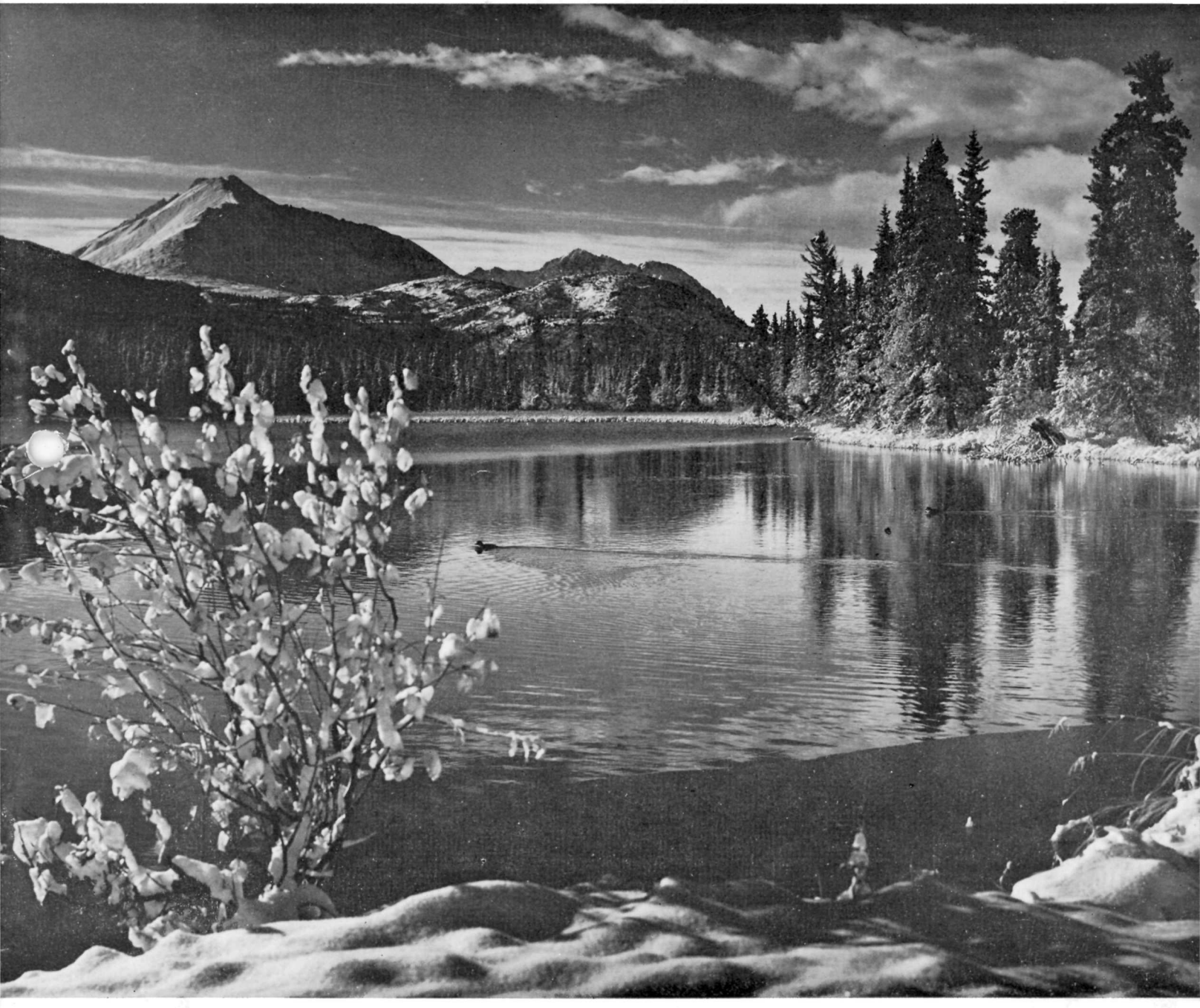
NATIONAL PARKS *Magazine*



The First Snow—Deniki Lake, near McKinley Park, Alaska

December 1960

The Editorial Page

Some Bright Spots In a Dull Year

IN BALANCING THE BOOKS for 1960, one need not be a professional accountant to realize that conservation folk in general—and those who labor in behalf of the nation's preserved areas in particular—have not enjoyed an especially prosperous year.

True, there have been a few bright moments to relieve an otherwise unproductive twelve months. For example, the President established, by proclamation, the Key Largo Coral Reef Preserve off the east coast of Florida, to save a representative segment of tropical reef—along with its colorful and bizarre inhabitants—from spoliation by commercial coral and shell collectors, spear-fishermen, and souvenir hunters.

Several new national memorial and national historic sites were created during the year. In Massachusetts, a small but determined band of people were able to block an assault on the integrity of small, but scenic and historic, Walden Pond, and to obtain from the Massachusetts Supreme Court an opinion of considerable importance to the cause of preservation.

There have been other gains of a modest nature; but these must be balanced against the general lack of progress toward a number of most important and urgent objectives. Indeed, as the year closes, an issue touching a cornerstone of national park policy lies heavily over a small Southwestern unit of the system—the still unresolved matter of protection for Rainbow Bridge National Monument against the future intrusion of waters impounded by a man-made dam.

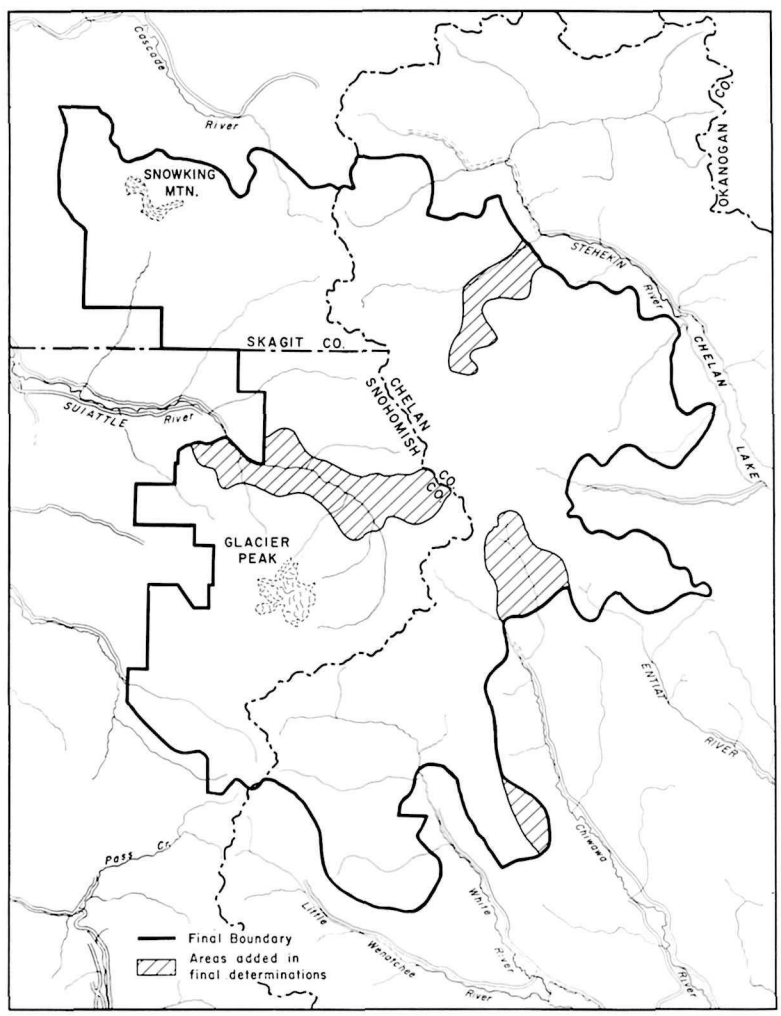
In light of the past year's developments, then, many conservationists have expressed satisfaction over the recent establishment, by the United States Forest Service, of the Glacier Peak Wilderness Area, nearly 460,000 acres of superb forest, peak, stream, lake and glacier in the Wenatchee and Mount Baker National Forests of Washington State's Cascade Range.

It is true that the National Parks Association, in common with many other conservation and preservation agencies, had hoped for a much larger preservation, and had gone on public record to that effect. (The boundaries of the area recommended by the Association were outlined in a map published in the April, 1960, issue of this magazine.) Many people and organizations had hoped that, at a bare minimum, the Glacier Peak Wilderness Area would incorporate the Cascade Pass-Mount Logan area, immediately to the north; and, as a larger goal, the entire backbone and flanks of the Cascades between the new wilderness area and the existing North Cascades Primitive Area.

The National Parks Association feels, nonetheless, that the Forest Service and its chief, Richard McArdle, are to be highly commended for the establishment of the new area, decision for which was made in the face of heavy pressure from lumber and other interests in the Pacific Northwest. The Association feels, too, that the Forest Service should very soon consider similar measures for the protection of the splendid tract—as large as the new preservation itself—lying immediately to the north of the new area.

The Forest Service has taken the first of what we hope may be several steps toward the eventual creation of a great preserved area in the Northern Cascades—call it wilderness area, national park, or what you will—that could match, in its variety of natural splendors, the best areas now owned by the people of the United States. ◆

Outlined in the U. S. Forest Service map below is the new Glacier Peak Wilderness Area in the Wenatchee and Mount Baker National Forests of Washington State, established by an order of the Secretary of Agriculture during September, 1960. Shaded portions of map show additions to area made after a review of testimony presented at public hearings in Bellingham and Wenatchee, Washington, in 1959.



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NATIONAL PARKS MAGAZINE

OFFICIAL PUBLICATION OF THE NATIONAL PARKS ASSOCIATION

DECEMBER 1960 Vol. 34, No. 159

Paul M. Tilden, Editor

Contents

The "first snow" at Deniki Lake, near McKinley Park, Alaska—our December cover photograph—is from the camera of Charles J. Ott.

THE SEASON'S GREETINGS

The editorial staff of National Parks Magazine wishes its readers a happy Christmas season, health and prosperity in the year to come.

THE NATIONAL PARKS AND YOU

Few people realize that ever since the first national parks and monuments were established, various commercial interests have been trying to invade them for personal gain. The national parks and monuments were not intended for such purposes. They are established as inviolate nature sanctuaries to preserve permanently outstanding examples of the once primeval continent, with no marring of landscapes except for reasonable access by road and trail, and facilities for visitor comfort. The Association, since its founding in 1919, has worked to create an ever-growing informed public on this matter in defense of the parks.

The Board of Trustees urges you to help protect this magnificent national heritage by joining forces with the Association now. As a member you will be kept informed, through NATIONAL PARKS MAGAZINE, on current threats and other park matters.

Dues are $5 annual, $8 supporting, $15 sustaining, $25 contributing, $150 life with no further dues, and $1000 patron with no further dues. Bequests, too, are needed to help carry on this park protection work. Dues and contributions are deductible from your federal taxable income, and bequests are deductible for federal estate tax purposes. As an organization receiving such gifts, the Association is precluded by relevant laws and regulations from advocating or opposing legislation to any substantial extent; insofar as our authors may touch on legislation, they write as individuals. Send your check today, or write for further information, to the National Parks Association, 1300 New Hampshire Avenue, N.W., Washington 6. D.C.

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A bit of historic America was saved in

The Battle of Walden Pond

By Truman Nelson

Part I

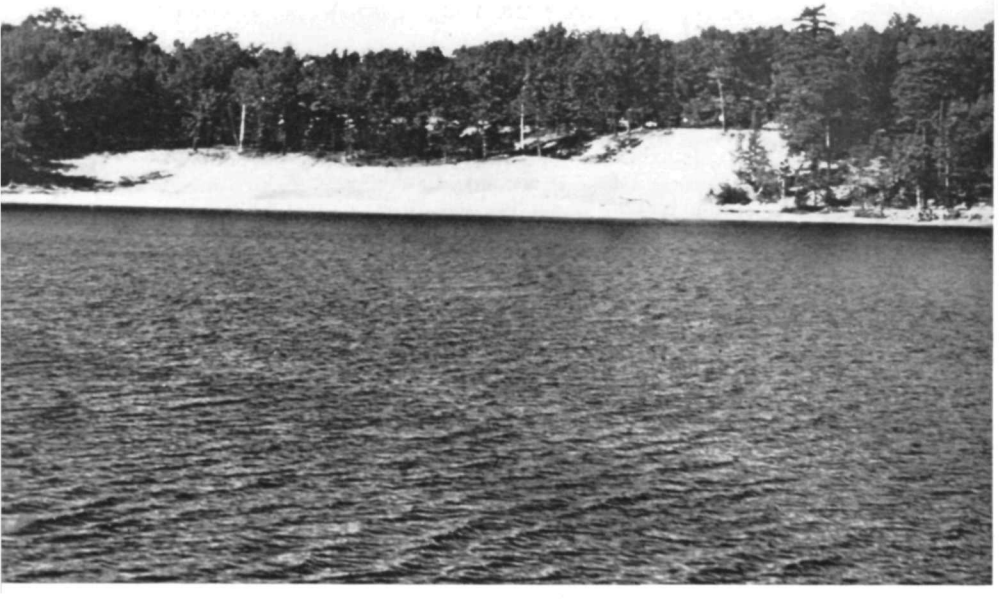
IN THE LAST WEEK of June, 1957, the Middlesex, Massachusetts, County Commissioners sent chainsaws and bulldozers to root, slash, and gouge out a new bathing beach which obliterated a large section of the hitherto-unbroken wooded continuity of Walden Pond's shores and woodlands. Their intention was to transform historic Walden Pond, in the town of Concord, into a public convenience; a pool and park which would inevitably turn into another dreary waste of littered sand, oil-stained blacktop, parking lots, picnic tables and trash baskets completely surrounding a small, slightly polluted suburban swimming facility.

This barbarous attack on the world's greatest and greenest monument to a book was met head-on by a small organization which gathers once a year for the reading of scholarly papers on Henry Thoreau, that most unorganized nineteenth-century genius who wrote the book that made Walden famous, and his Transcendental friends. There is an informal business meeting around lunch-time, the yearly dues of one dollar are paid, and the group breaks up into small clots of bemused solitaries that wander around Concord or the Walden woods to the sounds of different drummers.

Yet, miraculously, the Thoreau Society stopped the onslaught in its tracks, and in such a way as to provide defense strategies for resisting the whole vast front of bulldozer assaults upon the wilderness places, the meadows, the wetlands and the time-worn but cherished historical sites that are deep in our consciousness as a nation, and by which we can focus the attention of young citizens on the enduring values of the great past. They did it by setting and defending a value on Walden Pond that soared above the values of political expediency, public convenience, and community acquiescence to changes of temporary or meretricious advantage.

The main speaker in 1957 was G. L. Mehta, the Indian Ambassador to the United States, who made the audience fairly glow by placing Thoreau on the summit with the world's greatest movers and shakers, giving him full credit for the germinal ideas with which Gandhi freed the oppressed millions of India. The usual address by the retiring president was given by Dr. Howard Zahniser, better known as the executive secretary of the Wilderness Society of Washington, D. C. His theme was that Thoreau, the magnificent political radical, was also the first and perhaps the best of American conservationists, saying in 1859: "Each town should have a park, or rather a primitive forest of 500 to 1000 acres, where a stick would never be cut for fuel, a common possession forever, for instruction and recreation . . ." and later, "precious natural objects of rare beauty should belong to the public . . . if the inhabitants of a town were wise, they would seek to preserve these things,

Photograph courtesy the Concord *Journal*



Part of the shoreline area of historic Walden Pond was stripped of its forest cover in 1957 for creation of a park and swimming facility.

In the photograph at the right, a bulldozer is seen at its work of destruction at Walden Pond in June, 1957. Below: an acre of trees and natural slope at Walden has been bulldozed and the gravel pushed into the water to create a shallow public swimming beach.

Photographs this page by Keith Martin

though at a considerable expense, for such things educate far more than any hired teachers or preachers, or any presently recognized system of school education."

A Resolution Offered

Dr. Zahniser closed his remarks to the deeply-stirred congregation by saying that some drastic changes had just been made on the shores of Walden Pond. He offered a resolution by the Society's executive board stating that, as the land had been deeded to the State in memory of Emerson and Thoreau, the Society urge upon its custodians, the Middlesex County Commissioners, the preservation of its natural beauty, and expressing the eagerness of the Society to cooperate with them in every way towards this end.

The members began seething; and later, when they got the full story of what had happened, they came to a boil. In two days of mechanized carnage, well over a hundred towering and mature trees had been destroyed, along with almost every leaf and twig of the undergrowth at the northeast corner of the Pond. An acre and a half of the rich forest humus and topsoil had been excavated and pushed into the water, deforming the beautifully-scalloped shoreline into a trite stretch of beach.

In this gravel-pit a cinder block bath-house with six toilets was to be erected, twenty feet wide, one hundred feet long, and twelve feet deep, fronting the water's edge so belligerently that from every quadrant of the Pond it would appear as some sort of military emplacement ready to break the green peace with salvos of cannon fire. Coming up from this in a deep hairpin curve was to be a twenty-foot-wide blacktop road, terminating in an enlarged parking lot. Here there had been a thick stand of ancient oaks screening off for the saunterers, the dreamers, and meditators of Walden the glitter and roar of an obtrusive motorized world.

We all felt, hearing of this permanent desecration of the area, that merely deploring it and asking that we be consulted before the next sneak attack, was not enough . . . we must resolve to stop the bulldozers, stop the creeping tides of blacktop from sealing off the earth from green renewal, stop everything and make them put back, at no matter how high the cost, the life they had destroyed. It was then moved to go to the courts for an injunction to force the County Commissioners to cease and desist.

Inspecting the Scene

A Save Walden Committee was appointed and went to the scene of the crime, standing in harsh, hot gravel up to the ankles in a gigantic cut so raw, so steep in grade, so absolutely senseless in form that it looked like a bomb-crater. All of us felt ashamed as the Indian Ambassador looked sadly around at the spot which Gandhi had said he wanted to visit above all others, diplomatically silent, but obviously unable to understand why this had happened. It beggared explanation, as did the other scenes of squalor and neglect nearby: clusters of rusting beer cans in the clear shallows; long, vicious slashes of erosion in the descending slopes—this within a few yards of the artificial-beach project on which fifty thousand dollars of the State's money was spent.

Our righteous indignation exploded into the press, and there was a time when the sorrows of Walden were re-

verberating all over the world. More practically, we engaged a good lawyer, Frederick G. Fisher, Jr., of the firm of Hale and Dorr in Boston. We had no money for him, but letters were coming in, echoing our protests and amplifying them to such a pitch that we felt we could raise the necessary funds to carry the bitter and protracted struggle that loomed ahead.

When Mr. Fisher read the deed of gift and saw what had happened at Walden, he advised us to meet with the Commissioners before instituting court action. We agreed, thinking the desecration stemmed from ignorance on their part. Surely they could calmly and rationally be made to understand the importance of preserving the wholeness and identity of Walden Pond as a unique historic site of great commercial value for tourism; or as a spot of superb natural beauty and ecological interest in an otherwise congested urban area; or supremely, as a fitting memorial to two of the most exalted and beloved American men of genius, Thoreau and Emerson.

The Official Brushoff

We got nowhere. The Chairman of the Commissioners, Mr. Thomas B. Brennan, did most of the talking; and, as I still remember with indignation, kept signing official but irrelevant papers as we replied. Our case, which had seemed so crystal clear, so morally unassailable in the beginning, began to erode like the banks of Walden. The new beach, Brennan explained in tones as fully weighted with righteousness as our own, had been made at the request of the Concord Red Cross, to carry on their swimming-instruction program. Did we want children to drown for want of this? He personally preferred children to trees.

Furthermore, this program had been set up in the Massachusetts Legislature as a special bill, and he was obligated to carry it out. The Concord Town Recreation Committee was behind him; he had developed the whole project, including the planned bath-house and access road (although they were duplications of existing swimming facilities close by) in close association and agreement with the leading citizens of Concord. A Mr. Irving Chase had acted for the Red Cross, and Mr. Richard F. Wood for the Recreation Committee; the Chairman "did not know anyone else was interested."

Mr. Nelson, a member of the small organization that halted the recent assault on Walden Pond, Concord, Massachusetts, is a resident of Salem, in that State. He is author of a number of books, the most recent of which is *The Surveyor*, an account of John Brown in Kansas.

This last remark was infinitely discouraging. Mr. Brennan presented himself as a model of civic virtue—and well he might, flanked protectively by the Red Cross and the Town Hall. Seeing our discomfiture, he went on the offensive. He loved Walden fully as much as we did, and had a twenty-year plan for improving it. New roads were to be cut into the woods (in a total area of only seventy-six acres) so that cars carrying boats could get to the Pond more easily. A log cabin was to be put up on the site of Thoreau's framed and clap-boarded hut. As for Thoreau's memorial cairn, started by Bronson Alcott, "That pile of stones is a mess, it's very unsightly and should be taken out of there." Picnic tables, benches and trash baskets would be generously scattered about "so that young mothers can come here with their kids and feel safe and comfortable." In the face of this triumphant Philistinism, we could only withdraw. The Commissioner assured us again that he loved Walden so much that he often "went to smoke his pipe in the woods," and, shuddering at this, we had still another shock as he said we need not worry about appearances—the installations would be artistically surrounded with nice sod and grass.

"You will make Walden like a well-kept cemetery," I murmured, as we retreated in some disorder.

The Legal Difficulties

To make matters worse, our hard-working lawyer had been unable to discover a significant body of precedents for stopping the Commissioners with an injunction. It is almost impossible for a citizen to bring punitive action against the State in the courts. It was not clear who held actionable title to the Pond. The deed had granted it to the Commonwealth; the Commonwealth had given custody to the County; but which was legally responsible?

Although the intent of the gift was clearly stated, courts often find intentions made obsolete by prevailing conditions, not present when the gift was made, such as the "population explosion" around Boston which made expansion of swimming and active recreation areas almost mandatory. The present obstacle was, that we had to get special permission from the court before we could even enter our bill of complaint.

Our lawyer needed time, and we had even less of that than money. The swimming season was coming to a close, and the construction of the permanent excrescences on the despoiled landscape was imminent. We decided on another attempt to win the Commissioners, this time by proposing a consulting board of historians, literary men and conservationists whose massed knowledge and experience would overwhelm the Commissioner's parochialism and answer their infuriating question: "Just what is wrong with what we are doing there?"

Advice Not Needed

We arranged a pondside meeting with the Commissioners and two of our consultants—Walter Gropius, the famous planner and architect, and Professor Norman Newton of Harvard, then president of the American Society of Landscape Architects. They came, but the Commissioners found themselves "too busy" for this opportunity to obtain some free, high-level advice. Dr. Gropius and Professor Newton studied the damage carefully, and Dr. Gropius remarked that, if some limitation were not set on the bathing facilities and the parking lots, "the beauty and tranquility will be lost for all of us." Professor Newton, after looking with dismay at the two-to-one cut of the grade, said that all the dirt had better be put back or the whole bank would slide into the pond, and that the steep cutting of the slope would drain off the natural moisture of the trees still standing and kill them. This latter observation proved to be true.

(To be continued in the January, 1961, issue of *National Parks Magazine*.)

Photographs courtesy of National Park Service

Sunset Crater's cinder cone, formed around a once-active volcanic vent, is surrounded by rugged black lava. Mineral-stained cinders on the cone's rim produce a sunset-like glow.

LAND OF THE BLACK SHADOW

By Natt N. Dodge

VISITORS TO NORTHERN Arizona's Sunset Crater National Monument who find themselves surrounded by a strange, blackened landscape are likely to approach the park ranger stationed there with the comment: "Gee, what happened?"

In that monument, which was established in 1930, a symmetrical cinder cone rises one thousand feet among basal lava fields, fumaroles, "squeeze-ups" and cinder dunes. Vegetation is sparse and gnarled. Here, with dwarfed ponderosa pines, are small quaking aspen trees, a thousand feet below the elevation of their normal habitat in this vicinity. It is no wonder that the visitor's curiosity is piqued as he approaches the base of the cinder cone along the edge of the Bonita Lava Flow, a wide, motionless river of jagged, tilted basaltic blocks.

It was in 1066 A.D., four and a quarter centuries before Columbus made his historic voyage, that a violent eruption built the cone at the base of the San Francisco Peaks, in what is now the State of Arizona. Geologists think that this eruption of Sunset crater was quite similar to that of Paricutín, which burst out in a farmer's field about two hundred miles west of Mexico City on February 20, 1943, following a series of sharp earthquakes. There, steam and gases issuing through a break in the earth's crust swept dust and clods of soil into the air. As the vent grew larger, the increased pressure tore huge chunks from the ragged edge of the opening. Rocks from the

throat of the vent, along with ashes and cinders from deep within the earth, were thrown skyward.

Larger and larger grew the break, louder and more powerful the deep roar and pulsating rumble of the escaping blast. Globules of red-hot lava from far below were thrown upward, to fall back around the vent. The great, black mass of dust, ashes and cinders billowed higher and higher, to tower above the earth as a huge cloud that hid the sun and drifted away toward the northeast under the force of the prevailing southwest wind.

Just as Paricutín terrorized the Mexican farmers in the vicinity, so the outbreak of Sunset Crater must have frightened the few families of prehistoric farmer-Indians, driving them, frantic with fear, from their homes. They must have paused, breathless in flight, to watch the scene. As the thundering, earthshaking eruption grew in intensity, larger and heavier masses of ejected rock fell back around the vent, building up an ever-growing cone with the roaring, smoke-belching vent a crater in its crown.

Blanket of Ashes

As days passed and the eruption increased in force, the cone grew higher and higher. Red-hot boulders falling on its smoking slopes rolled and bounded to its base, rapidly enlarging the circumference. The great column of ashes and smoke rising from the crater, now at the summit of the cone-shaped mountain, glowed with occasional sullen flashes of lightning. Ashes and cinders continued to fall like hail, smothering the surrounding landscape under a spreading, black blanket.

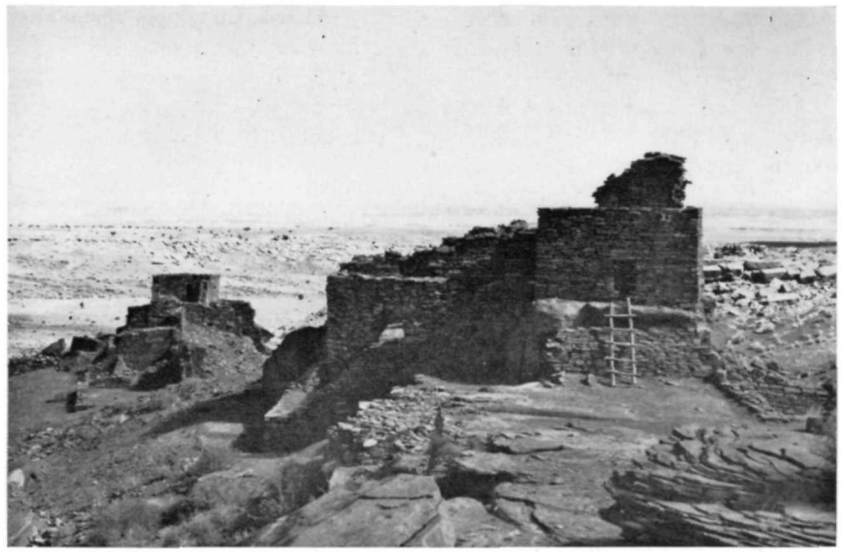
Geologists have found evidence that the violent activity of Sunset Crater continued for about six months, building a massive cone of cinders, ashes, scoria and volcanic boulders a thousand feet high and covering an area of a thousand square miles with its ebony blanket of cinders. This cover, which smothered most of the native vegetation, was much deeper in the immediate vicinity of the cone. Carried by the prevailing southwesterly winds, the cinders reached much farther to the east and north, falling like a great, black shadow over the land.

As eruptive activity slackened and finally ceased—and while a plume of steam still issued from the crater—some of the Indians cautiously returned. A grimy, barren, lifeless landscape greeted them; their pithouse homes and former fields had been buried under the cinder blanket. A few of the hardier families built new homes and planted corn where the cinders were not too deep. To their amazement, the corn grew tall and green, and the yield greatly exceeded that of their former fields. The cinders formed a mulch, holding the moisture from rain and melting snow in the soil. The volcanic destruction had turned out to be a blessing, and the great, black cloud was showing its silver lining. Nature had provided an effective form of water conservation and the eruption had transformed the valley of the Little Colorado River from a barren desert to a productive farmland.

A squeeze-up such as this occurs when tremendous pressure beneath the earth's surface forces cooling lava upward through cracks in crustal rock.

Prehistoric Land Rush

Even in those days of primitive communication, news that the gods had been kind spread rapidly and far. Archeologists believe that, by 1100 A.D., Indians were coming from all directions to take advantage of the fertile soil. A prehistoric land rush developed. From the southeast came adventurous spirits from among the Mogollon people. Hohokam irrigation farmers were attracted from the hot, dry deserts far to the south. Patayans came from the west, and Anasazi families immigrated from the north. Each brought their tribal customs and cultural habits. Evidence indicates that, by 1150 A.D., there were more than 8000 Indian farmers in the region made productive by the cinder fall. The densest population was concentrated north and northeast of Sunset Crater, which by that time gave no active evidence of its recent violence.



Drouth-ridden Sinagua left pueblos such as this one to find new land with streams for their crops. The pueblo shown replaced the pit-house.

A Monument visitor examines what was once a steaming spatter cone, or fumarole. When active, fumaroles emit vapors and hot gases.

Although at first there probably was strife and bickering among the various cultural groups, these differences apparently were not serious, and each family soon began to try some of the techniques of others which were superior to its own. From the Anasazi came knowledge of masonry dwellings, and old style pit-houses became obsolete. It was not long before families began building their houses to adjoin one another as apartments. Some of these grew, as the farmers prospered, into compact villages or pueblos, with buildings several stories high.

By this time most of the women potters had abandoned their former methods, and were making vessels of similar style and decorating them with black geometric figures and designs. Gradually, as the years passed, the several distinctly different groups which had contributed to the land rush intermingled and merged, to develop a new and improved way of life. There grew, in the melting pot of this land of the black shadow, a new and advanced cultural group that archeologists have named "the Sinagua."

Gods Grow Angry

Before the end of the twelfth century, troubles beset the people of the cinder bowl. Winds gradually thinned the cinder cover in places, sweeping exposed ridges bare and piling cinders into dunes that smothered some of the corn fields. Determined to stay with their fields at all costs, some of the farmers toiled to pile rocks on the life-giving mulch in an effort to hold the cinders in place. Other families, realizing the futility of such efforts, left their useless farms in search of better lands. Slowly the people gravitated to the larger villages—pueblos like Wupatki, Wukoki, Nalakihu, and Lomaki.

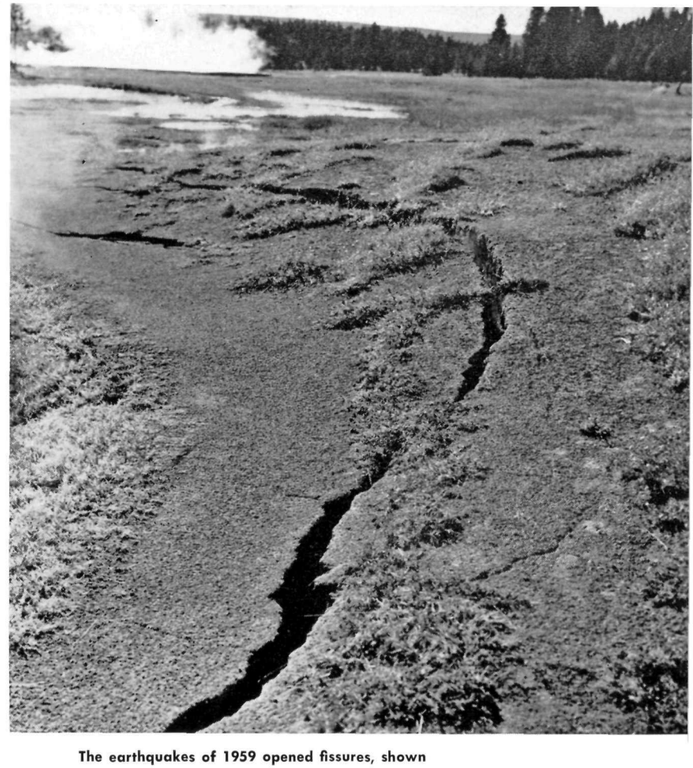
To add to the troubles of the Sinagua, the rain gods became angry and withheld the vital moisture so essential to the growth of corn, beans, squash, and other crops upon which the people depended for their livelihood. By 1215 A.D., the situation had become desperate. The cinder bowl had become a dust bowl, and the land rush had reversed itself into a rout.

As the drouth grew in intensity, more and more families left the villages. Many of them traveled southward, seeking new lands in the Verde Valley where permanent streams provided water for irrigating crops. Even before the climax of the great drouth —1276-1299 A.D.—the Sinagua had abandoned the great pueblos north of Sunset Crater. Slowly the once-proud villages crumbled under the force of winter storms and the steady pressure of the winds that whistled through the abandoned doorways and gradually filled the desolate rooms with the cinders that once held moisture for the crops.

That is what happened at Sunset Crater. Today, the ruins of the abandoned villages—as those preserved at Wupatki—still stand a short distance from Sunset Crater National Monument. Within the monument, where so long ago the tortured earth cracked open and stiff, putty-like lava was forced out under terrific pressure, rare, spectacular "squeezeups" delight both amateur and professional geologists. At the west base of the cinder cone are small caves in the basalt, where pockets of molten lava drained away centuries ago. Ice, forming in these caves in winter, remains all summer. Nearby are fumaroles, where cracks in the earth once allowed blobs of molten lava—under the pressure of escaping steam and hot gases—to spatter skyward, falling back around the vents to build, as they cooled, small cones of porous lava. In this land of the black shadow, where a wild outburst of nature had literally "laid the ground" for a primitive land rush, Sunset Crater lies strangely marked against the blue, cloud-flecked Arizona sky. ■

Clepsydra Geyser, in Yellowstone's Lower Geyser Basin, went into violent activity as a result of the series of earthquakes that shook the area during August, 1959.

The great earthquake that rocked Yellowstone National Park in 1959—commencing a few minutes before midnight, August 17th—produced changes in the thermal features of the park that investigating geologists believe to be profound and far-reaching. This account of the earthquake's effect on Yellowstone's geysers and hot springs is an excerpt from the 1959-60 special issue of Yellowstone Nature Notes, a publication of the Yellowstone Library and Museum Association, entitled YELLOWSTONE'S LIVING GEOLOGY. *It was written by Dr. William A. Fischer, chairman of the department of geology at The Colorado College. Much of the factual material presented in this excerpt is based on the observations of a Yellowstone park naturalist, Mr. George D. Marler. The article appears by permission of Dr. Fischer and the Yellowstone Library and Museum Association.*



The earthquakes of 1959 opened fissures, shown above, in the alluvial cover near Firehole Lake, in the Lower Geyser Basin of Yellowstone National Park.

Earthquake Effects at Yellowstone

By William A. Fischer

With photographs by Jack E. Boucher, courtesy of the National Park Service

DURING THE HOURS immediately following the main earthquake shock that rocked Yellowstone National Park near midnight of August 17, 1959, the chief concern was for the safety of the people. Few had time to consider what might be happening in the geyser basins. Had the earthquake occurred during daylight, one could probably have seen more geysers and hot springs in action than at any time since the establishment of the park.

On the morning of August 18, Park Naturalist George D. Marler made a reconnaissance of the Upper, Midway and Lower Basins. A rapid inventory revealed that 298 geysers and hot springs had erupted, and of this total 160 had no previous record of eruptive activity. Some of the less accessible thermal areas showed signs of increased activity, and some geysers, dormant for years, were rejuvenated. There was an obvious need for a thorough inventory of Yellowstone's thermal features.

The National Park Service approved a project known as the "Emergency Interpretive Study of Earthquake Phenomena, Yellowstone National Park," and under the guidance of Chief Park Naturalist Robert N. McIntyre, park naturalists began the laborious accumulation of data on temperature, discharge and physical change.

Temperatures were recorded by Taylor maximum registering Fahrenheit thermometers, and discharge was computed by using a large-caliber hose and graduated pail to determine the flow in gallons per minute. The criteria of physical change included: evidence of unusual eruptions, such as broken and dislocated sinter rims, eroded soil nearby, dead or dying vegetation adjacent to the feature, and increased erosion of the drainage channels; a large rise or fall in temperature compared with recent records; a change in water level as evidenced by flooded margins or dried out algae above present water level; and recent cracks through sinter or soil in the immediate area. All major features were documented by photographs, permitting a comparison of the 1959 status with that of earlier years. The study required pack trips into remote areas, and with early snows and sub-zero weather, working conditions were at times hazardous.

Evaluation of Data

From these observations there has resulted a vast accumulation of data that is now being evaluated. A few of the more pronounced changes believed to be of interest to park visitors are summarized here.

Yellowstone's major thermal resources are concentrated on the western side of the park along the Firehole and Gibbon River drainage. Smaller areas are found at Shoshone Lake, Heart Lake, West Thumb, Hayden Valley, and other remote areas seldom seen by man.

Observations show that the greatest physical changes occurred on the west side, particularly in the Upper, Midway, and Lower Basins. In these areas there is evidence of violent reactions immediately following the shock, and as time progressed it became apparent that many more subtle and delayed responses were being felt. Eight months after the disturbance, many features were gradually returning to their former state.

We are fortunate in having a Park Naturalist's eyewitness account of the simultaneous eruption of three major geysers immediately following the main shock. Fountain, Morning and Clepsydra went into action and continued erupting all through the 18th, at which time Fountain Geyser ceased. Periodic eruptions of Morning Geyser continued until September first, and Clepsydra, eight months later, was still in action. Their pre-earthquake pattern had been a chain reaction started by Morning, followed by Fountain and terminated by Clepsydra. At times they have erupted independently.

"Earthquake Geyser," a new feature west of Fountain Geyser, was born of the tremors. For several days it erupted at frequent intervals, and then gradu-

ally declined. Some springs acquired new water supplies at the expense of others, and Gentian Pool ebbed forty-one inches. It took seven months to resume its former status. Celestine, Silex and Leather Pools became violently active, and for a two-week period were ejecting muddy water.

There were no immediate changes in the Fountain Paint Pots, but by August 21 new mud pots began to form, and more violent action cast mud beyond the guard rail. Some of the vertical guard rail supports served as escape routes for steam, thus converting them into miniature fumaroles.

New steam vents opened up in the parking area, and because of the obvious changes and unpredictable pattern of activity, the old parking area was removed and a new one is being developed a short distance away. Geysers and hot springs had reclaimed a tract of land on which man had encroached.

In the Firehole Lake area, a random network of fissures developed in the alluvial cover—some with minor displacement—totaling 9072 feet in length. The well-known Great Fountain, White Dome, and Pink Dome Geysers departed radically from their normal eruption intervals.

Above: Celestine Pool, in the Lower Geyser Basin, was emptied of its water by the earthquakes, while below, Silex Spring—also in the Lower Geyser Basin—showed unusual turbulence and ejected muddy water over the course of a two-week period.

Midway Basin Effects

Most of the springs in the Midway Basin became turbid, and many lowered their water levels. Turquoise Pool ebbed eight feet, and the bowl of Grand Prismatic was slightly tilted so that the overflow shifted to a predominantly easterly direction. The exact change in level is not known; but it is estimated to be between one-half and one inch.

The stellar attraction of the Biscuit Basin has always been Sapphire Pool, a feature that has enthralled thousands of people over the years. Its pre-earthquake activity consisted of small eruptions about every twenty minutes, and from the boardwalk it was possible to see steam bubbles form, rise, and dome the surface with umbrella-like bursts while the water ebbed away in discharge channels ringed with globular growths of geyserite.

On the morning of August 18, Sapphire had become a steady geyser with murky water rising eight feet in the air. During the night of August 21 there was a major eruption, followed by even more violent eruptions in the months that followed. Blocks of geyserite with weights estimated at from fifty to 100 pounds were torn from the rim and cast up to fifty feet from the crater.

Some of the eruptions of Sapphire can definitely be associated with aftershocks as recorded on the seismograph at Butte, Montana. It would be interesting to learn if Sapphire is an "earthquake thermometer," triggered into action by tremors emanating from one epicenter.

The Grand Geyser in the Upper Basin erupted the night of August 17 and then went into a state of dormancy; it was believed to be an earthquake fatality. However, later in the season it resumed limited activity, and in time may regain its former status. After

The earthquakes caused no immediate changes in the Fountain Paint Pots, but a few days after the main quake new mud pots began to form, some of which undermined the walk at the parking area.

forty years of dormancy, the Cascade and Economic Geysers began periodic activity, and Giantess went into an unprecedented eruptive phase that lasted for more than a hundred hours.

Other well-known geysers, such as the Daisy, Riverside, Castle, Grotto, and Oblong, began playing at shorter eruptive intervals that persisted for the balance of the year. The Giant Geyser has remained dormant. World-famous Morning Glory Pool ebbed six inches, became murky, and took seven months to resume its former status.

On the 18th of August it was noticed that Old Faithful was playing on a more erratic schedule, with successive long and short intervals. Old Faithful's average eruption interval from June to August 17 was 61.8 minutes. For the last ten days of December, 1959, two hundred and fifty-five eruption intervals averaged out to 67.4 minutes. In this case, there was apparently a delayed response to the tremors. Whether it will continue or not, time alone will tell.

Forceful eruption of previously quiet hot springs, erratic eruptive intervals of geysers, ebbed pools, and turbid water conditions are all to be expected when a geyser basin is shaken by earth tremors. The Yellowstone basins are topographically low, and veneered with a cover of glacial gravels that provide the porous medium for ground water circulation. Earthquake vibrations have altered these circulation routes, opening up new channels and closing off some of the old.

An analysis of temperature and discharge measurements on several hundred springs shows a post-earthquake temperature rise of about 6° Fahrenheit, and an increased discharge of about ten percent. How long these conditions will persist, we, of course, have no way of knowing.

The 1959 earthquakes have left their impress on this region. To date, we have found no evidence of fault displacements within the park, with the exception of that area on the western boundary in the vicinity of Grayling Creek. Earthquake energy seems to have been channeled along old well-established faults, and the major rockslides occurred along canyon walls where the rocks are jointed and deeply weathered. Fractures in the alluvial cover and in the siliceous sinter of the geyser basins appear to be surface phenomena, and probably do not extend to any great depth. Future work of the U.S. Coast and Geodetic Survey will reveal what changes of level have occurred. Undoubtedly some of the earlier established elevations are no longer correct.

The Rumors Fly

Rumors and tall tales are a common aftermath of every major earthquake. Yellowstone was no exception. It was reported in the press that Old Faithful Geyser, shortly before the main shock, put on a performance of power unequalled in the history of the park. Every eruption of this geyser is different, and during any twenty-four hour period there are appreciable variations in height, interval and duration of play. It would be very difficult to correlate supposed unusual behavior of Old Faithful with events that preceded the earthquake. If caused by a minor foreshock then certainly the geyser should have been most erratic in the weeks that followed, when aftershocks were being recorded daily; but this is contrary to the facts.

The future of Yellowstone's heat resources is not easy to predict. We know that hot spring and geyser activity dates back to a time before the glacial epoch, and that within historic times no measurable decline in thermal activity has been detected. Could the increased heat flow in the geyser basins since the earthquakes be caused by a warming up of the magmatic hearths, and therefore indicate a trend toward renewed volcanic action? Or, is the heat increase due only to agitation of the fracture systems underground, permitting a freer circulation of water and magmatic gases? Careful observations in the years ahead should provide the answer. Certainly, we can rest assured that park visitors for generations to come will see "living geology" in Yellowstone; but it will be different from that of today.

One earthquake that seems so catastrophic to us in recorded history is seen as but one wave in the endless sea of time. Accordingly one can see how foolish it is to ask, "Will there be another earthquake?" Of course there will, but neither the time nor the place can be predicted with certainty. Without earthquakes we would not have the Yellowstone as we know it today. ■

Your National Parks Association at Work

Association Trustee Makes Southwestern Area Survey

During the month of July, Mr. Weldon F. Heald, of Tucson, Arizona—widely-known conservation worker, writer, and member of the National Parks Association's board of trustees—was able to visit a number of Southwestern parks and monuments. The following paragraphs set forth some of Mr. Heald's observations on prevailing conditions in the visited areas.

During a visit to Lehman Caves National Monument, Mr. Heald felt that both Park Service facilities and the monument concession were well-kept and well-operated. He also felt, however, that the recent installation of a gasoline power unit, roaring constantly in its coat of bright yellow paint close to the visitor center, was a source of continual disturbance, and that it should be removed as soon as possible to a more suitable location.

Capitol Reef

IN CAPITOL REEF NATIONAL MONUMENT, which Heald says "combines the fantasy of Bryce and the grandeur of Zion," Park Service developments appear to be awaiting a decision on the future routing of Utah Highway 24, which traverses a large part of the monument, and which provides access to the area. Until a decision is made, Heald believes, the old and inadequate visitor-center building will remain, the campground will continue haphazard and undeveloped, and spur roads to off-highway attractions will continue in poor condition. He noted that the Park Service's eventual plan was for a visitor center on Route 24, near to, but outside of the monument boundaries, but that the ground for the building would involve Forest Service exchange or acquisition.

AT BRYCE CANYON NATIONAL MONUMENT Heald interviewed a number of visitors, and received uniformly favorable comments on questions concerning accommodations, food, prices, and treatment—not only at Bryce, but also at Grand Canyon's North Rim, Zion, and Cedar Breaks. Some people, he noted, felt that prices charged by the concessioner at Grand Canyon's South Rim were excessive for services rendered.

Mr. Heald was not impressed with Bryce Canyon Lodge and Bryce Canyon Inn, noting that there had been no observable improvements made within the past 25 years. He reported that the original log buildings had been painted a pale lemon-yellow.

Weldon F. Heald

Park Service projects for increased visitation at Bryce Canyon have been largely completed, the observer found. Such projects include a road by-passing the concentrated special-use areas, enlarged campground and water system, additional Park Service personnel residences and new parking areas and guard-rails at many viewpoints. The new administration building, severely modern, "would make a suitable structure for a medium-sized airport," noted Heald. The exhibits relating to Bryce Canyon geology, history, botany, and zoology were termed by the investigator "especially fine and well-displayed." In a general comment, Heald noted that "the Park Service Division of Interpretation is certainly doing an excellent job these days."

Cedar Breaks

AT CEDAR BREAKS, Heald observed that, because of the monument's cramped area, it seemed that the impact of Mission 66 developments is rapidly changing the character of the preservation, and is "erasing much of its intimate charm." He was especially critical of the widening and re-aligning of the Rim Road in that monument, an operation now nearly completed. "While the former road wound pleasantly through the spruce and fir forests, and ambled across open parks," says Heald, "the new pushes ruthlessly over all obstructions, seeming to say: 'Stand back, Nature—you're in the way. Here comes progress!' " He could find no one at the monument who could explain why a wide high-speed road is necessary in the area.

The observer reported that the former campgrounds at Cedar Breaks are being transformed into a personnel residence and utility area, and that the beige color of the two buildings already completed is conspicuously out of harmony with the background of spruce forest. The new campgrounds occupy a beautiful situation among knolls, conifer groves, and open parkland, and all viewpoints are now finished, with parking areas, blacktop paths and steel-and-wire guard rails.

The two main Park Service problems at Cedar Breaks, Heald thinks, are lack of water and cramped space. He noted that it now seems unfortunate that when the monument was created in 1933, its boundaries did not run a full mile back from the rim at all points.

NPA Sponsors Second Reddish Knob Expedition

Conservationists of the Washington, D. C. area were again able to get together for a discussion of national forest multiple use and other matters of mutual interest during the National Parks Association's second expedition to Reddish Knob in the George Washington National Forest of western Virginia, October 21st to 23rd.

Reddish Knob and surrounding terrain, essentially a wilderness area, was in full fall foliage as ten of the group hiked some fifteen miles along the ridge of Shenandoah Mountain from Reddish Knob to Hard Scrabble Knob and Camp Todd.

High point of the expedition was a discussion at Camp May Flather, led by Association Executive Secretary Anthony Wayne Smith, of the watershed problem in the George Washington National Forest, and the impact of various watershed control proposals on the esthetic, recreational, and wildlife values of the area.

Participants in the expedition, which was made with the cooperation of the U. S. Forest Service and the Virginia Commission of Game and Inland Fisheries, were: Mr. James Black, photographer; Mr. and Mrs. G. F. Blackburn, Potomac Appalachian Trail Club; Mr. J. W. Bright, Region 1 of the National Park Service; Mr. Hal Bush, district ranger of the U. S. Forest Service, Mr. Max Carpenter, Virginia Commission of Game and Inland Fisheries.

Also Dr. John Cover, Chairman of the Potomac Valley NPA Program Group; Mrs. John Cover; Mr. Ellery R. Fosdick, consulting engineer; Mrs. Ellery R. Fosdick; Mr. Michael Nadel of the Wilderness Society; Mr. William Richardson; and from the staff of the National Parks Association, Executive Secretary Anthony Wayne Smith, and Ailene Kane and Barbara Hart of the Student Conservation Program.

A Merry Christmas to All!

The staff of *National Parks Magazine* and of your National Parks Association wishes to express to you our special Christmas greetings and our best wishes for the new year. The first twenty-four issues of our new, enlarged monthly magazine have been sent to you, and the response has been most encouraging. Your support of Association activities through your membership and letters to the magazine have contributed toward the success of this new venture.

To show our appreciation for your support during 1959 and 1960, and for your continued support in 1961, the National Parks Association is making the following special Christmas offer:

(1) Two new gift subscriptions to *National Parks Magazine* (regularly $5 each, a $10 value) $8.00

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Conservation News Briefs

Scientists Still Watching Kilauea Iki

Geological Survey scientists at the Hawaiian Volcano Observatory, in Hawaii National Park, are gathering new data from the slowly-cooling lava pond in Kilauea Iki crater. Since the furious activity of the volcano last November and December, a thick crust has formed over the 365-foot deep pond, enabling scientists to walk over the 2500-foot expanse of lava in the crater.

A hole drilled into the lava crust in April revealed graduated temperatures in the solidified lava ranging from 500° Fahrenheit at a depth of two feet to 1685° at the bottom, seven and a half feet below, where a red glow was visible. Beyond this point, further drilling was impossible, since the carbide-tipped masonry drills disintegrate at such extremely high temperatures. Scientists think that molten lava is not far below the bottom of the hole. Temperatures of more than 2100° were registered at the time of the eruption last year. (See January, 1960, magazine.)

A geophysical team continues to take tilt measurements, gravity measurements, and gas samplings for further research in the field of vulcanism.

News in New Format

The *Nature Conservancy News*, monthly publication of the Nature Conservancy of 2039 K Street, N.W., Washington, D.C., has recently appeared in an attractive new twelve-page format. Edited by C. J. S. Durham, the *News* reports the work of the Nature Conservancy in preserving natural areas as "living museums," and carries articles about those areas.

Interior Recommends Enlargement of Independence Park

In a recent report to Congress, Secretary of the Interior Fred A. Seaton recommended that legislation be enacted to authorize enlargement of Independence National Historical Park in Philadelphia, Pennsylvania.

The report points out that the number of visitors to the park has increased considerably since 1959, and that the proposed construction of the Delaware Expressway would substantially improve access to the park for greater numbers. Additional lands would provide parking facilities in an area which would not encroach upon historical features of the existing park, although it does include the site of William Penn's townhouse "which would be accorded appropriate treatment."

Nebraska Man Nominated Assistant Interior Secretary

President Eisenhower has nominated George W. Abbott, of Grand Island, Nebraska, as Assistant Secretary of the Interior to replace Roger C. Ernst, recently resigned.

Mr. Abbott, a native of Nebraska, has variously served as counsel of the House Committee on Interior and Insular Affairs, Assistant to the Secretary of the Interior, and Solicitor of the Department. He will direct and supervise the activities of the National Park Service, Bureau of Land Management, Bureau of Indian Affairs, and Office of Territories.

State Parks Conference Elects New Officers

At the Fortieth Annual Meeting of the National Conference on State Parks, held at Rockland, Maine during September, Frank D. Quinn of Austin, Texas was elected chairman of the board to succeed Horace M. Albright. Mr. Quinn is a member of the Texas State Parks Board.

Elected president of the conference was Arthur C. Elmer of Lansing, Michigan, chief of that State's Park and Recreation Division, who succeeds William W. Wells. Earl P. Hanson, deputy chief of operations of the California Division of Beaches and Parks, and John R. Vanderzicht, director of the Washington State Parks and Recreation Commission, were elected first and second vice-president respectively.

Ben H. Thompson, chief of the National Park Service's Division of Recreation Resource Planning, was elected treasurer of the Conference. Mrs. Dora A. Padgett is executive secretary of the organization, whose national headquarters are in Washington, D.C.

Graduate Study in Forestry

The College of Forestry of the State University of New York at Syracuse University is offering assistantships, scholarships and research fellowships to students qualified for graduate study. Among the fields of study and research are forest administration, botany and pathology, entomology, genetics, silviculture, soils, zoology and wildlife management, landscape architecture and world forestry.

Applications for college year 1961-62 should be made not later than March 1, 1961. For information write to the Associate Dean for Graduate Studies, State University College of Forestry at Syracuse University, Syracuse 10, New York.

Saline Water Conversion Plant Site Considered

Seven East Coast cities have been selected for further consideration as possible sites for a saline water conversion demonstration plant authorized by Public Law 85-883, according to a recent announcement by Dr. A. L. Miller, director of the Interior Department's Office of Saline Water. Chosen from a list of more than fifty cities on the basis of many technical and other factors were Portsmouth, New Hampshire; Greenport, New York; Cape May, New Jersey; Virginia Beach, Virginia; Wrightsville Beach, North Carolina; and Port Orange and Key West, Florida. These cities were visited in early December by Saline Water's site selection board prior to submission of recommendations to the Secretary of the Interior.

Secretary Seaton has already announced that the East Coast demonstration conversion plant will employ a freezing process, and it is believed that the plant will be designed to convert sea water to fresh water at a rated capacity of 150,000 to 350,000 gallons a day.

The Editor's

Bookshelf

THE LAW OF OPEN SPACE, Legal Aspects of Acquiring or Otherwise Preserving Open Space in the Tri-State New York Metropolitan Region: By Shirley Adelson Siegel. Park, Recreation and Open Space Project of the Tri-State New York Metropolitan Region. Regional Plan Association, Inc., 230 W. 41st Street, New York 36, New York, 1960. 72 pages, in paper cover. $3.50.

The expression "open space" is a happy one to indicate the broad scope of this study, which appeals not only to lawyers who work in this field but also to others interested in parks and open spaces. In view of the obvious padding in so many expensive law books, it is refreshing to find so much accurate and interesting material in less than seventy-five pages. Then too, the format is pleasing, and the picture on the back cover of the two small children in a wooded glade is irresistible.

The discussion of land acquisitions is not limited to conventional methods but also includes many other ways of accomplishing similar results. Even the consideration of purchase and eminent domain includes sidelights such as the different legal theories with respect to shorefront rights in the three States studied, New York, New Jersey, and Connecticut. Of equal interest is the consideration of fishing and hunting rights with the background in legal history of *profits à prendre*.

The most illuminating part of the book relates to the less orthodox methods of acquisition. It is surprising what can be accomplished by the solicitation of gifts, of property or rights therein or of money for purchases. (In my own experience, organizations like Nature Conservancy acquire land by gift, directly or through gifts of money, and then manage the tracts themselves or turn them over to governmental agencies with appropriate covenants or conditions.) Other methods discussed include: tax foreclosures, land filling, street closings, and urban renewal, the last being greatly stimulated, of course, by the federal government. Separately treated, because of legal complications, is excess condemnation as an incidental feature of other public improvements such as highways. Newer and less tested legally are the mapping of future park sites, sometimes with restricted options in the governmental body, with or without compensation to the landowner for the option. Functionally similar is a voluntary or required contribution of park land or money by subdividers with attendant legal problems.

With respect to space other than that for parks or recreation, the author considers acquisitions for future use, public easements (through gifts, purchase or condemnation) to prevent development, and the possibility of purchase or leaseback. Also considered are recent proposals for the acquisition of outlying vacant land to prevent or control "urban sprawl." Finally, the limited but significant use of police power zoning is discussed. Also mentioned briefly are Federal Housing Administration control over site planning, and private restrictive covenants (a fruitful area for governmental encouragement).

The chapter on tax incentives is helpful but rather sketchy. The reference to capital gains fails to mention the low rate of federal taxation on such gains, and that the Pomona College plan with respect to tax-exempt securities is encountering opposition in the Internal Revenue Service.

The author concludes that "there are no serious legal obstacles to a program for acquiring and preserving open space in the Tri-State New York Metropolitan Region." Although one may be doubtful that such a millennium has quite been reached, this excellent book will greatly contribute to that end.—*Ralph H. Dwan.*

THE STORY OF GEOLOGY: Our Changing Earth Through the Ages. By Jerome Wyckoff, with a foreword by Brian Mason. New York. 1960. The Golden Press, Inc., Rockefeller Center, New York 20. 178 pages in hard cover. Illustrated in color and black and white, with many cross-sectional diagrams. $4.95.

"Earth as we see it today is one frame of a moving picture that has been running for billions of years . . ." says Brian Mason, curator of physical geology and mineralogy at New York City's American Museum of Natural History, in a short foreword to Mr. Wyckoff's colorful book.

The author has, in word and picture, supplied a nicely-balanced account of the details to be found in Dr. Mason's single frame of film. He successfully leads his readers through the mazes of historical and physical geology without allowing them to become enmeshed in the detail and verbiage of the specialist—a feat of no mean proportions in reducing a thoroughly scientific subject to "popular" dimensions.—*P.M.T.*

A Quick Glance at . . .

ANIMAL SOUNDS AND COMMUNICATIONS: Wesley E. Lanyon and W. N. Tavolga, Editors. American Institute of Biological Sciences, 2000 P Street N. W., Washington 6, D.C. Illus. Includes 12-inch LP record. $9.50—Who has ever wondered, from the cozy circle of an evening campfire, about the meaning of the myriad sounds which fill the encircling summer woods? Insects trill and chirp, mammals bark and grunt—if your ear were attuned to the sounds going on beneath the surface of some nearby pond, you might also hear the fishes "talking" with each other. Does this vast assortment of chatter have a meaning? If so, what is it? A collection of papers by outstanding specialists in this field of study discusses the significance of the "signals" of various animal species.

The long-play record should prove to be a welcome addition to the libraries of naturalists—amateur or otherwise.

PROJECT TWENTY-TWELVE, United States Department of the Interior, Bureau of Land Management, Washington 25, D.C. 63 pp. Illus. Free of charge—Project Twenty-Twelve is a program to provide systematic development and use of public lands and resources until the year 2012. Report includes history of our public lands and detailed discussion of problems and program for lands, minerals, range and forest management, and resource protection.

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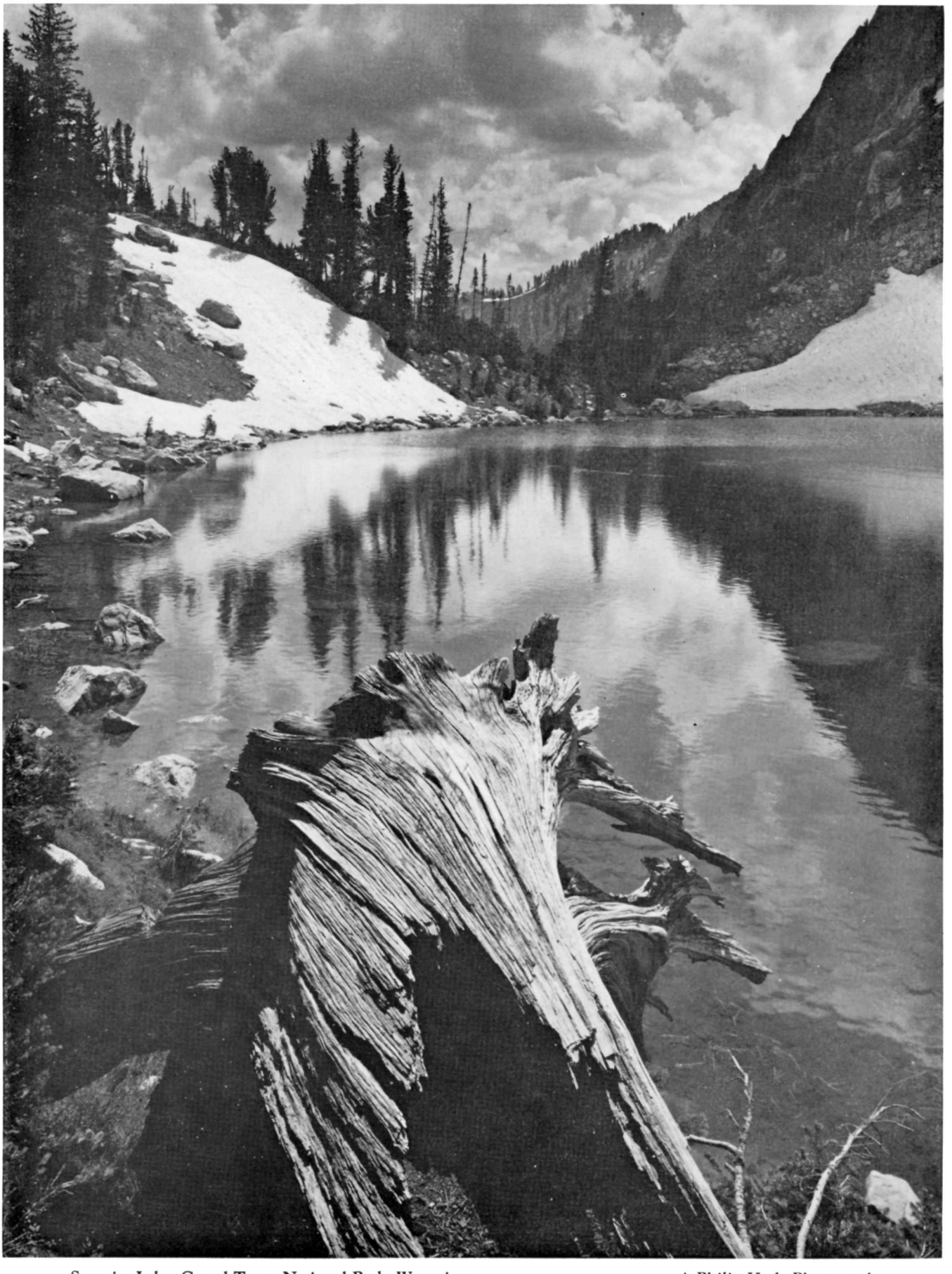
Index to the 1960 Magazines—Jan. through Dec.; Vol. 34, Nos. 148-159

Entries appearing in *italics* are titles of general articles. The abbreviation (gen.) indicates a general article on the subject listed. The abbreviation (edit.) signifies an editorial, while that of (illus.) denotes a major illustration of subject named. The month of issue is followed by the page number.

Authors of Articles appearing in the Magazines for 1960

Titles of Books Reviewed in the Magazines for 1960



Surprise Lake, Grand Teton National Park, Wyoming

A Philip Hyde Photograph