the park system natural history associations are com-

monly unpriced, a rather annoying circumstance for the reviewer but one probably made necessary in relatively small publication operations by the constant upward spiral of book production costs, postage, and publication expenses.

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Photograph courtesy National Park Service: Robert Bergman

Empire Bluffs, south of Sleeping Bear Point, in the proposed Sleeping Bear Dunes National Lakeshore, Michigan.

SOME THOUSANDS OF YEARS AGO the Pleistocene ice that had blanketed the northern third of our country in perpetual winter was slowly consumed by moderating winds from the south. Just as slowly the plants and animals returned to clothe and populate a desolate land; once again the normal forces of erosion commenced their attack on the earth's face. Today people speak of preserving a splendid example of ice-created land and water scenery in a Sleeping Bear Dunes National Lakeshore for the benefit of all Americans.

AS AMERICA'S LEADING CONSERVATION ORGANIZATION devoted primarily to the welfare of the national park system the National Parks Association evaluates the nature and quality of proposed preservations like Sleeping Bear and keeps its members informed through timely articles. You can assist in this work in any of several ways: by contributions to the Association's general funds over and above regular dues; by renewing membership promptly; by remembering the Association in your will; by helping to secure new members. All dues over and above basic annual dues, and all contributions, are deductible for Federal income taxation; gifts and bequests are deductible for Federal gift and estate tax purposes.

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